UTS

ENQUIRIES
DESK

# Faculty of Science

# Handbook

University of Technology, Sydney

1999

# UTS Faculty of Science Handbook 1999

The University attempts to ensure that the information contained in this handbook is correct as at 12 August 1998. 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.

**Access UTS on the Web**

http://www.uts.edu.au

Faculty Handbooks
http://www.uts.edu.au/div/publications/index.html

UTS Calendar
http://www.uts.edu.au/div/publications/cal/gencontents.html

UTS Rules and Policies
http://www.uts.edu.au/div/publications/policies/index.html

**Editorial and production**

Publications Branch,
Secretariat and Corporate Affairs Unit,
Registrar's Division

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# General information

## WELCOME

Welcome to the University of Technology, Sydney (UTS), one of the largest universities in New South Wales – a university with an international reputation for quality programs and flexible learning. UTS develops, and regularly revises its programs of study in partnership with industry, government and professional bodies, so that its degrees are based on the latest professional standards and current practices. As a result, UTS produces graduates who are ready for work, and this is demonstrated in the high numbers of its students who enter the workforce within four months of finishing their degree.

UTS offers its 24,000 students a lively, supportive and diverse learning environment across three campuses, and a range of social, cultural and sporting facilities to enrich each student's experience. UTS regards learning as a lifelong experience, and offers a range of programs to cater for the educational needs of people at a variety of stages in their lives, and from diverse backgrounds and cultures. UTS welcomes school leavers and re-enrolling students, those returning to study after a break, those seeking to add to their existing qualifications, and those who wish to change direction or begin a new career.

## ABOUT UTS

UTS offers over 100 undergraduate degrees and more than 280 postgraduate degrees, which are developed by the Faculties of Business; Design, Architecture and Building; Education; Engineering; Humanities and Social Sciences; Law; Mathematical and Computing Sciences; Nursing; and Science. Each of these faculties is responsible for a range of programs across a number of key disciplines, and many offer courses in conjunction with one another, or with the Institute for International Studies.

## ABOUT THE UTS HANDBOOKS

Every year UTS produces 10 faculty/institute handbooks which provide the latest information on approved courses and subjects to be offered in the following year. These handbooks include comprehensive details about course content and structure, subject and elective choices, attendance patterns, credit point requirements, and important faculty and student information. Many of them also contain faculty policies and guidelines for participation in specific courses. This provides students with the necessary information to meet the requirements of the course, complete a program of study, and receive a degree.

UTS also produces a companion volume to these handbooks every year. The *UTS Calendar* contains the University Act, By-law and Rules, a list of courses offered across the University, and other useful University information. Copies of the faculty/institute handbooks and the *UTS Calendar* are held in the University's libraries and faculty offices and can be purchased at the Co-op Bookshop.

The handbooks and Calendar are also published on the World Wide Web at:

http://www.uts.edu.au/div/publications/

# UTS PRIORITIES FOR THE FUTURE

## Flexible learning

The University of Technology, Sydney has made it a priority to develop a more flexible and responsive learning environment for its students. One of the ways UTS has achieved this is by restructuring some of its courses, giving students the opportunity to combine core studies with sub-majors or electives from across the University. This means that some students now have a choice of learning pathways (or subject combinations) which lead to a degree.

In an increasing number of UTS courses, some students also have a choice in the method of learning. For example, some subjects offer campus tutorials and lectures, others a mixed mode setting which combines intensive workshops, self-managed learning booklets, an interactive web site and phone links to other students.

UTS has also introduced greater flexibility in the time, rate and location at which students can learn, so that now many courses are offered in summer and winter schools, others allow students to use self-managed learning tools to learn in their own time. The implementation of **work-based learning** means that UTS is developing courses in conjunction with industry and business, so that students can learn at work, and be assessed on participation and proficiency in the work place.

Flexible learning at UTS is also reflected in changes which have been made to assessment, enrolment and fee payments, which are being geared to make the systems more user-friendly. For more information about flexible learning alternatives, contact your Faculty Student Centre.

## Internationalisation

At UTS students receive an education of international standing, because the University is committed to providing increased awareness and understanding of international issues for its students and staff. It achieves this by delivering and sharing its educational and research expertise overseas, expanding links with industry and business to include international relationships, and inviting students from overseas to gain a UTS award in Australia.

Some UTS students also have the opportunity to live and study overseas. Through the Institute for International Studies, students can study the language and culture of a non-English-speaking country or region of the world. Undergraduate and postgraduate programs in International Studies can be combined with a range of degrees from faculties across the University. For more information contact the **Institute for International Studies**.

telephone 9514 1574
email iisinfo@uts.edu.au

Alternatively, students can undertake part of a degree overseas through the exchange student program. Contact the Faculty Student Centre or the International Programs Office for more information.

Overseas students who want to study at UTS must meet the normal entry requirements for the course and be proficient in English. For details about courses, fees and application procedures, contact the **International Programs Office**.

telephone 9514 1531
email Intlprograms@uts.edu.au

## Research

UTS has developed a lively research culture which encourages interdisciplinary research and contributes to issues of international, national and local significance. UTS offers a choice of over 280 postgraduate courses including PhDs and Professional Doctorates. UTS promotes the formation of strategic partnerships with appropriate external organisations, and this helps students to make important links with the workplace before completing their studies.

Because UTS focuses on the needs of industry, business, the professions, cultural organisations and the community, its postgraduate courses are extremely attractive to employers and students alike. Postgraduate students are encouraged to be innovative and flexible in applying the knowledge gained during studies here, and these attributes make graduates well placed to handle the increasing complexities of globalisation, technological change and the workplace.

# HOW TO APPLY TO STUDY AT UTS

## Undergraduate applications

The NSW and ACT Universities Admissions Centre (UAC) processes most applications for undergraduate courses which start at the beginning of the year. Students are required to lodge these UAC application forms between August and October. To find out more about these courses and the application procedures, check the *UAC Guide*. Students can also apply for entry to some UTS courses by lodging a UTS application form directly with the University. 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. For more information contact the UTS Information Centres at the City campus on 9514 1222 or Kuring-gai campus on 9514 5555.

## Postgraduate applications

Applications for postgraduate courses should be made directly 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. For more information contact the UTS Information Centres at the City campus on 9514 1222 or Kuring-gai campus on 9514 5555.

## International student applications

International student's applications for both postgraduate and undergraduate courses can be made either directly to the International Programs Office or through one of the University's registered agents. For courses starting at the beginning of the year, applications should be received by 31 December of the previous year. For courses starting in the middle of the year, applications should be received by 31 May of that year. For more information please contact the International Programs Office on 9514 1531.

## Applications for non-award and external award study

Students who want to study a single subject at UTS which is not part of a UTS degree or qualification, must apply for non-award or external award study. There are four application periods, and closing dates vary for each semester. Some faculties may have special application procedures which will depend on the subjects chosen. For more information contact the UTS Information Centres or the appropriate faculty office.

# STUDENT INQUIRIES

### *City campus*

**UTS Information Office**
Foyer, Tower Building
1 Broadway

**Postal address**
PO Box 123
Broadway NSW 2007
Telephone: 9514 1222
Fax: 9514 1200

**Email inquiries**
Within Australia – *info.office@uts.edu.au*

### *Kuring-gai campus*

**Kuring-gai Student Centre**
Level 6, Main Building
Eton Road
Lindfield

**Postal Address**
PO Box 222
Lindfield NSW 2070
Telephone: 9514 5555
Fax: 9514 5032

### *International Programs*

10 Quay Street, Sydney

**Postal Address**
PO Box 123
Broadway NSW 2007
Telephone: 9514 1531
Fax: 9514 1530

**Email inquiries**
International – *intlprograms@uts.edu.au*

### *World wide web address*

http://www.uts.edu.au

## Transition to university programs

UTS offers a free 'Study Success' program of integrated lectures and activities before semester begins, to help new students manage the transition to university study. Students are informed of academic expectations, the skills needed to be an independent learner, and learning strategies which can help them successfully manage the work load. To help students adjust to university life, they are familiarised with the campus, the services available, the learning assistance programs available and valuable information about how the university and faculties operate.

The program is run by university staff with assistance from current students and recent graduates. For more information contact Student Services Unit.

telephone: 9514 1177 (City)
or 9514 5342 (Kuring-gai)

# FINANCIAL HELP

## Austudy/Youth Allowance

Students under 25 years old, may be eligible to receive financial assistance in the form of the Youth Allowance, which replaced AUSTUDY for people in this age group from 1998.

Full-time students over 25 years old, may be eligible to receive Austudy which provides financial help to students who meet its income and assets requirements. Application forms and information about eligibility for Austudy are available from Student Services at Kuring-gai or City campuses.

Federal legislation sets strict requirements over which the University has no control. It is important for the students concerned to understand these requirements.

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.

For more information, talk to a student welfare officer in the Student Services Unit.

telephone: 9514 1177 (City)
or 9514 5342 (Kuring-gai)

Application forms for both schemes should be lodged as soon as possible with any Centrelink office, or:

Centrelink Student Services
Parker Street, Haymarket
Locked Bag K710
Haymarket NSW 2000

## Abstudy

Abstudy assists Aboriginal and Torres Strait Islander tertiary students by providing income support and other assistance. For more information about Abstudy, contact the staff at Jumbunna Centre for Australian Indigenous Studies, Education and Research.

Level 17, Tower Building
telephone 9514 1905.

## HECS (Higher Education Contribution Scheme)

HECS is a financial contribution paid to the Commonwealth Government by tertiary students towards the cost of their education. HECS is payable each teaching period as a proportion of the standard annual charges set by the Commonwealth Government, and the amount paid will vary according to the number of credit points undertaken and the method of payment nominated. Many students choose to defer their payment until they have finished their degree and are participating in the work force. However, some pay the amount in full (up front) or pay part of the amount (partial payment). Some tertiary students are not required to pay HECS.

Federal legislation sets strict conditions for HECS over which the University has no control. HECS charges are based on the subjects in which students are enrolled on the HECS Census Date. It is important for students to realise that any reductions in their academic workload after the census date for a particular semester (e.g. by withdrawals or substitution of subjects with a lower credit point value) will not reduce their HECS liability.

For Autumn Semester the HECS Census Date is 31 March, and for Spring Semester the HECS Census Date is 31 August. HECS Census Dates for other teaching periods can be obtained from the UTS Information Centre.

# EQUITY AND DIVERSITY

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. UTS has a strong commitment to ensure that the diverse nature of the Australian society is reflected in all aspects of its employment and education.

The Equity and Diversity Unit provides a range of services for students and prospective students. These include community outreach programs to support the participation of disadvantaged students/under-represented groups; coordination of the inpUTS Educational Access Scheme for students who have experienced long-term educational disadvantage; coordination of financial scholarships and awards for commencing low-income students; coordination of the Women's Re-Entry Scholarships for women who have been out of the workplace due to family responsibilities; and the provision of confidential advice and assistance with the resolution of equity-related student grievances, including complaints about racism, sexism, sex-based harassment, homophobia, pregnancy/family responsibilities, or other equity issues. The Unit also undertakes research, conducts training and develops policy and programs relating to equity, diversity and social justice issues.

Equity and Diversity Unit
Level 17, Tower Building
telephone 9514 1084

# SUPPORT FOR STUDENT LEARNING

The following services and facilities are available to all UTS students.

## UTS Library

The University Library collections are housed in three campus libraries which contain over 600,000 books, journals and audiovisual items as well as a large range of electronic citation and full-text databases. Services for students include assistance in finding information through Inquiry and Research Help Desks and training programs, loans, reservations, reciprocal borrowing and copying. The Library provides as much information as possible electronically so that users can also access it from home. More information about the Library can be found at:

http://www.lib.uts.edu.au

### *City Campus Library*

Corner Quay Street and Ultimo Road, Haymarket
telephone 9514 3388

### *Kuring-gai Campus Library*

Eton Road, Lindfield
telephone 9514 5234

### *Gore Hill Library*

Corner Pacific Highway and Westbourne Street, Gore Hill
telephone 9514 4088

## Student Services

The Health, Counselling, Special Needs and Welfare Services are located on Level 3A Tower Building and Level 5, Kuring-gai campus. The Careers Service is located on Level 5 Tower Building and the Housing Service on Level 6 Tower Building. Careers and Housing information is also available from the Student Services Unit office on Level 5 and from the noticeboards on Level 4, Kuring-gai campus.

### Careers Service

The Careers Service offers career guidance, and assists with job placement for students seeking permanent or casual employment.

telephone 9514 1471 (City campus)

### Counselling

Counsellors are available at the City and Kuring-gai campuses for individual consultation, and group programs are also held throughout the year.

telephone 9514 1471 (City campus)
or 9514 5342 (Kuring-gai campus)

### Health

The Health Service offers a bulk billing practice to students at two locations:

telephone 9514 1166 (City campus)
or 9514 5342 (Kuring-gai campus)

### Housing

University Housing provides assistance to students in locating private accommodation. Limited UTS-owned housing is also available.

telephone 9514 1509 (listings)
or 9514 1199 (UTS accommodation)

### Special Needs Coordinator

Support is also available for students with special needs. Students with a physical, sensory or learning disability can contact the Special Needs Coordinator for information and advice.

telephone 9514 1177

### Welfare

Welfare officers assist students with personal financial matters, including loan and financial counselling, Youth Allowance, Austudy and other Social Security claims and appeals advice.

telephone 9514 1177

## Chemistry Learning Resources Centre

Room 211, Building 4, City campus.

Dr Ray Sleet
telephone 9514 1739
email r.sleet@uts.edu.au

or

Rosemary Ward
telephone 9514 1729
email rosemary.ward@uts.edu.au

WWW address
http://www.science.uts.edu.au/depts/chem/clrc/index.html

## English Language Study Skills Assistance (ELSSA) Centre

ELSSA Centre provides free English language and study skills courses for all UTS students.

ELSSA Centre
Alex Barthel (Director)
Level 19, Tower Building
telephone 9514 2325
email alex.barthel@uts.edu.au
*or*
Room 2-522
Kuring-gai campus
telephone 9514 5160

WWW address
http://www.uts.edu.au/div/elssa/

## Physics Learning Centre

Level 11, Tower Building (with an adjoining computer laboratory).

Peter Logan
telephone 9514 2194
email peter@phys.uts.edu.au

## Mathematics Study Centre

Level 16, Tower Building; and at Kuring-gai campus, Room 2-522.

City campus
Leigh Wood (Director)
telephone 9514 2268
email leigh@maths.uts.edu.au

Kuring-gai campus
Dr Jules Harnett
telephone 9514 5186
email jules@maths.uts.edu.au

## Computer laboratories

There are 22 computer laboratories throughout the University which are available for all students and staff to use. Details of locations and availability of the computer laboratories may be obtained from the Information Technology Division Resource Centre, telephone 9514 2118.

## Jumbunna Centre for Australian Indigenous Studies, Education and Research (CAISER)

Jumbunna CAISER is run by a predominantly Australian indigenous staff who provide specialist advice and a broad range of services to assist Aboriginal and Torres Strait Islander students.

Jumbunna CAISER
Level 17, Tower Building
telephone 9514 1902

# OTHER UNIVERSITY SERVICES

## Child care

UTS Child Care Inc. (UTSCC) coordinates all child care services at UTS. Child care is available from 8.00 a.m. to 10.00 a.m. at both City and Kuring-gai campuses.

Students and staff of UTS receive priority access and a small rebate on fees. Normal Government assistance is available to low and middle income families.

telephone 9514 1456 (City)
or 9514 2960 (Blackfriars)
or 9514 5105 (Kuring-gai)

## The Co-op Bookshop

The Co-op Bookshop stocks the books on student's reading lists, and a variety of general titles and computer software. It has branches at the City and Kuring-gai campuses (Room 2.401), and, at the start of semester, at Haymarket and Gore Hill.

City campus
telephone 9212 3078
email uts@mail.coop-bookshop.com.au

Kuring-gai campus
telephone 9514 5318
email kuringai@mail.coop-bookshop.com.au

WWW address
http://www.coop-bookshop.com.au

## Freedom of Information

Under the *Freedom of Information Act 1989* (NSW), students have the right to apply for access to information held by the University.

George Bibicos
FOI Coordinator
Level 4A, Tower Building
telephone 9514 1280
email George.Bibicos@uts.edu.au

## Student Ombudsman

Enrolled or registered students with a complaint against decisions of University staff may seek assistance from the Student Ombudsman.

All matters are treated in the strictest confidence and in accord with proper processes.

Room 402, Building 2
City campus, Broadway
telephone 9514 2575
email ombuds@uts.edu.au

## Students' Association

The Students' Association (SA) is the elected representative body of students at UTS: it is an organisation run by students for students. UTS students have the right to stand for election of the SA and to vote in the annual elections.

The main office of the Students' Association is located on Level 3 of the Tower Building, City campus, Broadway.

City campus office:
telephone 9514 1155

Kuring-gai campus office:
(next to the cashier service)
telephone 9514 5237

## UTS Union

The UTS Union is the community centre for the University. It provides food and drink services, lounges and recreational areas, comprehensive social and cultural programs, sports facilities and programs, stationery shops, a newsagency, ski lodge and resource centres.

Union Office 9514 1444
Haymarket 9514 3369
Kuring-gai 9514 5011

### Union Sports Centre

The centre contains a gymnasium, squash courts, weights rooms, climbing wall, and saunas.

Lower ground floor, Building 4
telephone 9514 2444

### UTS Rowing Club

Dobroyd Parade, Haberfield
telephone 9797 9523

## Radio Station 2SER-FM

2SER-FM is a community radio station run by hundreds of volunteers who are involved in producing and presenting a smorgasbord of programs focusing on education, information, public affairs and specialist music. Students interested in community media, are welcome to visit the 2SER studios or to attend a volunteer recruitment meeting. Contact the station for more details.

Level 26, Tower Building
telephone 9514 9514

## UTS Gallery and Art Collection

The UTS Gallery is a dedicated public gallery located on Level 4, Building 6, City campus, 702 Harris Street, Ultimo. The UTS Gallery presents regularly changing exhibitions of art and design from local, interstate and international sources.

The UTS Art Collection comprises a diverse range of paintings, prints, photographs and sculptures which are displayed throughout the University and, at times, in the UTS Gallery.

Tony Geddes, Curator
telephone 9514 1284
fax 9514 1228
email tony.geddes@uts.edu.au

# PRINCIPAL DATES FOR 1999

## January

2 Release of HSC results

8 Formal supplementary examinations for 1998 Spring semester students

8 Closing date for changes of preference to the Universities Admissions Centre (UAC)

15 Final examination timetable for Summer session

15 Last day to submit appeal against exclusion from Spring 1998

22 Main Round of offers to UAC applicants

22 Last day to submit 'Show Cause' appeal for Spring 1998

26 Australia Day – public holiday

26 Public school holidays end

27 Closing date for changes of preference to Universities Admissions Centre (UAC) for final round offers

29 Last day to submit application for Postgraduate Equity Scholarships for Autumn Semester 1999

29-30 Enrolment of new undergraduate students at City campus (and 1-4 February)

30 Summer session ends for subjects with formal exams

## February

1 Last day for continuing students to pay their 1999 Service Fees

1-4 Enrolment of new Undergraduate students at City campus (and 28-30 January)

1-12 Formal examinations for Summer session

1-12 Intensive Academic English course (ELSSA Centre)

5 Final round of offers (UAC)

6 Last day to lodge a Stage 2 appeal against assessment for Spring semester 1998

22 Release of results for Summer session

5-26 Enrolment of students at City campus

## March

1 Classes begin

4-5 Enrolment (external award, non-award and exchange students)

12 Last day to enrol in a course or add subjects

19 Last day to pay HECS or postgraduate course fees for Autumn semester 1999

30 Last day to apply to graduate in Spring semester 1999

31 Last day to apply for leave of absence without incurring student fees/charges[1]

31 Last day to withdraw from a subject without financial penalty[1]

31 HECS Census Date

## April

2 Good Friday – public holiday

2 Public school holidays commence

5 Easter Monday – public holiday

5-9 Vice-Chancellors' Week (non-teaching)

9 Last day to withdraw from a course or subject without academic penalty[1]

13-16 Graduation (Kuring-gai)

16 Public school holidays end

16 Last day for changes involving subsitution of one subject for another, with the same credit point value, to be processed without charge to the student

16 Last day for changes involving deletion of one or more subjects

16 Last day for changes involving the addition of a subject to be processed –the student will be required to enrol in and incur HECS liability for the subject in Summer session

23 Provisional examination timetable available

23 Public school holidays end

25 Anzac Day – public holiday

## May

3 Applications available for undergraduate courses where applicable

3 Applications open for available postgraduate courses for Spring semester 1999

3-14 Graduation (City)

14 Examination masters due

28 Closing date for undergraduate and postgraduate applications for Spring semester

28 Final examination timetable

## June

7 Queen's Birthday – public holiday

11 Last teaching day of Autumn semester

12-30 Formal examination period (and 1-2 July)

30 Last day to submit application for Postgraduate Equity Scholarships for Spring semester 1999

## July

1-2 Formal examination period (and 12-30 June)

2 Autumn semester ends

5 Public school holidays commence

5-9 Vice-Chancellors' Week (non-teaching)

12-16 Formal alternative examination period for Autumn semester students

16 Public school holidays end

19-30 Intensive Academic English course (ELSSA Centre)

23 Release of Autumn semester examination results; two days earlier via UniPhone™

26 Formal supplementary examinations for Autumn semester students

## August

2 Applications available for undergraduate and postgraduate courses for Autumn semester 2000

2 Classes begin

6 Last day to withdraw from full year subjects without academic penalty[1]

13 Last day to enrol in a course or add subjects

13 Last day to submit 'Show Cause' appeal for Autumn semester 1999

20 Last day to pay HECS or postgraduate course fees for Spring semester 1999

31 Last day to apply for leave of absence without incurring student fees/charges (Spring enrolments only)[1]

31 Last day to withdraw from a subject without financial penalty[1]

31 Last day to apply to graduate in Autumn semester 2000

31 HECS census date

## September

1 Applications for Postgraduate Scholarships available

10 Last day to withdraw from a course or subject without academic penalty[1]

13 Last day for changes involving subsitution of one subject for another, with the same credit point value, to be processed without charge to the student

13 Last day for changes involving deletion of one or more subjects to be processed as'late withdrawal without academic penalty', however, the student's liability for HECS or course fees liability for HECS or course fees will be unchanged

13 Last day for changes involving the addition of a subject to be processed – the student will be required to enrol in and incur HECS liability for the subject in Summer session

24 Provisional examination timetable available

27 Vice-Chancellors' Week (non-teaching) begins

27 Public school holidays commence

27-29 Graduation (City)

30 Closing date for undergraduate applications via UAC (without late fee)

30 Closing date for inpUTS Equity Access Scheme via UAC

## October

1 Graduation (City)

1 Vice-Chancellors' Week (non-teaching) ends

4 Labour Day – public holiday

8 Public school holidays end

15 Examination masters due

29 Final examination timetable available

29 Closing date for undergraduate applications via UAC (with late fee)

29 Closing date for undergraduate applications direct to UTS (without late fee)

29 Closing date for most postgraduate courses for Autumn 2000 (some courses may have earlier closing dates in September)

29 Closing date for Australian Postgraduate Awards , the R L Werner and University Doctoral scholarships

29 Last day to submit application for Postgraduate Equity Scholarships for Summer session 2000

## November

12 Last teaching day of Spring semester

13-30 Formal examination period (and 1-3 December)

30 Closing date for undergraduate applications via UAC (with late fee)

## December

1-3 Formal examination period (and 13-30 November)

3 Spring semester ends

13-17 Formal alternative examination period for Spring semester students

20 Release of Spring semester examination results; two days earlier via UniPhone™

20 Public school holidays commence

25 Christmas Day – public holiday

26 Boxing Day – public holiday

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[1] HECS/Postgraduate course fees will apply after the HECS census date (31 March and August or last working day before).

**Note:** Information is correct as at 29 June 1998. The University reserves the right to vary any information described in Principal Dates for 1999 without notice.

# Faculty information

## MESSAGE FROM THE DEAN

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 years have a very high reputation with Australian Industry and the professions for their knowledge, skills and ethical approach to the practice of science.

The Faculty of Science provides education to students from a diversity of backgrounds and offers study patterns that are flexible and adaptable. The Faculty offers 28 undergraduate degree programs, Master's and PhD programs by research, and several postgraduate coursework programs. In addition to courses in key science discipline areas, the combined degrees offered by the Faculty are designed to equip graduates with the ability to make the necessary links between science and other professions.

The Faculty is committed to excellence in teaching, scholarship and research, and will continue to provide a supportive learning environment for students at all levels. In recent years the Faculty's strength in research has enabled it to improve significantly the quality of its laboratories and equipment, to the obvious benefit of its students.

This handbook will provide you with all of the relevant course information you need to complete your studies as smoothly as possible. I wish you an enjoyable and productive year and hope that you find professional and personal satisfaction during your time at UTS.

***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, chemical, earth, and environmental sciences. The Departments of Applied Physics, Health Sciences, Chemistry, Materials and Forensic Science as well as the main Faculty Office are located at the City campus. The St Leonards campus houses the Department of Cell and Molecular Biology and a Dean's office. The Department of Health Sciences works on both campuses while operating the College of Traditional Chinese Medicine on Harris Street and running the Acupuncture Clinic on Broadway. The Department of Environmental Sciences is located on both campuses.

The Faculty provides high quality professional education in the physical, chemical, earth, environmental, biological and biomedical sciences, and engages in high-level research, scholarship and 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 Science and Honours programs are offered in applied chemistry, applied chemistry/forensic science, applied physics, biomedical science, biotechnology, materials science, medical science, environmental biology, environmental and urban horticulture, earth and environmental science with honours in either geoscience or environmental science. Bachelor of Health Science and Honours programs are offered in acupuncture and Chinese herbal medicine. Professional Experience is offered as an optional and additional component of all of the Bachelor of Science degree courses and leads to the award of a Diploma in Scientific Practice.

The Faculty is involved in the teaching of science to other faculties, including Engineering and Nursing. The Faculty is also involved in offering eight 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 degree course is offered in conjunction with the Faculty of Law. In order to qualify for separate awards in science and law, students are required to select an area of specialisation in science so that they can proceed to more advanced studies and thereby obtain recognition in relevant professional fields. Graduates from the course will be qualified for professional practice as either scientists or lawyers and especially in areas where a knowledge of both disciplines is desirable.
- The BMedSc LLB double degree course, newly introduced in 1998, is similar in structure to the BSc LLB course but with a specialisation in medical science. Graduates will qualify for professional practice in either field but may expect to be in most demand in those areas of law in which a knowledge of medical science is a particular advantage or, conversely, in areas of science such as the biotechnology or pharmaceutical industries where a knowledge of the law has special value.
- The combined degree Bachelor of Science/Bachelor of Arts in International Studies, newly introduced in 1998, provides students specialising in Science with additional practical skills, in particular those that increase awareness of their international contexts through providing the opportunity to acquire knowledge and understanding of a language and culture other than English. Students are required to select an area of specialisation in science and a region or country of specialisation within the International Studies program.

The length of the Bachelor of Science/Bachelor of Arts in International Studies course is five years full-time (six years for Forensic Science students) which includes one year of In-country study. Graduates may work as professionals in their area of scientific expertise particularly in specialist positions where an understanding of a particular culture may be highly desirable.

- The combined degrees Bachelor of Health Science in Acupuncture/Bachelor of Arts in International Studies and the Bachelor of Health Science in Chinese Herbal Medicine/Bachelor of Arts in International Studies provide acupuncture and Chinese herbal medicine 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 and Chinese herbal medicine graduates to practise outside Australia.
- The Bachelor of Science in Applied Physics/Bachelor of Engineering in Electrical Engineering/Diploma in Engineering Practice course integrates four-and-a-half years of full-time academic study in applied physics and electrical engineering with two semesters of paid industrial experience. Graduates may work in professional practice in high technology industries or in research and development. Career areas may include medical technology, energy technology, applied optics, communications, computer modelling, electromagnetics, technology management, materials analysis and instrumentation and control.
- The Bachelor of Science/Bachelor of Business requires completion of Bachelor of Business core subjects, and subjects in one selected major with an equal subject load from one of the Science programs over four years of full-time study.[1]

  Graduates may work as professional scientists or as business professionals. Career areas include management, marketing, finance, accounting or economics in enterprises in which high level scientific expertise is desirable; the program also provides business expertise for scientists who wish to be administrators in research or other scientific institutions.

In the postgraduate area, the Faculty offers PhD and Master's degrees (by thesis), Master of Science programs (by coursework), a Graduate Diploma, and Graduate Certificates. Prospective students should discuss possible topics of research with the relevant Associate Dean or 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 possible for part-time students to undertake a portion of their research at a site external to UTS, provided appropriate supervisory arrangements can be made. Details of current research in progress can be obtained from the office of the Associate Dean (Research).

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 a substantial part of the competitive grants awarded to the University and is a major contributor in three Cooperative Research Centres, namely Cardiac Technology, Aquaculture, and the Australian Centre for Renewable Energy. 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 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 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 strong links with industry. Staff members maintain contact with industry by undertaking appropriate research and consulting activities.

For the Bachelor of Medical Science and all Bachelor of Science degree courses students have the option to spend a further 12 months working in a relevant industry. This leads to an additional award, a Diploma in Scientific Practice (subject to University approval). The Faculty provides assistance to students in

finding these professional experience positions. Part-time students may combine the Diploma with their normal work if it is relevant to their degree.

Most programs 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 Traditional Chinese Medicine and administers two clinics. Details of the centres, institutes and the College of Traditional Chinese Medicine can be found on the following pages. The units in the Faculty are as follows:

## Coastal Resource Management Unit

The Coastal Resource Management Unit 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, Faculty of Engineering, Schools of Leisure and Tourism Studies, Law and Building Studies are involved. The Unit is located on the St Leonards campus.

The Unit 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 Unit is linked with several overseas and national universities. These linkages are expanding. Students may complete work at those institutions and gain credit.

## 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 toxinology, 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.

The Unit is a participating laboratory in the Cooperative Research Centre for Aquaculture.

## Molecular Parasitology Unit

The Molecular Parasitology Unit was established in 1991 as a laboratory investigating evolution, taxonomy, differentiation and diagnosis of parasites 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 Sciences.

In May 1997, the Unit was recognised as a Key University Research Strength when more staff from the Department of Cell and Molecular Biology and the Department of Chemistry, Materials and Forensic Science added their research skills to the Unit to become a major Australian focus for Molecular parasitology research and teaching.

## 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), and multidrug resistance (prokaryotic and eukaryotic).

## Psycho-Oncology Unit

The Psycho-Oncology Unit (formerly the Neurobiology Unit) was established in 1973 within the Department of Cell and Molecular Biology. It now carries out research into the effects of emotional states on cancer recurrence in early and late stage breast cancer using cognitive behavioural therapy in groups. The unit is funded through donations by the community and business sectors.

## College of Traditional Chinese Medicine

The UTS College of Acupuncture was established in 1994, founded upon the experience and educational expertise of Acupuncture Colleges (Australia). 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.

In 1995, the College was incorporated into the Faculty of Science as part of the Department of Health Sciences. In 1997, the College of Acupuncture was renamed the College of Traditional Chinese Medicine, offering undergraduate programs in both acupuncture/moxibustion and Chinese herbal medicine, the two major strands of Traditional Chinese Medicine (TCM).

The Faculty of Science offers courses in Acupuncture and Chinese Herbal Medicine. Facilities do not yet exist for offering these courses on a part-time basis. In addition to the undergraduate degree, the Faculty offers a Master of Health Science in Traditional Chinese Medicine (by coursework) that provides graduate education in either acupuncture or Chinese herbal medicine to qualified applicants who wish to extend their knowledge to incorporate another branch of Chinese medicine into their clinical practice. Studies leading to a Master of Science by research are also available.

The Faculty administers two clinics, one offering acupuncture services and the other Chinese herbal services, to the community. These clinics also play a major role in the clinical education of acupuncture and Chinese herbal medicine students. One clinic operates from a shop on Broadway (acupuncture), while the other operates from Level 4, 645 Harris Street (Chinese herbalism).

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 traditional Chinese medical practice.

The Faculty benefits from close links with the Universities of Traditional Medicine in China and the TCM Unit at the Victoria University of Technology. Through a memorandum of understanding 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 programs.

Students entering either the Bachelor of Health Science in Acupuncture or the Bachelor of Health Science in Chinese Herbal Medicine are eligible to apply for places in the combined degree: Bachelor of Health Science (in Acupuncture or Chinese Herbal Medicine)/ Bachelor of Arts in International Studies (Mandarin major). Academically selected students enter this program at the beginning of their third year. The combined program extends the course length to five-and-a-half years, one year of which is spent in China studying language, culture and TCM.

Students of the College of TCM are strongly recommended to read the 'Code of Conduct for students of the College of Traditional Chinese Medicine' under the section on 'Information for Students' in this Faculty of Science Handbook.

All course inquiries should be directed to: Mr Bob Hayes, at the UTS College of Traditional Chinese Medicine, 4/645 Harris Street, Ultimo 2007, telephone (02) 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 the nursing–technology interface.

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 Master's (by thesis) and Doctoral degree programs.

## Centre for Ecotoxicology

This Centre is a joint enterprise of UTS and the NSW Environment Protection Authority (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 effluents on communities in affected areas.

The Centre coordinates research programs at Honours, Master's and Doctoral levels, and also offers Master's and Graduate Certificates by coursework in ecotoxicology. 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 multi-disciplinary 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 seminars; present regular postgraduate and postcertificate courses; present in-house high-tech training courses for industry; present research and development seminars; and to develop products and devices of high quality. The Centre has nine projects involving carbons, cements, composites, nanoengineering, fuels, electroactive sensors, lighting, alumina and dental implants. The Centre has recently been successful in obtaining external funding for research into conducting polymers, applications of piezoelectric devices and alumina and synthetic fuel production.

## 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 CRC's Health Protection and Maintenance Program has been redesigned and now comprises two major multi-institutional projects. One of these is led from the UTS Department of Cell and Molecular Biology, and also involves the University of Tasmania, the Tasmanian Department of Primary Industry and Fisheries, the Queensland Department of Primary Industries and the salmon industry. It is aimed at the development of novel generic technologies for fish vaccines.

The Production Efficiency and Environmental Management Program includes a large collaborative project between CSIRO, Australian Institute of Marine Science, James Cook and Queensland Universities and UTS, as well as other research groups and several prawn farms. This project covers the analysis, management, effluent control and environmental impacts of ponds used for the intensive farming of prawns.

## Cooperative Research Centre for Cardiac Technology (CRC-CT)

The Cooperative Research Centre for Cardiac Technology (CRC-CT) was established in 1992 with a commitment to achieving excellence in multidisciplinary research relating to cardiac technology and its development. Its main purpose is to link industry with academic research and to exploit the developed intellectual property for the benefit of Australia. It also has a remit to train a new breed of PhD students with industry experience.

The CRC-CT brings together four universities (UTS, UNSW, University of Queensland and University of Sydney), the CSIRO (Molecular Science Division), hospitals (RNSH and Westmead Hospital) and industry partners (AMLAB Int). Cardiac CRC Nominees Pty Ltd is the commercial arm of the CRC-CT.

UTS participants in the CRC-CT include members of the Centre for Biomedical Technology, Department of Chemistry, Materials and Forensic Science, and the Faculties of Nursing and Engineering.

Cardiovascular diseases including stroke kill more than 44 per cent of Australians. The CRC's Research and Development Program addresses specific aspects of two large areas of heart disease: heart failure and heart rhythm disturbances, and an enabling technology, Biomaterials, that has direct application in both conditions as well as in a more diverse set of medical conditions. The CRC's work includes research in the following areas:

- development of biomaterials for use in artificial blood vessel grafts (bypass procedures), artificial heart valves, leads and electrodes used for pacing or defibrillating the heart
- mapping and ablation of aberrant electrical pathways in the heart
- heart failure solutions involving new diagnostic and monitoring devices, forming a continuum from mild drug therapy to total mechanical assistance.

The CRC-CT also offers an extensive training program for PhD students which provides them with industrial experience in a multidisciplinary, multi-site collaborative environment. Summer and Winter Vacation Scholarships for undergraduate students have proved popular and successful, as has the High

Schools Science Initiative Program, which aims to stimulate interest in science and medical research as a career.

The CRC is active in welcoming international visiting scientists and in presenting its work in international fora. It continues to strengthen its links with industry and various health sector organisations as well as enhancing its relationships with a number of international universities (e.g. Nagoya and Liverpool) which provide opportunities for joint research projects, publications, and exchange of postdoctoral scientists and cardiac surgeons.

## Cooperative Research Centre for Renewable Energy

The Cooperative Research Centre for Renewable Energy commenced operation in late 1996. It is incorporated in Western Australia. UTS is one of eight universities which are members of this CRC. The UTS participants include members of the Faculty of Engineering, the Department of Applied Physics and the Faculty of Design, Architecture and Building and the Centre for Materials Technology. The CRC's work ranges over many areas of renewable energy technology including solar cells, solar thermal systems and energy efficient technologies. The UTS contributions are predominantly in the area of energy efficiency including novel electric motors, energy efficient glazing, and new daylighting and lighting systems. There is also a major contribution to the development and assessment of computer software for use in the design of energy efficient buildings.

The CRC will have a major impact on Australia's contribution to technologies which will reduce greenhouse gas emissions and will open up a range of new industries which are anticipated to generate considerable income for the country, and a wide range of new employment opportunities. The UTS participants are constructing special systems for the accurate specification of building components as needed for complex computer models that address lighting and energy flows in buildings. There are strong links with companies in Sydney and Canberra.

## 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. There are flexible arrangements for each program: part-time, full-time and distance mode. 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 (02) 9514 1984
fax (02) 9514 1985
email groundwater.management@uts.edu.au

# INFORMATION FOR SCIENCE STUDENTS

Students in the Faculty of Science are strongly encouraged to read the handbook and the 1999 *UTS Calendar* (particularly Chapter 2 'General Information') for advice on student administration matters. The *UTS Calendar*, the official information guide to UTS courses, rules and regulations, may be purchased from the Co-op Bookshop on the corner of Harris Street and Broadway. Copies of the *UTS Calendar* are available for perusal at the UTS Library and at the student information offices at Kuring-gai (Student Centre is on Level 6, with an inquiry counter in the foyer area on Level 5 of the Kuring-gai campus) and Broadway (the foyer area, Level 4 of the Tower Building, City campus). There will also be copies of the *UTS Calendar* available for viewing in each Department and Faculty Office at both the St Leonards and City campuses. The *UTS Calendar* contains valuable information about the different services available to students, student admission requirements, enrolment, examinations, exclusion, progression, graduation, HECS, Austudy, Abstudy and other important matters. The *UTS Calendar* is available online at http://www.uts.edu.au/div/publications/cal/gencontents.html

## 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.

### Personal responsibility

- Always remember that health and safety is 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 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 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 you have 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.

## Remarking of assessment items

Occasionally, you might not be clear about why you received a lower than expected mark, or you might feel that your work has not been fairly assessed.

Initially, you should discuss the matter with the marker or Coordinating Examiner (CE) concerned. Such discussions are part of routine academic procedure by which you receive advice, clarification and feedback about your performance.

Usually, the result of such a discussion will be either:

(i) the marker or CE will satisfy you that the mark is fair; or

(ii) you will satisfy the marker or CE that the item was not fairly marked. For example, the marker or CE might have misread a section of your paper. In such cases, the marker or CE will adjust the original mark accordingly.

Sometimes, however, agreement cannot be reached. For example, you might consider that the point of view of the marker or CE does not allow a disinterested assessment of a particular item. In these cases, you may request that the item be re-assessed by a second marker.

## Code of Conduct for students of the UTS College of Traditional Chinese Medicine

**Rule 2.4.2** of the University states: 'Whilst on the premises of the University or engaged in any activity related to their study at the University, students shall comply with any reasonable directive given to them by an officer of the University, and shall maintain an acceptable standard of conduct.'

**Rule 2.4.4** of the University states: 'Where the Responsible Academic Officer, in consultation with the appropriate External Supervisor (if any), considers that a student so assessed is not ready to proceed with or is unsuitable to continue any part of the required professional experience on its scheduled commencement, the Responsible Academic Officer may defer or re-schedule the student's participation.

The Responsible Academic Officer must advise the students, in writing, of the decision within three business days of making it.

Where the deferral of a student's participation in any part of the required clinical education program would have the effect of preventing the student from continuing his/her course, the Responsible Academic Officer may refer the matter, with appropriate recommendation, to the Vice-Chancellor, who shall take such action as he/she deems appropriate.

The Vice-Chancellor must advise the student in writing of the decision within three business days of making it.'

In addition to Rule 2.4.2. and 2.4.4 students are required to sign an agreement to observe the UTS College of Traditional Chinese Medicine Code of Clinical Conduct. This agreement is an undertaking to observe clinical policy and procedures, to maintain a duty of care to patients and fellow students, and to demonstrate an acceptable level of professional conduct.

### Clinic dress

The high neck, shoulder buttoning, white, 'dentist' style jacket has been approved as the College's regulation clinical dress for students. Students not dressed in the approved clinical style will not be permitted to attend the clinic session. Students are also required to wear one colour (white, black, brown, navy or grey) shoes in a 'closed' style, with a plain (not patterned) skirt or trousers in a conservative colour. Sneakers, runners, sports shoes and jeans are not acceptable clinic wear. All clothing must be clean.

All visible jewellery such as rings, earrings, face and body piercing rings or studs, bracelets and anklets must not be worn in the clinic. Long hair should be tied back neatly and must look clean and tidy. If nail polish is worn it should be clear or in a pale, natural shade and unchipped. It is recommended that nails are kept short, clean, and natural. Heavy perfumes should not be worn.

Name tags must be worn by all students in the clinic. Students without a name tag may not attend patients.

The standard of cleanliness and the general appearance of students attending College clinics is subject to the approval of the individual practitioner-in-charge or clinic manager. A student who does not meet the required standards may be refused permission to attend their rostered clinic session.

## College of Traditional Chinese Medicine Policies

### Discrimination

In line with State and Federal anti-discrimination legislation, UTS has a policy of equal opportunity and non-discrimination. This policy is not only applied to students and staff but also to community services. Students should be aware that the patients of the University's clinical services are included, and that anti-discrimination laws must be observed.

### Confidentiality

All matters pertaining to patients are confidential. It is unethical to discuss any patient outside the treatment situation. Patient cards and records must not be removed from the clinic and must be stored in locked files.

### Recording patient information

Details pertaining to the health and medical history of a patient must be recorded on the patient's clinical record card. Sometimes patients confide personal histories that do not have a primary bearing on their health and which they request should not be recorded. In such instances the patient's wishes should be respected. If the disclosure has a bearing on the primary condition of the patient, or will be a significant factor in their response to treatment, it must be recorded. The patient should be advised of this requirement and given the option of seeking treatment elsewhere.

### Patient records

If a student is asked to treat or to care for a patient, it is the student's responsibility to familiarise themselves with the patient's current condition and to check the patient's clinical records. It is not the responsibility of the clinical manager or the supervising practitioner, although they may advise the student, at their own discretion, of any issues that they deem to be important.

### Patients on medication and/or attending another practitioner

It is unethical to comment on any course of treatment or medication provided by another practitioner, or to advise in any manner on a course of treatment provided by another practitioner. All decisions regarding therapeutic choices belong to the patient and, even if a patient asks for advice on the appropriateness, or otherwise, of a therapeutic procedure, it is not acceptable for a student or student/practitioner to comment on matters outside their area of expertise.

### Refusal of services

Practitioners and students have the right to refuse TCM services to patients who are drunk, under the influence of mind-altering drugs, abusive, or who exhibit antisocial behaviours. They also have the duty to refuse to carry out services that are illegal, or that they believe have the potential to endanger the health of the patient.

### Practicums

Students during practicums in acupuncture, moxibustion, treatment techniques and massage will be required to carry out therapeutic and diagnostic procedures on fellow students. These practical sessions and workshops are under the supervision of a practitioner and all standard procedures and infection control measures must be observed. Students who decline to participate in giving and receiving treatments in practicums will be unable to complete these subjects and will therefore be unable to complete the course.

### Student Health and Welfare

It is important that students, especially those entering a healing profession, should maintain good health and general well-being during their studies. The University has a Student Health Service that offers both health care and counselling services.

Students will be participating in the University's acupuncture or Chinese herbal medicine clinics as observers, assistants and, in their final year, as student practitioners. It is not appropriate for anyone with an infectious condition to work closely with patients. Should students be suffering from any temporary, communicable disease they must advise their clinical supervisor. Students who believe that they may be coming down with a cold, or some minor ailment, are advised to provide, and wear, a surgical mask to protect patients and fellow students from infection.

Students who are HIV positive or who have a hepatitis infection must be aware of their duty of care to staff, other students, and patients during clinical practice.

### Advice from the NSW Department of Health

'The Department, bearing in mind its recommendations to the general community, would hope that all students were adequately immunised against poliomyelitis, diphtheria and tetanus in childhood. They should have had a booster of Sabine vaccine against poliomyelitis and a booster of Adult Diphtheria Tetanus Toxoid (ADT) at about 25 years of age. In addition, persons particularly involved in health services would be wise to have had a Mantoux test and, if seronegative, to have had BCG vaccination (for tuberculosis).'

The guidelines of the College in relation to hepatitis B and health care workers and students indicate the need for hepatitis B immunisation before contact with blood/body fluids and state that it is their obligation to know their current hepatitis B status.

### Hepatitis B inoculation and Mantoux testing

Students entering the course are advised that, for their own protection, they should contact the Student Health Service at the City campus to arrange for a hepatitis B inoculation. These are available at a minimal cost to all acupuncture students. Immunisation against tetanus and tuberculosis is also recommended for your protection.

Information regarding Mantoux testing is also available through the Student Health Service.

The Student Health Service can make individual or group arrangements for students to receive anti-hepatitis B virus and anti-tetanus vaccinations at any time. The Service is also able to offer advice on anti-tuberculosis vaccination.

Further information on these matters is available from Student Services Health Service, City campus: telephone (02) 9514 1166.

### External clinical training

The College office keeps a list of practitioners who have been approved by the University and who are willing to allow students to attend their private clinics for pre-internship levels of clinical experience. Students should contact the practitioner they wish to attend before making application at the College office.

## Student Support Centres in the Faculty of Science

### Chemistry Learning Resources Centre

The Chemistry Learning Resources Centre is located in Room 211 in Building 4 on the City campus. It has a range of resources to support the learning of chemistry by undergraduate students from the Faculties of Science, Nursing, Engineering and Business. Resources available in the Centre include microcomputers equipped with interactive software, videos, models and books. Most of the resources are for first year students but there are also resources for students studying chemistry in the later stages of their degree program. The Centre is open each weekday during semester. Further information may be obtained by visiting the web pages at http://www.science.uts.edu.au/depts/chem/clrc/index.html or by contacting the coordinators:

Dr Ray Sleet
telephone 9514 1739
fax 9514 1460
email R.Sleet@uts.edu.au
*or*
Mrs Rosemary Ward
telephone 9514 1729
fax 9514 1460
email Rosemary.Ward@uts.edu.au

### Physics Learning Centre

The Applied Physics Department operates a drop-in Physics Learning Centre on Level 11 of the Tower Building on the City campus. Academic staff members are available at convenient times during the week to assist students with any problems they have associated with their first-year physics studies. In addition to the fixed schedule for personal tutorial assistance, there is a computer laboratory adjoining the Physics Learning Centre in which assistance can be obtained whenever the Physics Laboratory Office is open (normally 9.00 a.m. – 8.30 p.m.). There are also computer-aided learning programs and simulated textbook problems available for study by all first-year physics students. For further information contact:

Associate Professor Peter Logan
telephone 9514 2194
fax 9514 2219
email peter@phys.uts.edu.au

## Bridging courses

### Chemistry bridging course

First year Chemistry subjects in 1999 will be conducted on the assumption that students have either HSC chemistry or some other suitable prior knowledge.

UTS Bridging Chemistry is a bridging course designed to introduce students to the language, symbols, and basic concepts on which to build a meaningful study of chemistry at the tertiary level. The format of the course includes lectures and demonstrations, tutorial and problem sessions, self-paced learning, and laboratory experiences. Students in Science enrol for two weeks in February, and are supported by comprehensive learning materials. Further information can be obtained from:

Dr John Kalman
UTS Bridging Chemistry, Dept of Chemistry
Materials and Forensic Science, UTS
PO Box 123, Broadway NSW 2007
telephone 9514 1728
email John.Kalman@uts.edu.au
http://www.maths.uts.edu.au/msc/bc_inf.htm

# 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.

Please note that the conditions of the awards listed in this handbook are being reviewed due to extensive course restructuring and may be subject to change.

### 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

Information and application forms can be obtained from the Office of the Associate Dean (Research). The closing date is normally the end of November in the year prior to award.

### Dean's Merit List for Academic Excellence

The Faculty wishes formally to 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, Case Studies in Clinical Biochemistry, and Clinical Laboratory Management. The prize consists of a suitably worded 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 worded 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 (or equivalent subject) 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 worded 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 worded 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.

### 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 worded 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 2C 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 worded 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. 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 Sensing, 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 worded 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 enrolled in the Biomedical Science degree course 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 $750 and a suitably worded 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 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. The prize consists of a cash award of $200 and one year's membership of the Institute of Metals and Materials Australasia.

### 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 worded 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 – 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.

### M Y Ali Prize in Cytopathology (previously known as M Y 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 worded 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.

### The New South Wales Police Service Prize

This prize was established in 1997 by the New South Wales Police Service Education and Training Command. It is awarded to the student enrolled in the Bachelor of Applied Science (Honours) in Applied Chemistry – Forensic Science who obtains the highest weighted average mark for the Forensic Examination of Physical Evidence subjects. The prize consists of a suitably worded certificate together with a cash award of $500.

### 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.

### Pfizer Achievement Award

This prize was established in 1997 by Pfizer Pty Ltd. It is awarded to the student enrolled in either the Applied Chemistry degree course or the Forensic Science degree course who achieves the highest mark in the subject Organic Chemistry 2, provided that the grade obtained is not lower than distinction. The prize has a cash value of $1,000.

### 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 Master of Occupational Health and Safety Management 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 a 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 Polymer Science 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 Introduction to Materials 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 (Environmental and Urban Horticulture) course who obtains the highest weighted average mark in Stages 3 – 6 of the course, at distinction level or above. The prize will be in the form of a suitably worded 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 Chemistry, Materials and Forensic 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 Master of Occupational Health and Safety Management 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 AND CODES

| Course title | Code |
|---|---|
| **Undergraduate degrees** | |
| Bachelor of Science in Applied Chemistry | NC05 |
| Bachelor of Science (Honours) in Applied Chemistry | NC06 |
| Bachelor of Science (Honours) in Applied Chemistry – Forensic Science | NC04 |
| Bachelor of Science in Earth and Environmental Science | NG05 |
| Bachelor of Science (Honours) in Geoscience | NG06 |
| Bachelor of Science (Honours) in Environmental Science | NG07 |
| Bachelor of Science in Materials Science | NM05 |
| Bachelor of Science (Honours) in Materials Science | NM06 |
| Bachelor of Science in Applied Physics | NP05 |
| Bachelor of Science (Honours) in Applied Physics | NP06 |
| Bachelor of Science in Applied Physics/Bachelor of Engineering in Electrical Engineering/ Diploma in Engineering Practice | NP04 |
| 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 Health Science in Chinese Herbal Medicine/Bachelor of Arts in International Studies[4] | NH05 |
| Bachelor of Medical Science | NH04 |
| Bachelor of Science (Honours)[1] | KB04 |
| Bachelor of Science in Biomedical Science | KB02 |
| Bachelor of Science in Biotechnology | KB06 |
| Bachelor of Science in Environmental Biology | KB05 |
| Bachelor of Science in Environmental and Urban Horticulture | KB03 |
| Bachelor of Science in Science Education | N003 |
| Bachelor of Science/Bachelor of Laws | LL04 |
| Bachelor of Medical Science/Bachelor of Laws | LL09 |
| Bachelor of Science/Bachelor of Arts in International Studies | N004 |
| Bachelor of Science/Bachelor of Business[4] | N006 |
| Diploma in Scientific Practice[4] | N005 |
| **Graduate Certificates** | |
| Clinical Biochemistry | KB79 |
| Biochemical Analysis | KB81 |
| Medical Biochemistry | KB82 |
| Coastal Resource Management[2] | KB69 |
| Principles of Ecotoxicology[3] | KB77 |
| Laboratory Methods in Ecotoxicology[3] | KB83 |
| Field Methods in Ecotoxicology[3] | KB84 |
| Management in Ecotoxicology[3] | KB85 |
| Medical Microbiology | KB86 |
| Molecular Microbiology | KB87 |
| Diagnostic Bacteriology | KB88 |
| Parasitology and Mycology | KB89 |
| Occupational Health and Safety | P053 |
| Occupational Health and Safety Management | P054 |
| **Graduate Diploma** | |
| Hydrogeology and Groundwater Management | N061 |

| Course title | Code |
|---|---|
| **Master's degrees (by coursework)** | |
| Master of Coastal Resource Management[2] | KB59 |
| Master of Health Science in Traditional Chinese Medicine | NH61 |
| Master of Occupational Health and Safety Management | P055 |
| Master of Occupational Health and Safety Management (Honours) | P057 |
| Master of Science in Clinical Biochemistry | KB55 |
| Master of Science (Honours) in Clinical Biochemistry | KB61 |
| Master of Science in Ecotoxicology[3] | KB52 |
| Master of Science (Honours) in Ecotoxicology | KB62 |
| Master of Science in Hydrogeology and Groundwater Management | N057 |
| Master of Science in Medical Microbiology | KB57 |
| Master of Science (Honours) in Medical Microbiology | KB60 |
| **Master's degrees (by thesis)** | |
| Master of Science | N053 |
| Master of Science (Hydrogeology and Groundwater Management) | N056 |
| **Doctor of Philosophy** | |
| PhD (Science) | N054 |
| PhD (Hydrogeology and Groundwater Management) | N055 |

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

[2] Interdisciplinary course run by the Faculty of Science in collaboration with the Faculties of Engineering; Business; Law; and Design, Architecture and Building. Modified Graduate Certificate programs in Coastal Resource Management will be offered subject to University approval.

[3] In collaboration with the NSW Environment Protection Authority.

[4] Subject to approval by Academic Board.

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 innovatory areas in keeping with the needs of our highly technological society.

# INTERNATIONAL STUDIES ELECTIVES

The Institute for International Studies at 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 at 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.

The Institute offers language programs in: Cantonese, Chinese, Croatian, French, German, Greek, Indonesian, Italian, Japanese, Korean, Malaysian, Polish, Russian, Spanish, Slovenian, Thai and Ukrainian. The Institute can arrange for the teaching of other language programs depending on availability and demand.

## 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 Europe that are the areas of specialisation of the Institute.

Introductory subjects on the contemporary societies of China, Japan, South-East Asia, Korea, Hong Kong and Taiwan, Latin America and 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. Further information is available in the *1999 Institute for International Studies Handbook*, or by contacting:

Institute for International Studies, UTS
10 Quay Street, Sydney
telephone 9514 1574
fax 9514 1578

# Undergraduate courses

## PASS DEGREE COURSES

### Continuing students

All students who commenced before 1997 should refer to the *1998 Faculty of Science Handbook* for old course and subject descriptions and transitional arrangements.

Printed copies of the *1998 Faculty of Science Handbook* are available for viewing in all Department offices and from the Faculty Office at the St Leonards and Broadway campuses. The 1998 faculty handbooks can also be found on the UTS website.

http://www.uts.edu.au/div/publications/

### 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 or non-recent school leavers (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 medical sciences courses will have studied at least any two-units of English, 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 or chemistry/biology. For students entering programs in Applied Chemistry, Applied Physics, Forensic Science, Earth and Environmental Science, and Materials Science, it is assumed that they have studied at least any two units of English, two-unit mathematics plus two-unit physics, or two-unit chemistry or three-/four-unit science. The minimum University Admissions Index (UAI) 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[1]

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 other approved 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 other approved 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.

[1] 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 prescribed 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. Contact details of all course directors are listed at the end of the entry for each course. 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/industrial experience

Students enrolled in science courses have the option to undertake industrial training or other relevant professional experience additional to the normal academic requirements of their course. In most cases this will involve spending up to 12 months working in a relevant industry. This experience will normally be gained prior to completing the academic requirements of the course and will earn the student extra academic credit which will be recognised by the award of a Diploma in Scientific Practice. Further details appear below.

## General structure of the Bachelor of Science and Bachelor of Medical Science courses

In 1997, the structures of all undergraduate courses except the Bachelor of Health Science courses were extensively revised with the aim of increasing the study options available to students. As a result, the general structure of these courses now comprises four components:

i) a *'core discipline [major] strand'* (approximately 72 credit points) consisting of the prescribed subjects that define the course and form the basis for professional recognition;

ii) a variable number of prescribed *'core support'* subjects (normally 24 – 36 credit points in stages 1 – 3) which underpin the core discipline strand though may not contribute directly to the requirements for professional recognition;

iii) a *'second major'* component (normally 24 credit points) comprising a coherent set of non-prescribed subjects offered by the Faculty of Science, by another faculty of the University or by the Institute for International Studies;

iv) *'free elective'* subjects (12 – 24 credit points), selected from anywhere in the University or cross-institutionally.

Details of some second majors offered by the Faculty of Science and other parts of the University are given at the end of the Undergraduate Courses section of this Handbook.

# Diploma in Scientific Practice[1]

***Course code: N005***

*Course Director: Associate Professor R T Buckney*

The Faculty of Science offers a Diploma in Scientific Practice, which can be taken in combination with any Science or Medical Science course. The Diploma study consists of a minimum of 30 weeks of Industrial Training and two six-credit-point subjects. Students will undergo workplace assessment and must also pass both subjects to graduate with the combined Bachelor of Science/ Diploma in Scientific Practice. The combined program is designed to ensure that graduates have enhanced practical skills and a mature understanding of the workplace environment.

## Admission

Students enrolled in a Bachelor of Science or Bachelor of Medical Science program may apply to enter the combined program after completion of at least 48 credit points of study; in some programs a later entry is recommended. Places are not guaranteed because industrial training providers are not necessarily in a position to offer places in any one year.

[1] Subject to University approval.

## Course program

The following general pattern will be followed, though students in particular Bachelor courses may undertake the Diploma components at a different stage or sequence.

### Full-time program

Year 1

***Autumn semester***

| | |
|---|---|
| Bachelor program subjects | 24cp |

***Spring semester***

| | |
|---|---|
| Bachelor program subjects | 24cp |

Year 2

***Autumn semester***

| | |
|---|---|
| Bachelor program subjects | 24cp |

***Spring semester***

| | |
|---|---|
| Bachelor program subjects | 24cp |

Year 3

***Autumn semester***

| | |
|---|---|
| Industrial Training | 0cp |
| 60811 Professional Scientific Practice A | 6cp |

***Spring semester***

| | |
|---|---|
| Industrial Training | 0cp |
| 60812 Professional Scientific Practice B | 6cp |

Year 4

***Autumn semester***

| | |
|---|---|
| Bachelor program subjects | 24cp |

***Spring semester***

| | |
|---|---|
| Bachelor program subjects | 24cp |

Students enrolled in the combined program will normally complete the Bachelor program *after* the Scientific Practice subjects are completed, though there may be circumstances, for example with part-time students, where concurrent completion would occur. For further information please contact:

Office of the Associate Dean (Coursework Programs)
Faculty of Science
telephone 9514 4044
fax 9514 4095

# HONOURS DEGREE COURSES

Honours programs provide basic training in research and introduce students to advanced areas of study in the relevant discipline. Graduates generally enter occupations for which an Honours degree is the minimum requirement, or continue with postgraduate research.

## Admission

From 1999 all Honours courses except the Bachelor of Science (Honours) in Applied Chemistry – Forensic Science and the Bachelor of Health Science (Honours) courses will be one-year full-time or equivalent part-time courses. They will be open to students who possess, or have fulfilled all the requirements for, a relevant Bachelor's degree from UTS, or equivalent qualification, with at least an average credit over the final third of the undergraduate program.

## Attendance patterns

Honours courses are offered as full-time programs over two semesters or part-time programs over four semesters. The major component is a research project which extends over the full duration of the course and normally takes the form of an experimental or analytical investigation, undertaken either in the laboratory or the field. Candidates may also be required to undertake one or more critical reviews of the scientific literature in designated areas and to attend formal classes devoted to advanced coursework. The results of the project are presented in an oral seminar and in a written thesis, both of which are formally assessed.

## Application and selection

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.

Applications for entry to Honours degree courses will be considered by a relevant Faculty selection committee. The Registrar will notify applicants of the results of their applications.

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

## Award

Honours degrees may be awarded in the following grades: First Class, Second Class Division 1, Second Class Division 2, and Third Class.

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

Abbreviation: BSc (Hons).

## Further information

Interested students should discuss the program and possible research projects available with the relevant Head of Department or Honours Course Coordinator, or with individual members of academic staff.

# Bachelor of Science in Applied Chemistry

***Course code: NC05***

*Course Director: Dr J R Kalman*

All students who commenced before 1997 should refer to the note for continuing students at the beginning of the Undergraduate Courses section of this handbook.

This course gives students a firm foundation of study in the basic sciences, with in-depth development in the particular discipline of chemistry, emphasising its industrial applications. When coupled with concurrent work experience, for which an additional Diploma in Scientific Practice may be awarded, the course provides an excellent preparation for entry to professional work in the field of applied chemistry.

Students have the opportunity to tailor their studies to their individual interests. By taking an appropriate second major and selecting relevant electives, students can prepare themselves for employment in a variety of situations in industries concerned with plastics, paints, foods, metals and alloys, solvents or industrial chemicals. Students should refer to the section on second majors in this handbook and consult the Applied Chemistry Course Director for advice on selecting second majors and elective subjects.

The course consists of six academic stages but may include a period of industrial training which extends the minimum completion time to four years. Although the course can be completed by three years of full-time attendance if the professional/industrial experience component is not taken, students are strongly encouraged to undertake the industrial experience program. In this case a number of different patterns of attendance are possible: 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.[1]

[1] Holders of a TAFE Associate Diploma in Chemical Technology or equivalent qualification may be eligible for a number of subject exemptions and may therefore be able to complete the course in less than the standard time.

Full-time attendance involves approximately 24 hours each week at the University during the first year and 18 hours per week in the second and third years. 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 in the first year and nine hours per week in the second and third years. This form of attendance allows students to complete a full stage in one year. It is expected that employers will 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 Science. The course has been designed to meet the academic requirements for entry to corporate membership of the Royal Australian Chemical Institute.

The Honours program is designed to introduce students to more advanced coursework and to research work in chemistry. It allows selected students to continue on with postgraduate studies if desired and generally enhances their employment prospects.

The Department of Chemistry, Materials and Forensic Science strongly encourages students in this course to undertake the professional/industrial experience option and an Industrial Training Committee within the Department of Chemistry, Materials and Forensic Science provides guidance in the matter of appropriate vocational training. The industrial component normally involves a period of up to one year in full-time relevant employment. Each student is assigned to a member of staff who maintains regular contact during subsequent periods of study and employment. All academic inquiries should be made to:

Course Director, Applied Chemistry,
Dr J R Kalman
Department of Chemistry, Materials and Forensic Science
telephone 9514 1728
fax 9514 1628
email John.Kalman@uts.edu.au

## Full-time program

### Stage 1

***Autumn semester***

| | | |
|---|---|---|
| 33190 | Mathematical Modelling for Science | 6cp |
| 65101 | Chemistry 1C | 6cp |
| 67101 | Introduction to Materials | 6cp |
| | *either* | |
| 68101 | Physics 1C[1] | 6cp |
| | *or one of* | |
| 66101 | Earth Science 1 | 6cp |
| 91311 | Biology 1 | 6cp |
| 91701 | Medical Science 1 | 6cp |

### Stage 2

***Spring semester***

| | | |
|---|---|---|
| 33290 | Computing and Mathematics for Science | 6cp |
| 65201 | Chemistry 2C | 6cp |
| 68201 | Physics 2 | 6cp |
| | *or* | |
| 68041 | Physics 1A[2] | 6cp |
| | *plus* | |
| | Approved science subject | 6cp |

### Stage 3

***Autumn semester***

| | | |
|---|---|---|
| 65202 | Organic Chemistry 1 | 6cp |
| 65306 | Analytical Chemistry 1 | 6cp |
| 65307 | Physical Chemistry 1 | 6cp |
| | Elective/second major | 6cp |

### Stage 4

***Spring semester***

| | | |
|---|---|---|
| 65409 | Analytical Chemistry 2 | 6cp |
| 65411 | Inorganic Chemistry 1 | 6cp |
| 65410 | Chemical Safety and Legislation | 6cp |
| | Elective/second major | 6cp |

### Stage 5

***Autumn semester***

| | | |
|---|---|---|
| 65508 | Organic Chemistry 2 | 6cp |
| 65509 | Inorganic Chemistry 2 | 6cp |
| | Electives/second major | 12cp |

### Stage 6

***Spring semester***

| | | |
|---|---|---|
| 65606 | Analytical Chemistry 3 | 6cp |
| 65607 | Physical Chemistry 2 | 6cp |
| | Electives/second major | 12cp |

## Part-time program

### Stage 1

***Autumn semester***

| | | |
|---|---|---|
| 33190 | Mathematical Modelling for Science | 6cp |
| 67101 | Introduction to Materials | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 65101 | Chemistry 1C | 6cp |
| 68101 | Physics 1C[1] | 6cp |
| | *or* | |
| 68041 | Physics 1A[2] | 6cp |

### Stage 2

***Autumn semester***

| | | |
|---|---|---|
| 65201 | Chemistry 2C | 6cp |
| | *either* | |
| 68201 | Physics 2 | 6cp |
| | *or one of* | |
| 66101 | Earth Science 1 | 6cp |
| 91311 | Biology 1 | 6cp |
| 91701 | Medical Science 1 | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 33290 | Computing and Mathematics for Science | 6cp |
| 65410 | Chemical Safety and Legislation | 6cp |

### Stage 3

***Autumn semester***

| | | |
|---|---|---|
| 65202 | Organic Chemistry 1 | 6cp |
| 65306 | Analytical Chemistry 1 | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 65411 | Inorganic Chemistry 1 | 6cp |
| | Elective/second major | 6cp |

### Stage 4

***Autumn semester***

| | | |
|---|---|---|
| 65307 | Physical Chemistry 1 | 6cp |
| | Elective/second major | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 65409 | Analytical Chemistry 2 | 6cp |
| | Elective/second major | 6cp |

### Stage 5

***Autumn semester***

| | | |
|---|---|---|
| 65508 | Organic Chemistry 2 | 6cp |
| | Elective/second major | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 65606 | Analytical Chemistry 3 | 6cp |
| | Elective/second major | 6cp |

### Stage 6

***Autumn semester***

| | | |
|---|---|---|
| 6559 | Inorganic Chemistry 2 | 6cp |
| | Elective/second major | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 65607 | Physical Chemistry 2 | 6cp |
| | Elective/second major | 6cp |

[1] Strongly recommended.

[2] Not available to students who have completed 68101 Physics 1C.

**Note:** Students should check the Student Notice Boards on Level 3 (Harris Street end), Building 4, Broadway campus, for subject timetables and available electives.

# Bachelor of Science (Honours) in Applied Chemistry

***Course code: NC06***

All students who commenced studies before 1997 should refer to the note for continuing students at the beginning of the Undergraduate courses section of this handbook.

The Honours degree in Applied Chemistry is a one year full-time course, or equivalent part-time, which is taken after completing the Bachelor of Science in Applied Chemistry or an equivalent course with an average grade of at least credit over the final third of the course. The Honours degree offers basic training in research and introduces students to advanced areas of study in chemistry. The major component is a supervised individual research project which extends over the full duration of the course and normally takes the form of an experimental or analytical investigation undertaken in the laboratory.

Further details are provided in the general introduction to the Undergraduate Courses section of this handbook.

Students wishing to undertake Honours in 1999 should contact the Head of the Department of Chemistry, Materials and Forensic Science for advice and consult the student noticeboards in the department for details of available projects and supervisors.

## Full-time program

| Stage 1 | | |
|---|---|---|
| 65854 | Honours (Chemistry) (2 sem) | 24cp |
| **Stage 2** | | |
| 65854 | Honours (Chemistry) (2 sem) | 24cp |

# Bachelor of Science (Honours) in Applied Chemistry – Forensic Science

***Course code: NC04***

*Course Director: Dr C Roux*

All students who commenced their studies before 1997 should refer to the note for continuing students at the beginning of the Undergraduate courses section of this handbook.

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 comprises four years of full-time coursework including one semester of research work.

## Attendance pattern

The course is offered over four years, full-time.

## Course structure

The first two years of the program are similar, though not identical to the Bachelor of Science in Applied Chemistry course. The final two years are strongly focused on 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 Bachelor of Science in Applied Chemistry. All academic inquiries should be made to:

Course Director, Forensic Science
Dr Claude Roux
Department of Chemistry, Materials and Forensic Science
telephone 9514 1718
fax 9514 1628
email Claude.Roux@uts.edu.au

## Full-time program

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

### Stage 1

***Autumn semester***

| | | |
|---|---|---|
| 33190 | Mathematical Modelling for Science | 6cp |
| 65101 | Chemistry 1C | 6cp |
| 68101 | Physics 1C | 6cp |
| | *either* | |
| 91311 | Biology 1 | 6cp |
| | *or* | |
| 91701 | Medical Science 1 | 6cp |

### Stage 2

***Spring semester***

| | | |
|---|---|---|
| 33290 | Computing and Mathematics for Science | 6cp |
| 65201 | Chemistry 2C | 6cp |
| 65241 | Principles of Forensic Science | 6cp |
| | *one of* | |
| 67101 | Introduction to Materials | 6cp |
| 68201 | Physics 2 | 6cp |
| 91702 | Medical Science 2 | 6cp |

### Stage 3

***Autumn semester***

| | | |
|---|---|---|
| 65202 | Organic Chemistry 1 | 6cp |
| 65306 | Analytical Chemistry 1 | 6cp |
| 65341 | Forensic Imaging | 6cp |
| 65307 | Physical Chemistry 1 | 6cp |

### Stage 4

***Spring semester***

| | | |
|---|---|---|
| 65409 | Analytical Chemistry 2 | 6cp |
| 65411 | Inorganic Chemistry 1 | 6cp |
| 65410 | Chemical Safety and Legislation | 6cp |
| 91141 | Biological Evidence | 6cp |

### Stage 5

***Autumn semester***

| | | |
|---|---|---|
| 65508 | Organic Chemistry 2 | 6cp |
| 65509 | Inorganic Chemistry 2 | 6cp |
| 65542 | Forensic Toxicology 1 | 6cp |
| 65541 | Physical Evidence 1 | 6cp |

### Stage 6

***Spring semester***

| | | |
|---|---|---|
| 65606 | Analytical Chemistry 3 | 6cp |
| 65607 | Physical Chemistry 2 | 6cp |
| 65642 | Forensic Toxicology 2 | 6cp |
| 65641 | Physical Evidence 2 | 6cp |

### Stage 7

***Autumn semester***

| | | |
|---|---|---|
| 65741 | Chemistry and Pharmacology of Illicit Drugs | 6cp |
| 65742 | Fire and Explosion Investigation | 6cp |
| 65743 | Complex Forensic Cases (Chemistry) | 6cp |
| 79991 | Complex Forensic Cases (Law) | 6cp |

### Stage 8

***Spring semester***

| | | |
|---|---|---|
| 65856 | Forensic Research Project | 24cp |

# Bachelor of Science in Earth and Environmental Science

### *Course code: NG05*

*Course Director: Associate Professor C G Skilbeck*

This course started in 1997 and replaces the Bachelor of Applied Science in Geology.

All students who commenced their studies before 1997 should refer to the note for continuing students at the beginning of the Undergraduate courses section of this handbook.

The Bachelor of Science in Earth and Environmental Science program is designed for students seeking careers as professional geoscientists or environmental scientists. The basic award for successful completion of the new course is Bachelor of Science.

The course consists of six stages of formal academic study and students also have the opportunity to undertake a professional/industrial experience program leading to the additional award of Diploma in Scientific Practice. The course begins with a study of basic chemistry, physics, biology, mathematics, computing, statistical design and analysis, and earth science, followed by a general training in field techniques, igneous, metamorphic and sedimentary origin, structural and resource geology. Geophysics, remote sensing and tectonics are studied during the later part of the program in association with exploration, resource, engineering and environmental geology, quaternary geology and Earth dynamics. In addition, specialised earth science subjects are available through the Sydney Universities Consortium of Geology and Geophysics (SUCOGG).

Concurrently with these studies in earth science, students undertake a second major in environmental studies which comprises a sequence of subjects including ecological sampling and experimentation, Australian biota and environmental management. These complementary studies are aimed at ensuring that the course produces graduates in earth science who also have a sound knowledge and awareness of environmental issues and practices to assist them in their professional careers. Students who already hold approved credentials in environmental science may be permitted to undertake a second major in another field of study. There is also an opportunity to undertake complementary study in civil and environmental engineering, chemistry and physics.

Although the course may be completed by three years of full-time attendance if the professional/industrial experience component is not taken, all students are strongly encouraged to undertake the industrial experience program. Hence, the common course patterns are four years of full-time enrolment, including one year of industrial experience; or six years of part-time attendance 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 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 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 expected that employers will 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. All academic inquiries should be directed to:

Course Director
Associate Professor Greg Skilbeck
Earth and Environmental Science
Department of Environmental Sciences
telephone 9514 1760
fax 9514 1755
email Greg.Skilbeck@uts.edu.au

## Full-time program

### Stage 1

***Autumn semester***

| | | |
|---|---|---|
| 33101 | Mathematics 1 (LS) | 3cp |
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 66101 | Earth Science 1 | 6cp |
| 65012 | Chemistry 1A | 6cp |
| 91311 | Biology 1 | 6cp |

### Stage 2

***Spring semester***

| | | |
|---|---|---|
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 66204 | Field Studies 1 | 6cp |
| 65022 | Chemistry 2A | 6cp |
| 91312 | Biology 2 | 6cp |
| | *either* | |
| 91395 | Biocomputing | 3cp |
| | *or* | |
| 31871 | Computing for Science | 3cp |

### Stage 3

***Autumn semester***

| | | |
|---|---|---|
| 66304 | Earth Materials | 6cp |
| 66305 | Fold Belts and Cratons | 6cp |
| 68041 | Physics 1A | 6cp |
| 91303 | Experimental Design in Ecology | 3cp |
| 91329 | Ecological Sampling | 3cp |

### Stage 4

***Spring semester***

| | | |
|---|---|---|
| 66407 | Mapping and Remote Sensing | 6cp |
| 66408 | Earth Resources | 6cp |
| 66409 | Surficial Processes and Products | 6cp |
| 91309 | Australian Biota | 6cp |

### Stage 5

***Autumn semester***

| | | |
|---|---|---|
| 66508 | Crustal and Mantle Processes | 8cp |
| 66509 | Tectonics and Surface Dynamics | 4cp |
| 66510 | Geophysics | 4cp |
| | Electives[1] | 8cp |

### Stage 6

***Spring semester***

| | | |
|---|---|---|
| 66609 | Environmental and Quaternary Geology | 8cp |
| 66610 | Engineering Geology | 4cp |
| 66034 | Groundwater Geology | 4cp |
| 91327 | Environmental Management Procedures | 4cp |
| | Elective[1] | 4cp |

## Part-time program

### Stage 1

***Autumn semester***

| | | |
|---|---|---|
| 65012 | Chemistry 1A | 6cp |
| 66101 | Earth Science 1 | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 65022 | Chemistry 2A | 6cp |
| 66204 | Field Studies 1 | 6cp |

### Stage 2

***Autumn semester***

| | | |
|---|---|---|
| 33101 | Mathematics 1 (LS) | 3cp |
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 91311 | Biology 1 | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 91312 | Biology 2 | 6cp |
| 91395 | Biocomputing | 3cp |
| | *or* | |
| 31871 | Computing for Science | 3cp |

### Stage 3

***Autumn semester***

| | | |
|---|---|---|
| 66304 | Earth Materials | 6cp |
| 68041 | Physics 1A | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 66408 | Earth Resources | 6cp |
| 91309 | Australian Biota | 6cp |

### Stage 4

***Autumn semester***

| | | |
|---|---|---|
| 66305 | Fold Belts and Cratons | 6cp |
| 91303 | Experimental Design in Ecology | 3cp |
| 91329 | Ecological Sampling | 3cp |

***Spring semester***

| | | |
|---|---|---|
| 66407 | Mapping and Remote Sensing | 6cp |
| 66409 | Surficial Processes and Products | 6cp |

### Stage 5

***Autumn semester***

| | | |
|---|---|---|
| 66508 | Crustal and Mantle Processes | 8cp |
| 66510 | Geophysics | 4cp |

***Spring semester***

| | | |
|---|---|---|
| 66609 | Environmental and Quaternary Geology | 8cp |
| | Elective[1] | 4cp |

### Stage 6

***Autumn semester***

| | | |
|---|---|---|
| 66509 | Tectonics and Surface Dynamics | 4cp |
| | Elective[1] | 8cp |

***Spring semester***

| | | |
|---|---|---|
| 66610 | Engineering Geology | 4cp |
| 66034 | Groundwater Geology | 4cp |
| 91346 | Environmental Management Procedures | 4cp |

[1] Students may elect to study other UTS subjects or subjects from the list of SUCOGG Electives below. Recommended electives in Environmental Sciences are listed in the Elective Options Table for Environmental Biology and Environmental and Urban Horticulture courses.

## Sydney Universities Consortium of Geology and Geophysics (SUCOGG)

Through a cooperative agreement between the four metropolitan universities teaching geosciences, students are able to choose electives from a range of honours level specialist subjects. These subjects are offered in a variety of flexible modes (field-based, short-course) with coursework usually timetabled for Thursdays and Fridays during the first half of each year. A subject will only be offered if the staff member(s) listed is (are) available and sufficient students (usually a minimum of 8–10) enrol. Students are required to advise both the Department of Environmental Sciences Honours Coordinator and the nominated Subject Coordinator of their intention to enrol, before the end of the second week of semester. Contact details for SUCOGG subject coordinators are given in the subject descriptions section of this handbook.

| | | |
|---|---|---|
| 66651 | Convergent Margin Tectonics | 3cp |
| 66653 | Advanced Clastic Basin Analysis | 3cp |
| 66941 | Applied Palaeontology | 3cp |
| 66942 | Paleobiology Part I | 3cp |
| 66943 | Coastal Environmental Assessments | 3cp |
| 66944 | Coal Exploration and Mining Geology | 3cp |
| 66947 | Carbonates in Petroleum Exploration | 3cp |
| 66949 | Palaeobiology Part II | 3cp |
| 66950 | Geochemical Analysis Techniques and Applications | 3cp |
| 66952 | An Introduction to Phase Diagrams and Thermobarometry | 3cp |
| 66953 | Interpretation of 2D and 3D Seismic Reflection Data | 3cp |
| 66954 | Processing of Seismic Reflection and Ground Penetrating Radar Data | 3cp |
| 66955 | Geological and Structural Interpretation of Potential Field Data | 3cp |
| 66956 | Deformation Processes | 3cp |
| 66957 | Introduction to Geostatistical Data Analysis | 3cp |

# Bachelor of Science (Honours) in Geoscience

***Course code: NG06***

# Bachelor of Science (Honours) in Environmental Science

***Course code: NG07***

Both of these honours programs are one year full-time courses, or equivalent part-time, which are taken after completing the Bachelor of Science in Earth and Environmental Science or an equivalent course with an average grade of at least credit over the final third of the course. The Honours degrees offer basic training in research and introduce students to advanced areas of study in either geoscience or environmental science. The major component is a supervised individual research project which extends over the full duration of the course and normally takes the form of an experimental or analytical investigation undertaken in the laboratory or the field.

Entry requirements and further details are provided in the general introduction to the Undergraduate Courses section of this handbook.

Students wishing to undertake Honours in 1999 should contact the Head of Department for advice concerning projects available and the pattern of Honours most suitable for them, and consult the student noticeboards in the Department of Environmental Sciences for details of available projects and supervisors.

## Full-time program Bachelor of Science (Honours) in Geoscience

| Stage 1 | | |
|---|---|---|
| 66854 | Honours (Geoscience) (2 sem) | 24cp |
| **Stage 2** | | |
| 66854 | Honours (Geoscience) (2 sem) | 24cp |

## Full-time program – Bachelor of Science (Honours) in Environmental Science

| Stage 1 | | |
|---|---|---|
| 66855 | Honours (Environmental Science) (2 sem) | 24cp |
| **Stage 2** | | |
| 66855 | Honours (Environmental Science) (2 sem) | 24cp |

# Bachelor of Science in Materials Science

***Course code: NM05***

*Course Director: Dr A S Ray*

All students who commenced their studies before 1997 should refer to the note for continuing students at the beginning of the Undergraduate Courses section of this handbook.

With the advancement of technology comes 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 for students, the Bachelor of Science in Materials Science and the Bachelor of Science (Honours) in Materials Science. Graduates from these degrees will be well equipped to work in materials science-related industry. Honours degree graduates will, however, be better prepared to undertake postgraduate research.

Students have the opportunity to tailor their studies to their individual interests by taking

elective subjects or a second major stream of study either in another area of science or in another field of study such as business, communication, international studies, law, mathematics or computing sciences. Students should refer to the section on second majors in this handbook and consult their Course Director for advice on selecting second majors.

The Pass degree course consists of six stages of formal academic study and students also have the opportunity to undertake a professional/industrial experience program leading to the additional award of Diploma in Scientific Practice. Although the course may be completed by three years of full-time attendance if the professional/industrial experience component is not taken, all students are strongly encouraged to undertake the industrial experience program. Hence the common course patterns are four years of full-time enrolment, including one year of industrial experience; or six years of part-time attendance while concurrently employed in a relevant industry; or alternating periods of full-time study with similar periods of full-time relevant employment.

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 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 expected that employers will 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. All academic inquiries should be directed to:

Course Director, Materials Science
Dr Abhi Ray
Department of Chemistry, Materials and Forensic Science
telephone 9514 1788
fax 9514 1628
email Abhi.Ray@uts.edu.au

## Full-time program

### Stage 1

***Autumn semester***

| | | |
|---|---|---|
| 33190 | Mathematical Modelling for Science | 6cp |
| 65101 | Chemistry 1C | 6cp |
| 67101 | Introduction to Materials | 6cp |
| 68101 | Physics 1C | 6cp |

### Stage 2

***Spring semester***

| | | |
|---|---|---|
| 33290 | Computing and Mathematics for Science | 6cp |
| 65201 | Chemistry 2C | 6cp |
| 67303 | Mechanical Properties of Materials | 6cp |
| 68201 | Physics 2 | 6cp |

### Stage 3

***Autumn semester***

| | | |
|---|---|---|
| 67304 | Physical Metallurgy | 6cp |
| 67305 | Polymer Science | 6cp |
| 67306 | Industrial Ceramics | 6cp |
| | Elective/second major | 6cp |

### Stage 4

***Spring semester***

| | | |
|---|---|---|
| 67408 | Industrial Metallurgy | 6cp |
| 67409 | Polymer Technology | 6cp |
| 67506 | Technical Ceramics | 6cp |
| | Elective/second major | 6cp |

### Stage 5

***Autumn semester***

| | | |
|---|---|---|
| 67608 | Composites | 6cp |
| 67407 | Physical Properties of Materials | 6cp |
| | Electives/second major | 12cp |

### Stage 6

***Spring semester***

| | | |
|---|---|---|
| 65062 | Extractive Metallurgy | 6cp |
| 67606 | Corrosion and Degradation of Materials | 6cp |
| | Electives/second major | 12cp |

## Part-time program

### Stage 1

***Autumn semester***

| | | |
|---|---|---|
| 33190 | Mathematical Modelling for Science | 6cp |
| 67101 | Introduction to Materials | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 65101 | Chemistry 1C | 6cp |
| 68101 | Physics 1 | 6cp |

### Stage 2

***Autumn semester***

| | | |
|---|---|---|
| 65201 | Chemistry 2C | 6cp |
| 68201 | Physics 2 | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 33290 | Computing and Mathematics for Science | 6cp |
| 67303 | Mechanical Properties of Materials | 6cp |

### Stage 3

***Autumn semester***

| | | |
|---|---|---|
| 67304 | Physical Metallurgy | 6cp |
| 67305 | Polymer Science | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 67408 | Industrial Metallurgy | 6cp |
| 67409 | Polymer Technology | 6cp |

### Stage 4

***Autumn semester***

| | | |
|---|---|---|
| 67306 | Industrial Ceramics | 6cp |
| | Elective/second major | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 67506 | Technical Ceramics | 6cp |
| | Elective/second major | 6cp |

### Stage 5

***Autumn semester***

| | | |
|---|---|---|
| 67407 | Physical Properties of Materials | 6cp |
| | Elective/second major | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 65062 | Extractive Metallurgy | 6cp |
| | Elective/second major | 6cp |

### Stage 6

***Autumn semester***

| | | |
|---|---|---|
| 67608 | Composites | 6cp |
| | Elective/second major | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 67606 | Corrosion and Degradation of Materials | 6cp |
| | Elective/second major | 6cp |

# Bachelor of Science (Honours) in Materials Science

***Course code: NM06***

This course is a one year full-time course, or equivalent part-time, which is taken after completing the Bachelor of Science in Materials Science or an equivalent course with an average grade of at least credit over the final third of the course. The Honours degree offers basic training in research and introduces students to advanced areas of study in materials science. The major component is a supervised individual research project which extends over the full duration of the course and normally takes the form of an experimental or analytical investigation undertaken in the laboratory.

Further details are provided in the general introduction to the Undergraduate Courses section of this handbook.

Students wishing to undertake Honours in 1999 should contact the Honours Course Coordinator, Department Chemistry, Forensic and Materials Science for advice concerning projects available and the pattern of Honours most suitable for them.

## Full-time program

### Stage 1

| | | |
|---|---|---|
| 67854 | Honours (Materials Science) (2 sem) | 24cp |

### Stage 2

| | | |
|---|---|---|
| 67854 | Honours (Materials Science) (2 sem) | 24cp |

# Bachelor of Science in Applied Physics

### *Course code: NP05*

*Applied Physics Student Coordinator:*
*Dr R L S Woolcott*

All students who commenced their studies before 1997 should refer to the note for continuing students at the beginning of the Undergraduate Courses section of this handbook.

The development of modern technology and its application in a wide variety of industries has created a demand for scientists who have a confident 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. Applied physics graduates meet this demand and find employment in a wide range of private industries and public authorities.

The early stages of the Pass degree course consist of the study of basic science subjects, with the remainder of the course placing an emphasis on measurement, and on the use and design of instrumentation for measurement and control. There is thus a focus on modern electronics and computers. Students who perform well in the Pass program may proceed to the Honours program in order to pursue their studies to more advanced levels.

The Pass degree course consists of six stages of formal academic study and students also have the opportunity to undertake a professional/industrial experience program leading to the additional award of Diploma in Scientific Practice. Although the course may be completed by three years of full-time attendance if the professional/industrial experience component is not taken, all students are strongly encouraged to undertake the industrial experience program. Hence the common course patterns are four years of full-time enrolment, including one year of industrial experience; or six years of part-time attendance while concurrently employed in a relevant industry; or alternating periods of full-time study with similar periods of full-time relevant employment.

Students have the opportunity to tailor their studies to their individual interests by taking elective subjects or a second major stream of study either in another area of science or in another field of study such as business, communications, international studies, law, mathematics or computing sciences. Students should refer to the section on second majors in this handbook and consult the Applied Physics Student Coordinator for advice on selecting second majors.

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 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 expected that employers will 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. All academic inquiries should be directed to:

Dr Ray Woolcott
Department of Applied Physics
telephone 9514 2208
fax 9514 2219
email Ray.Woolcott@uts.edu.au

## Full-time program

### Stage 1

#### *Autumn semester*

| | | |
|---|---|---|
| 33190 | Mathematical Modelling for Science | 6cp |
| 65101 | Chemistry 1C | 6cp |
| 68101 | Physics 1C | 6cp |
| | *one of* | |
| 66101 | Earth Science 1 | 6cp |
| 91311 | Biology 1 | 6cp |
| 91701 | Medical Science 1 | 6cp |
| 48210 | Engineering for Sustainability | 6cp |

### Stage 2

#### *Spring semester*

| | | |
|---|---|---|
| 33290 | Computing and Mathematics for Science | 6cp |
| 65201 | Chemistry 2C | 6cp |
| 67101 | Introduction to Materials | 6cp |
| 68201 | Physics 2 | 6cp |

### Stage 3

#### *Autumn semester*

| | | |
|---|---|---|
| 33390 | Mathematics and Scientific Software | 6cp |
| 68314 | Electronics | 6cp |
| 68311 | Physics 3 | 6cp |
| 68312 | Applied Physics 1 | 6cp |

Stage 4

***Spring semester***

| | | |
|---|---|---|
| 33490 | Computational Mathematics and Physics | 6cp |
| 68411 | Physics 4 | 6cp |
| 68412 | Applied Physics 2 | 6cp |
| | Elective/second major | 6cp |

Stage 5

***Autumn semester***

| | | |
|---|---|---|
| 68514 | Electronics and Interfacing | 6cp |
| 68511 | Quantum and Solid State Physics | 6cp |
| | Elective/second major | 12cp |

Stage 6

***Spring semester***

| | | |
|---|---|---|
| 68512 | Applied Physics 3 | 6cp |
| 68611 | Electromagnetics and Optics | 6cp |
| | Electives/second major | 12cp |

## Part-time program

Stage 1

***Autumn semester***

| | | |
|---|---|---|
| 33190 | Mathematical Modelling for Science | 6cp |
| | *one of* | |
| 66101 | Earth Science 1 | 6cp |
| 91311 | Biology 1 | 6cp |
| 91701 | Medical Science 1 | 6cp |
| 48210 | Engineering for Sustainability | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 65201 | Chemistry 2C | 6cp |
| 68201 | Physics 2 | 6cp |

Stage 2

***Autumn semester***

| | | |
|---|---|---|
| 65201 | Chemistry 1C | 6cp |
| 68201 | Physics 2C | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 33290 | Computing and Mathematics for Science | 6cp |
| 67101 | Introduction to Materials | 6cp |

Stage 3[1]

***Autumn semester***

| | | |
|---|---|---|
| 68311 | Physics 3 | 6cp |
| 68312 | Applied Physics 1 | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 68411 | Physics 4 | 6cp |
| 68412 | Applied Physics 2 | 6cp |

Stage 4

***Autumn semester***

| | | |
|---|---|---|
| 33390 | Mathematics and Scientific Software | 6cp |
| 68314 | Electronics | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 33940 | Computational Mathematics and Physics | 6cp |
| | Elective/second major | 6cp |

Stage 5

***Autumn semester***

| | | |
|---|---|---|
| 68511 | Quantum and Solid State Physics | 6cp |
| | Elective/second major | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 68611 | Electromagnetics and Optics | 6cp |
| | Elective/second major | 6cp |

Stage 6

***Autumn semester***

| | | |
|---|---|---|
| 68514 | Electronics and Interfacing | 6cp |
| | Elective/second major | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 68512 | Applied Physics 3 | 6cp |
| | Elective/second major | 6cp |

[1] At this point students study subjects in a different order depending on whether they enter Stage 3 in an even or an odd numbered year. Above is shown the program for entry in an odd year. For the other program refer to the Applied Physics Student Coordinator, Ray Woolcott or Head of the Applied Physics Department, Suzanne Hogg.

# Bachelor of Science (Honours) in Applied Physics

***Course code: NP06***

All students who commenced their studies before 1997 should refer to the note for continuing students at the beginning of the Undergraduate Courses section of this handbook.

This course is a one year full-time course, or equivalent part-time, which is taken after completing the Bachelor of Science in Applied Physics or an equivalent course with an average grade of at least credit over the final third of the course. The Honours degree offers basic training in research and introduces students to advanced areas of study in applied physics. The major component is a supervised individual research project which extends over the full duration of the course and normally

takes the form of an experimental or analytical investigation undertaken in the laboratory.

Further details are provided in the general introduction to the Undergraduate Courses section of this handbook.

Students wishing to undertake Honours in 1999 should contact the Head of the Department of Applied Physics or the Honours Course Coordinator for advice concerning eligibility, selection and assessment procedures, and for information on projects available and the pattern of Honours most suitable for them.

## Full-time program

**Stage 1**

| | | |
|---|---|---|
| 68854 | Honours (Physics) (2 sem) | 24cp |

**Stage 2**

| | | |
|---|---|---|
| 68854 | Honours (Physics) (2 sem) | 24cp |

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

***Course code: NP04***

*Applied Physics Student Coordinator: Dr R L S Woolcott*

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 to 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.

All academic inquiries should be directed to:

Dr Ray Woolcott
Department of Applied Physics
telephone 9514 2208
fax 9514 2219
email Ray.Woolcott@uts.edu.au

## Sandwich program

**Stage 1**

***Autumn semester***

| | | |
|---|---|---|
| 33130 | Mathematical Modelling 1 | 6cp |
| 48210 | Engineering for Sustainability | 6cp |
| 65101 | Chemistry 1C | 6cp |
| 68101 | Physics 1C | 6cp |

**Stage 2**

***Spring semester***

| | | |
|---|---|---|
| 33230 | Mathematical Modelling 2 | 6cp |
| 48220 | Informatics | 6cp |
| 65201 | Chemistry 2C | 6cp |
| 68201 | Physics 2 | 6cp |

**Stage 3**

***Autumn semester***

| | | |
|---|---|---|
| 48430 | Software Development | 6cp |
| 68314 | Electronics | 6cp |
| 68311 | Physics 3 | 6cp |
| 68312 | Applied Physics 1 | 6cp |

Stage 4

***Spring semester***

| | | |
|---|---|---|
| 33490 | Computational Mathematics and Physics | 6cp |
| 48230 | Engineering Communication | 6cp |
| 48530 | Circuit Analysis | 6cp |
| 68411 | Physics 4 | 6cp |

Stage 5

***Autumn semester***

| | | |
|---|---|---|
| 48120 | Review of Engineering Practice 1 | 6cp |
| 48110 | Engineering Experience 1 | 0cp |

Stage 6

***Spring semester***

| | | |
|---|---|---|
| 48240 | Uncertainties and Risk in Engineering | 6cp |
| 48540 | Signals and Systems | 6cp |
| 68412 | Applied Physics 2 | 6cp |
| 68511 | Quantum and Solid State Physics | 6cp |

Stage 7

***Autumn semester***

| | | |
|---|---|---|
| 48250 | Engineering Economics and Finance | 6cp |
| 48441 | Introductory Digital Systems | 6cp |
| 68611 | Electromagnetics and Optics | 6cp |
| 68512 | Applied Physics 3 | 6cp |

Stage 8

***Spring semester***

| | | |
|---|---|---|
| 48140 | Review of Engineering Practice 2 | 6cp |
| 48130 | Engineering Experience 2 | 0cp |

Stage 9

***Autumn semester***

| | | |
|---|---|---|
| 48260 | Engineering Management | 6cp |
| 48550 | Power Systems | 6cp |
| 48451 | Advanced Digital Systems | 6cp |
| 48570 | Data Acquisition and Distribution | 6cp |

Stage 10

***Spring semester***

| | | |
|---|---|---|
| 48270 | Technology Assessment | 6cp |
| 48560 | Analogue and Digital Control | 6cp |
| 48561 | Power Electronics | 6cp |
| | Submajor/Elective | 6cp |

Stage 11

***Autumn semester***

| | | |
|---|---|---|
| 48006 | Capstone Project | 6cp |
| | Submajor/Elective | 18cp |

Subject descriptions for Engineering subjects are included in this handbook.

# Bachelor of Health Science in Acupuncture

***Course code: P005***

*Course Director: Mr C Zaslawski*

This course is under review in 1998 and may be subject to change. For further details contact the College of Traditional Chinese Medicine on telephone 9514 2500.

All students who commenced their studies before 1997 should refer to the note for continuing students at the beginning of the Undergraduate Courses section of this handbook.

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).

All academic inquiries should be directed to:
Course Director, Acupuncture
Mr Chris Zaslawski
College of Traditional Chinese Medicine
Faculty of Science
telephone 9212 4427 or 9514 2500
fax 9281 2267
email Chris.Zaslawski@uts.edu.au

## 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 A | 6cp |
| 91607 | Research Methods 1 | 4cp |

### Stage 4

***Spring semester***

| | | |
|---|---|---|
| 99511 | History and Philosophy of TCM | 6cp |
| 99576 | Advanced Chinese Diagnosis | 6cp |
| 99541 | Clinic – Level 4 (A&M) and Point Location 2 | 6cp |
| 99540 | Pathophysiology B | 6cp |

### Stage 5

***Autumn semester***

| | | |
|---|---|---|
| 99578 | Microsystems | 6cp |
| 99579 | Chinese Massage (*Tuina*) | 6cp |
| 99582 | Clinic – Level 5 & Advanced Treatment Techniques | 6cp |
| 99584 | Clinical Features of Disease | 6cp |

### Stage 6

***Spring semester***

| | | |
|---|---|---|
| 99542 | 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 | 0cp |

### Stage 7

***Autumn semester***

| | | |
|---|---|---|
| 99590 | Special Topics in TCM (Intermodal and Professional) | 8cp |
| 99591 | Practice Management | 4cp |
| 99538 | Clinical Internship (A&M) | 12cp[1] |

[1] 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 Acupuncture (Honours)

***Course code: P006***

*Course Director: Mr C Zaslawski*

This course is under review in 1998 and may be subject to change. For further details contact the College of Traditional Chinese Medicine on telephone 9514 2500.

## 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 | 24cp |

### Stage 9

| | | |
|---|---|---|
| 99593 | Honours Project | 24cp |

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

***Course code: NH01***

*Course Director: Mr C Zaslawski*

This course is under review in 1998 and may be subject to change. For further details contact the College of Traditional Chinese Medicine on telephone 9514 2500.

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 five-and-a-half-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 264 credit points of study: 168 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.

All academic inquiries should be directed to:
Course Director, Acupuncture
Mr Chris Zaslawski
College of Traditional Chinese Medicine
Faculty of Science
telephone 9212 4427 or 9514 2500
fax 9281 2267
email Chris.Zaslawski@uts.edu.au

## Course structure

### Year 1

#### *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

#### *Stage 3*

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

#### *Stage 4*

| | | |
|---|---|---|
| 99511 | History and Philosophy of TCM | 6cp |
| 99576 | Advanced Chinese Diagnosis | 6cp |
| 99541 | Clinic – Level 4 (A&M) and Point Location 2 | 6cp |
| 99540 | Pathophysiology B | 6cp |

### Year 3

#### *Stage 5*

| | | |
|---|---|---|
| 971111 | Chinese Language and Culture 1 | 8cp |
| 99578 | Microsystems | 6cp |
| 99582 | Clinic – Level 5 (A&M) and Advanced Treatment Techniques | 6cp |
| 99584 | Clinical Features of Disease | 6cp |

### *Stage 6*

| | | |
|---|---|---|
| 972111 | Chinese Language and Culture 2 | 8cp |
| 99542 | Project Workshop | 3cp |
| 99521 | Clinical Acupuncture | 5cp |
| 99588 | Clinical Theory and Clinic – Level 6 (A&M) | 6cp |
| 99536 | First Aid Certificate course | 0cp |

Year 4

### *Stage 7*

| | | |
|---|---|---|
| 973111 | Chinese Language and Culture 3 | 8cp |
| 99590 | Special Topics | 8cp |
| 99606 | Clinical Internship (A&M/INT.ST) A | 6cp |

### *Stage 8*

| | | |
|---|---|---|
| 974111 | Chinese Language and Culture 4 | 8cp |
| 976111 | Contemporary China | 8cp |
| 91608 | Research Methods 2 | 4cp |
| 99585 | Disease States (Acupuncture) | 6cp |

Year 5

### *Stage 9*

| | | |
|---|---|---|
| 977110 | In-country Study 1: China | 24cp |

### *Stage 10*

| | | |
|---|---|---|
| 978110 | In-country Study 2: China | 24cp |

Year 6

### *Stage 11*

| | | |
|---|---|---|
| 50140 | Modernisation and Social Change | 8cp |
| 99579 | Chinese Massage | 6cp |
| 99591 | Practice Management | 4cp |
| 99607 | Clinical Internship (A&M/INT.ST) B | 6cp |

Total 264cp

# Bachelor of Health Science in Chinese Herbal Medicine

### *Course code: NH02*

*Course Director: Mr C X Yang*

This course is under review in 1998 and may be subject to change. For further details contact the College of Traditional Chinese Medicine on telephone 9514 2500.

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 (CHM). This program is a companion course to the Bachelor of Health Science in Acupuncture that is also offered by the Faculty of Science.

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. All academic inquiries should be directed to:

Course Director, Chinese Herbal Medicine
Mr Cong-Xing Yang
College of Traditional Chinese Medicine
Faculty of Science
telephone 9212 4375 or 9514 2500
fax 9281 2267
email Congxing.Yang@uts.edu.au

## 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 A | 6cp |
| 91607 | Research Methods 1 | 4cp |

### Stage 4

***Spring semester***

| | | |
|---|---|---|
| 99511 | History and Philosophy of TCM | 6cp |
| 99576 | Advanced Chinese Diagnosis | 6cp |
| 99577 | Clinic – Level 4 (CHM) and Chinese Herbal Medicine Practice | 6cp |
| 99540 | Pathophysiology B | 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***

| | | |
|---|---|---|
| 99542 | 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[1] |

[1] 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 99592 Clinical Internship.

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

***Course code: NH03***

*Course Director: Mr C X Yang*

This course is under review in 1998 and may be subject to change. For further details contact the College of Traditional Chinese Medicine on telephone 9514 2500.

## 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 | 24cp |

### Stage 9

| | | |
|---|---|---|
| 99593 | Honours Project | 24cp |

# Bachelor of Health Science in Chinese Herbal Medicine/ Bachelor of Arts in International Studies

***Course code: NH05***

*Course Director: Mr C X Yang*

This course is under review in 1998 and may be subject to change. For further details contact the College of Traditional Chinese Medicine on telephone 9514 2500.

This course parallels the combined degree of its companion program, Bachelor of Health Science in Acupuncture/Bachelor of Arts in International Studies (Chinese major) NH01.

The structure of the proposed degree in Chinese Herbal Medicine and Chinese Studies is derived from the combination of the complete Bachelor of Heath Sciences in Chinese Herbal Medicine and the China specialisation within the International Studies program. All academic inquiries should be made to:

Course Director, Chinese Herbal Medicine
Mr Cong-Xing Yang
College of Traditional Chinese Medicine
Faculty of Science
telephone 9212 4375 or 9514 2500
fax 9281 2267
email Congxing.Yang@uts.edu.au

## Course structure

Year 1

***Stage 1 – Autumn semester***

| | | |
|---|---|---|
| 99560 | Introduction to TCM | 6cp |
| 99502 | Foundations of TCM | 6cp |
| 99562 | Clinical Theory and Clinic – Level 1 | 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 |

Year 2

***Stage 3 – Autumn semester***

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

***Stage 4 – Spring semester***

| | | |
|---|---|---|
| 99511 | History and Philosophy of TCM | 6cp |
| 99576 | Advanced Chinese Diagnosis | 6cp |
| 99577 | Clinic – Level 4 and Chinese Herbal Practice | 6cp |
| 99540 | Pathophysiology B | 6cp |

Year 3

***Stage 5 – Autumn semester***

| | | |
|---|---|---|
| 99580 | Pharmacognosy | 6cp |
| 99583 | Clinic – Level 5 and Chinese Herbal Medicine Practice | 6cp |
| 99584 | Clinical Features of Disease | 6cp |
| 971111 | Chinese Language and Culture 1 | 8cp |

***Stage 6 – Spring semester***

| | | |
|---|---|---|
| 99542 | Project Workshops (Major Essay) | 3cp |
| 99587 | Clinical Chinese Herbalism | 5cp |
| 99589 | Clinical Theory (Internship) and Clinic – Level 6 | 6cp |
| 972111 | Chinese Language and Culture 2 | 8cp |
| 99536 | First Aid Course (External) | 0cp |

Year 4

***Stage 7 – Autumn semester***

| | | |
|---|---|---|
| 99581 | Chinese Herbal Medicine 1 | 6cp |
| 99608 | Clinical Internship (CHM/INT.ST) A | 8cp |
| 973111 | Chinese Language and Culture 3 | 8cp |

***Stage 8 – Spring semester***

| | | |
|---|---|---|
| 974111 | Chinese Language and Culture 4 | 8cp |
| 976111 | Contemporary China | 8cp |
| 99586 | Chinese Herbal Medicine 2 | 6cp |
| 91608 | Research Methods 2 | 4cp |

Year 5

***Stage 9 – Autumn semester***

| | | |
|---|---|---|
| 977110 | In-Country Study 1: China | 24cp |

***Stage 10 – Spring semester***

| | | |
|---|---|---|
| 978110 | In-Country Study 2: China | 24cp |

Year 6

***Stage 11 – Autumn Semester***

| | | |
|---|---|---|
| 50140 | Modernisation and Social Change | 8cp |
| 99590 | Special Topics in TCM | 8cp |
| 99591 | Practice Management | 4cp |
| 99609 | Clinical Internship (CHM/INT.ST) B | 4cp |

# Bachelor of Medical Science

***Course code: NH04***

*Course Director: Dr G Nicholson*

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, some of which may form a coherent second major strand. All students enrolled in the course must satisfactorily complete a total of 40 credit points of elective/second major subjects for award of the degree. Students generally choose these subjects with a particular theme or area of expertise in mind, such as a particular area of study, through subjects available within the biological and biomedical sciences, or by way of subjects from other parts of the Faculty of Science or other faculties of UTS including Humanities and Social Sciences, Engineering, Nursing, Business, Law, or the Institute for International Studies. Examples of recommended electives are given in the Elective Options Table for Biomedical Science and Medical Science courses. Students may be eligible to take a second major in the biomedical science area (provided that they fulfil all of the prerequisites for subjects listed in the recommended biomedical subject strands). Students should also refer to the section on second majors in this handbook and consult the Medical Science Course Director for advice on selecting second majors and electives. It should be noted that timetable constraints may prevent the undertaking of some subject combinations.

All academic inquiries should be directed to:
Course Director, Medical Science
Dr Graham Nicholson
Department of Health Sciences
telephone 9514 2230 or 9514 2234
fax 9514 2228
email Graham.Nicholson @uts.edu.au

### Stage 1

***Autumn semester***

| | | |
|---|---|---|
| 33101 | Mathematics 1 (LS) | 3cp |
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 65101 | Chemistry 1C | 6cp |
| 68041 | Physics 1A | 6cp |
| 91701 | Medical Science 1 | 6cp |

### Stage 2

***Spring semester***

| | | |
|---|---|---|
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 65201 | Chemistry 2C | 6cp |
| 91395 | Biocomputing | 3cp |
| 91702 | Medical Science 2 | 6cp |
| | *one of* | |
| 68201 | Physics 2 | 6cp |
| 91312 | Biology 2 | 6cp |
| | *or* | |
| | Other approved subject | 6cp |

### Stage 3

***Autumn semester***

| | | |
|---|---|---|
| 91313 | Biochemistry 1 | 6cp |
| 91703 | Physiological Systems | 6cp |
| | Electives/ second major | 12cp |

Stage 4

***Spring semester***

| | | |
|---|---|---|
| 91704 | Behavioural Sciences | 6cp |
| 91705 | Medical Devices and Diagnostics | 6cp |
| | Electives/ second major | 12cp |

Stage 5

***Autumn semester***

| | | |
|---|---|---|
| 91706 | Neuroscience | 8cp |
| 91707 | Pharmacology 1 | 8cp |
| | Electives/ second major | 8cp |

Stage 6

***Spring semester***

| | | |
|---|---|---|
| 91708 | Psychophysiology | 8cp |
| 91709 | Pharmacology 2 | 8cp |
| | Electives/ second major | 8cp |

# Bachelor of Science (Honours)

***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, Environmental and Urban Horticulture or Medical Science 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 and course requirements

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.

## Other information

Information concerning the method of application, starting dates and other relevant matters is provided at the beginning of the Undergraduate Courses section of this handbook.

## Course structure

### Full-time program

Year 1 – Stages 1 and 2

***Autumn and Spring semesters***

| | | |
|---|---|---|
| 91304 | Honours (Biological and Biomedical Sciences) | 48cp |

### Part-time program

Year 1 – Stages 1 and 2

***Autumn and Spring semesters***

| | | |
|---|---|---|
| 91305 | Honours (Biological and Biomedical Sciences) (2yrs) | 24cp |

Year 2 – Stages 3 and 4

***Autumn and Spring semesters***

| | | |
|---|---|---|
| 91305 | Honours (Biological and Biomedical Sciences) (2yrs) | 24cp |

# Bachelor of Science in Biomedical Science

***Course code: KB02***

*Course Director: Dr J Swann*

All students who commenced their studies before 1997 should refer to the note for continuing students at the beginning of the Undergraduate Courses section of this handbook.

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. At least half of these must be biomedical science electives covering more advanced biomedical aspects of the second-year core subjects or introducing a range of important areas of applied biomedical science.

The opportunity also exists for students to undertake a range of second majors or free electives in disciplines outside 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.

Graduates from this course who have completed studies in relevant clinical areas will be eligible for membership of the Australian Institute of Medical Scientists (AIMS). Further advice may be obtained from the Head of the Department of Cell and Molecular Biology.

## 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. The full-time course may be extended by up to one year for students who elect to take the professional/industrial experience program leading to the additional award of Diploma in Scientific Practice.

Subjects are divided into core subjects and elective subjects, some of which may form a coherent second major strand. 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/second major subjects. Students generally choose these subjects with a particular theme or area of expertise in mind. Recommended electives are given in the Elective Options Table for Biomedical Science and Medical Science courses. Students should also refer to the section on second majors in this handbook and consult the Biomedical Science Course Director for advice in selecting second majors and electives. It should be noted that timetable constraints may prevent the undertaking of some elective combinations. All academic inquiries should be directed to:

Course Director, Biomedical Science
Dr John Swann
Department of Cell and Molecular Biology
telephone (02) 9514 4064
fax (02) 9514 4026
email John.Swann@uts.edu.au

## Full-time program

### Stage 1

***Autumn semester***

| | | |
|---|---|---|
| 33101 | Mathematics 1 (LS) | 3cp |
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 65012 | Chemistry 1A | 6cp |
| 91701 | Medical Science 1 | 6cp |
| 68041 | Physics 1A | 6cp |

Stage 2

***Spring semester***

| | | |
|---|---|---|
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 65022 | Chemistry 2A | 6cp |
| 91395 | Biocomputing | 3cp |
| 91702 | Medical Science 2 | 6cp |
| | *one of* | |
| 68201 | Physics 2 | 6cp |
| 91312 | Biology 2 | 6cp |
| | *or* | |
| | Other approved science subject | 6cp |

Stage 3

***Autumn semester***

| | | |
|---|---|---|
| 91313 | Biochemistry 1 | 6cp |
| 91314 | Microbiology 1 | 6cp |
| 91354 | Anatomical Pathology | 6cp |
| | Elective/second major | 6cp |

Stage 4

***Spring semester***

| | | |
|---|---|---|
| 91320 | Biochemistry 2 | 6cp |
| 91326 | Analytical Biochemistry | 6cp |
| 91330 | Microbiology 2 | 6cp |
| | Elective/second major | 6cp |

Stage 5

***Autumn semester***

| | | |
|---|---|---|
| | Biomedical Science Electives[1] | 16cp |
| | Elective/second major | 8cp |

Stage 6

***Spring semester***

| | | |
|---|---|---|
| | Biomedical Science Electives[1] | 8cp |
| | Electives/second major | 16cp |

[1] For details of electives available for the Biomedical Science degree, see Biomedical Science Elective Options Table.

## Part-time program

Stage 1

***Autumn semester***

| | | |
|---|---|---|
| 65012 | Chemistry 1A | 6cp |
| 91701 | Medical Science 1 | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 65022 | Chemistry 2A | 6cp |
| 91702 | Medical Science 2 | 6cp |

Stage 2

***Autumn semester***

| | | |
|---|---|---|
| 33101 | Mathematics 1 (LS) | 3cp |
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 68041 | Physics 1A | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 91395 | Biocomputing | 3cp |
| | *one of* | |
| 68201 | Physics 2 | 6cp |
| 91312 | Biology 2 | 6cp |
| | *or* | |
| | Other approved science subject | 6cp |

Stages 3 and 4 – in 1999 and odd years

***Autumn semester***

| | | |
|---|---|---|
| 91314 | Microbiology 1 | 6cp |
| 91354 | Anatomical Pathology | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 91330 | Microbiology 2 | 6cp |
| | Elective/second major | 6cp |

Stages 3 and 4 – in 2000 and even years

***Autumn semester***

| | | |
|---|---|---|
| 91313 | Biochemistry 1 | 6cp |
| | Elective/second major | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 91320 | Biochemistry 2 | 6cp |
| 91326 | Analytical Biochemistry | 6cp |

Stage 5

***Autumn semester***

| | | |
|---|---|---|
| | Biomedical Science Electives[1] | 16cp |

***Spring semester***

| | | |
|---|---|---|
| | Biomedical Science Electives[1] | 8cp |

Stage 6

***Autumn semester***

| | | |
|---|---|---|
| | Elective/second major | 8cp |

***Spring semester***

| | | |
|---|---|---|
| | Electives/second major | 16cp |

[1] For details of electives available for the Biomedical Science degree, see Elective Options Table for the Biomedical Science and Medical Science courses.

**Note:** 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 the Biomedical Science and Medical Science courses

| Subject number | Subject name | Credit points | Sem A/S | Biomedical Science Recommended stage for subject[1] | Medical Science |
|---|---|---|---|---|---|
| 91703 | Physiological Systems | 6 | A | 3 | C |
| 91706 | Neuroscience | 8 | A | 5 | C |
| 91351 | Immunology 1 | 3 | S | 4 | 4 |
| 91313 | Biochemistry 1 | 6 | A | C | 3 |
| 91314 | Microbiology 1 | 6 | A | C | 3 |
| 91320 | Biochemistry 2 | 6 | S | C | 4 |
| 91326 | Analytical Biochemistry | 6 | S | C | 4 |
| 91330 | Micrbiology 2 | 6 | S | C | 4 |
| 91354 | Anatomical Pathology | 6 | A | C | 3 |
| 91355 | Haematology 1 | 3 | S | 4 | 4 |
| 91704 | Behavioural Science | 6 | S | 4 | C |
| 91705 | Medical Devices and Diagnostics | 6 | S | 4 | C |
| 91331 | Microbiology 3 | 8 | A | 5 e | 5 |
| 91332 | Molecular Biology 1 | 8 | A | 5 o | 5 |
| 91344 | Clinical Biochemistry 1 | 8 | A | 5 e | 5 |
| 91358 | Haematology 2 | 8 | A | 5 o | 5 |
| 91707 | Pharmacology 1 | 8 | A | 5 | C |
| 91335 | Molecular Biology 2 | 8 | S | 6 o | 6 |
| 91338 | Clinical Bacteriology | 8 | S | 6 e | 6 |
| 91340 | Transfusion Science | 8 | S | 6 o | 6 |
| 91345 | Clinical Biochemistry 2 | 8 | S | 6 e | 6 |
| 91352 | Eukaryotic Microbiology | 8 | S | 6 o | 6 |
| 91359 | Immunology 2 | 8 | S | 6 e | 6 |
| 97108 | Psychophysiology | 8 | S | 6 | C |
| 91709 | Pharmacology 2 | 8 | S | 6 | C |
| 91377 | Cytopathology | 16 | Full Year | 5&6 e | 5&6 |
| 91398 | Special Reading Assignment LS[2] | 4 | A&S | 5 or 6 | 5 or 6 |
| 91399 | Individual Project LS[2] | 8 | A&S | 5&6 | N/A |
| xxxxx | Miscellaneous elective[3] | 4/8 | A&S | 5 or 6 | 5 or 6 |

Key:

A = Timetabled in Autumn semester

S = Timetabled in Spring semester

LS = Life Sciences

C = Core subject for that course

1 The Stage 5 and 6 subjects marked (o) will run in part-time mode in odd-numbered years only; those marked (e) will run in part-time mode in even numbered years only.

2 Supervision form must be completed and approved by the relevant Course Director.

3 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 (Coursework Programs).

**Note**: Subjects recommended for particular stages 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.

## Recommended subject strands

Completion of any combination of subjects totalling a minimum of 24 credit points from the table of approved biomedical science electives, plus another 24 credit points of electives/second major subjects which may be drawn from the table or from another part of the Faculty or elsewhere in the University, 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 |
| | *plus* | |
| | Additional electives | 8cp |

**Stage 6**

| | | |
|---|---|---|
| 91335 | Molecular Biology 2 | 8cp |
| 91345 | Clinical Biochemistry 2 | 8cp |
| | *plus* | |
| | Additional electives | 8cp |

### Microbiology strand

**Stage 5**

| | | |
|---|---|---|
| 91331 | Microbiology 3 | 8cp |
| 91332 | Molecular Biology 1 | 8cp |
| | *plus* | |
| | Additional electives | 8cp |

**Stage 6**

| | | |
|---|---|---|
| 91338 | Clinical Bacteriology | 8cp |
| 91352 | Eukaryotic Microbiology | 8cp |
| | *plus* | |
| | Additional electives | 8cp |

### Pathology strand

**Stage 5**

| | | |
|---|---|---|
| 91358 | Haematology 2 | 8cp |
| 91377 | Cytopathology (2 sem) | 8cp |
| | *plus* | |
| | Additional electives | 8cp |

**Stage 6**

| | | |
|---|---|---|
| 91340 | Transfusion Science | 8cp |
| 91377 | Cytopathology (2 sem) | 8cp |
| | *plus* | |
| | Additional electives | 8cp |

### Immunology strand

**Stage 5**

| | | |
|---|---|---|
| 91332 | Molecular Biology 1 | 8cp |
| | *plus* | |
| | Additional electives | 16cp |

**Stage 6**

| | | |
|---|---|---|
| 91335 | Molecular Biology 2 | 8cp |
| 91359 | Immunology 2 | 8cp |
| | *plus* | |
| | Additional electives | 8cp |

# Bachelor of Science in Biotechnology

### *Course code: KB06*

*Course Director: Dr I Stevenson*

All students who commenced their studies before 1997 should refer to the note for continuing students at the beginning of the Undergraduate Courses section of this handbook.

The UTS Bachelor of Science degree in Biotechnology provides you with a professional qualification in biological science with emphasis on DNA technology and its applications, and a firm basis in the industrial aspects of biotechnology.

The course in Biotechnology involves a thorough grounding in biochemistry, microbiology, immunology and molecular biology; these are the principal areas which together comprise the multidisciplinary science that we now term 'Biotechnology'. The methods of biotechnology find application in almost every area of biological and medical sciences – to take just a few examples, areas as diverse as the development of new vaccines and therapeutic substances, the study of early human populations, improving the quality of foods and beverages, pest control in agriculture, and studies of the causation of cancer, all make use of the methods of biotechnology.

## 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. 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 grounding 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. The full-time course may be extended by up to one year for students who elect to take the professional/industrial experience program leading to the additional award of Diploma in Scientific Practice.

Subjects are divided into core subjects and elective subjects, some of which may be combined to form a coherent second major strand. 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 34 credit points of elective/second major subjects. Students generally choose these subjects with a particular theme or area of expertise in mind. Examples of recommended electives are given in the Elective Options Table for the Biotechnology course; however, it should be noted that timetable constraints may prevent the undertaking of some elective combinations.

The **second major strand** may consist entirely of subjects chosen from the Elective Options Table for the Biotechnology course, or other subjects from the Faculty of Science. Some students may wish to undertake subject from other faculties or institutes of UTS such as Business or Law or with the approval of the Associate Dean (Coursework Programs), subjects from other universities.

Students may also refer to the section on second majors in this handbook and consult the Biotechnology Course Director for advice on selecting second majors and electives.

All academic inquiries should be directed to the Course Director, Dr Iain Stevenson, Department of Cell and Molecular Biology:
telephone (02) 9514 4154
fax (02) 9514 4026
email Iain.Stevenson@uts.edu.au

## Full-time program

### Stage 1

***Autumn semester***

| | | |
|---|---|---|
| 33101 | Mathematics 1 (LS) | 3cp |
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 65012 | Chemistry 1A | 6cp |
| 68041 | Physics 1A | 6cp |
| 91701 | Medical Science 1 | 6cp |

### Stage 2

***Spring semester***

| | | |
|---|---|---|
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 65022 | Chemistry 2A | 6cp |
| 91395 | Biocomputing | 3cp |
| 91702 | Medical Science 2 | 6cp |
| | *one of* | |
| 68201 | Physics 2 | 6cp |
| 91312 | Biology 2 | 6cp |
| | *or* | |
| | Other approved science subject | 6cp |

### Stage 3

***Autumn semester***

| | | |
|---|---|---|
| 91313 | Biochemistry 1 | 6cp |
| 91314 | Microbiology 1 | 6cp |
| | Electives[1]/second major | 12cp |

### Stage 4

***Spring semester***

| | | |
|---|---|---|
| 91325 | Principles and Practice of Biotechnology | 3cp |
| 91326 | Analytical Biochemistry | 6cp |
| 91330 | Microbiology 2 | 6cp |
| 91351 | Immunology 1 | 3cp |
| | Elective[1]/second major | 6cp |

### Stage 5

***Autumn semester***

| | | |
|---|---|---|
| 91332 | Molecular Biology 1 | 8cp |
| 91369 | Applied and Environmental Microbiology | 8cp |
| | Electives[1]/second major | 8cp |

### Stage 6

***Spring semester***

| | | |
|---|---|---|
| 91335 | Molecular Biology 2 | 8cp |
| 91368 | Bioprocessing | 8cp |
| | Electives[1]/second major | 8cp |

[1] For details of the electives available for the Biotechnology degree, see Elective Options Table.

## Part-time program

### Stage 1

***Autumn semester***

| | | |
|---|---|---|
| 65012 | Chemistry 1A | 6cp |
| 91701 | Medical Science 1 | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 65022 | Chemistry 2A | 6cp |
| 91702 | Medical Science 2 | 6cp |

### Stage 2

***Autumn semester***

| | | |
|---|---|---|
| 33101 | Mathematics 1 (LS) | 3cp |
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 68041 | Physics 1A | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 91395 | Biocomputing | 3cp |
| | *one of* | |
| 68201 | Physics 2 | 6cp |
| 91312 | Biology 2 | 6cp |
| | *or* | |
| | Other approved science subject | 6cp |

### Stages 3 and 4 – in 1999 and odd years

***Autumn semester***

| | | |
|---|---|---|
| 91314 | Microbiology 1 | 6cp |
| | Elective[1]/second major | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 91330 | Microbiology 2 | 6cp |
| 91351 | Immunology 1 | 3cp |
| 91325 | Principles and Practice of Biotechnology | 3cp |

### Stages 3 and 4 – in 2000 and even years

***Autumn semester***

| | | |
|---|---|---|
| 91313 | Biochemistry 1 | 6cp |
| | Elective[1]/second major | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 91326 | Analytical Biochemistry | 6cp |
| | Elective[1]/second major | 6cp |

### Stage 5

***Autumn semester***

| | | |
|---|---|---|
| 91332 | Molecular Biology 1 | 8cp |
| | Electives[1]/second major | 8cp |

***Spring semester***

| | | |
|---|---|---|
| 91335 | Molecular Biology 2 | 8cp |

### Stage 6

***Autumn semester***

| | | |
|---|---|---|
| 91369 | Applied and Environmental Microbiology | 8cp |

***Spring semester***

| | | |
|---|---|---|
| 91368 | Bioprocessing | 8cp |
| | Electives/second major | 8cp |

[1] For details of the electives available for the Biotechnology degree, see Elective Options Table for Biotechnology course.

**Note:** 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 (Biological, Biomedical and Environmental Science subjects)

| Subject number | Subject name | Credit points | Sem A/S | Recommended stage for subject[1] |
|---|---|---|---|---|
| 91315 | Biochemistry 2 | 6 | S | 4 |
| 91324 | Environmental Toxicology | 8 | S | 6 |
| 91331 | Microbiology 3 | 8 | A | 5 e |
| 91327 | Environmental Management Procedures | 4 | S | 6 |
| 91338 | Clinical Bacteriology | 8 | S | 6 e |
| 91347 | Toxic Materials in the Environment | 4 | S | 6 |
| 91352 | Eukaryotic Microbiology | 8 | S | 6 o |
| 91359 | Immunology 2 | 8 | S | 6 e |
| 91375 | Field Studies: Introductory Marine Science | 4 | A&S | 5 or 6 |
| 91376 | Environmental Measurement | 3 | A | 3 |
| 91398 | Special Reading Assignment[1] | 4 | A&S | 5 or 6 |
| 91399 | Individual Project LS[2] | 8 | A&S | 5 or 6 |
| 91703 | Physiological Systems | 6 | A | 3 |
| 91707 | Pharmacology 1 | 8 | A | 5 |
| 91709 | Pharmacology 2 | 8 | S | 6 |
| xxxxx | Miscellaneous elective[3] | 4&8 | A&S | 3 – 6 |

Key:

A = Timetabled in Autumn semester

S = Timetabled in Spring semester

LS = Life Sciences

1 The subjects marked (o) will run in part-time mode in odd-numbered years only; those marked (e) will run in part-time mode in even-numbered years only.

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

3 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 (Coursework Programs).

**Note 1:** Subjects recommended for particular stages 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.

**Note 2:** Other electives may be undertaken, either from the Faculty of Science, other faculties at UTS or, with permission of the Associate Dean (Coursework Programs), suitable subjects offered at other universities may be included. Students interested in such broader based programs should consult the Course Director as early as possible.

# Bachelor of Science in Environmental Biology

***Course code: KB05***

*Course Director: Dr U Munro*

All students who commenced their studies before 1997 should refer to the note for continuing students at the beginning of the Undergraduate Courses section of this handbook.

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 1999, the excursions for the subjects Aquatic Ecology and Terrestrial Ecosystems 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 Sydney Water, Environment Protection Authority, Departments of Urban Affairs and Planning, Land and Water Conservation, Fisheries, 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. The full-time course may be extended by up to one year for students who elect to take the professional/industrial experience program leading to the additional award of Diploma in Scientific Practice.

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 38 credit points of elective subjects, some of which may be combined to form a coherent second major strand. Students generally choose these subjects with a particular theme or area of expertise in mind. Examples of recommended electives are given in the Elective Options Table for the Environmental Biology and Environmental and Urban Horticulture courses, however, it should be noted that timetable constraints may prevent the undertaking of some elective combinations.

**Elective/second major combinations** include a particular area of study by subjects available from within the biological and biomedical sciences, or by subjects from other parts of the Faculty of Science, other faculties or institutes of UTS, or, with the approval of the Associate Dean, other universities. Students should also refer to the section on second majors in this handbook and consult the Course Director, Environmental Biology for advice on selecting second majors. All academic inquiries should be directed to:

Course Director, Environmental Biology
Dr Ursula Munro
Department of Environmental Sciences
telephone 9514 4150
fax 9514 4033
email Ursula.Munro@uts.edu.au

## Full-time program

### Stage 1

***Autumn semester***

| | | |
|---|---|---|
| 33101 | Mathematics 1 (LS) | 3cp |
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 65012 | Chemistry 1A | 6cp |
| 91311 | Biology 1 | 6cp |
| | *one of* | |
| 66101 | Earth Science 1 | 6cp |
| 68041 | Physics 1A | 6cp |
| 91231 | Horticulture 1 | 6cp |
| | *or* | |
| | Other approved science subject | 6cp |

### Stage 2

***Spring semester***

| | | |
|---|---|---|
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 65022 | Chemistry 2A | 6cp |
| 91312 | Biology 2 | 6cp |
| 91395 | Biocomputing | 3cp |
| | *one of* | |
| 66204 | Field Studies 1 | 6cp |
| 68041 | Physics 1A | 6cp |
| 68201 | Physics 2 | 6cp |
| | *or* | |
| | Other approved science subject | 6cp |

### Stage 3

***Autumn semester***

| | | |
|---|---|---|
| 91270 | Plant Physiology | 6cp |
| 91303 | Experimental Design in Ecology | 3cp |
| 91329 | Ecological Sampling | 3cp |
| | Electives[1]/second major | 12cp |

### Stage 4

***Spring semester***

| | | |
|---|---|---|
| 91307 | Community and Population Ecology | 3cp |
| 66409 | Surficial Processes and Products | 6cp |
| 91309 | Australian Biota | 6cp |
| 91363 | Animal Ecophysiology | 6cp |
| | Elective[1]/second major | 3cp |

### Stage 5

***Autumn semester***

| | | |
|---|---|---|
| 91306 | Terrestrial Ecosystems | 4cp |
| 91318 | Ecological Modelling | 4cp |
| 91323 | Mapping and Remote Sensing | 4cp |
| 91364 | Aquatic Ecology | 8cp |
| | Elective[1]/second major | 4cp |

### Stage 6

***Spring semester***

| | | |
|---|---|---|
| 91324 | Environmental Toxicology | 8cp |
| | Electives[1]/second major | 16cp |

[1] For details of the electives available for the Environmental Biology degree, see Elective Options Table for the Environmental Biology and Environmental and Urban Horticulture courses.

## Part-time program

### Stage 1

***Autumn semester***

| | | |
|---|---|---|
| 65012 | Chemistry 1A | 6cp |
| 91311 | Biology 1 | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 65022 | Chemistry 2A | 6cp |
| 91312 | Biology 2 | 6cp |

### Stage 2

***Autumn semester***

| | | |
|---|---|---|
| 33101 | Mathematics 1 (LS) | 3cp |
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| | *one of* | |
| 66101 | Earth Science 1 | 6cp |
| 68041 | Physics 1A | 6cp |
| | *or* | |
| | Other approved science subject | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 91395 | Biocomputing | 3cp |
| | *one of* | |
| 66204 | Field Studies 1 | 6cp |
| 68041 | Physics 1A | 6cp |
| 68201 | Physics 2 | 6cp |
| | *or* | |
| | Other approved science subject(s) | 6cp |

### Stages 3 and 4 – in 1999 and odd years

***Autumn semester***

| | | |
|---|---|---|
| 91270 | Plant Physiology | 6cp |
| | Elective[1]/second major | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 91309 | Australian Biota | 6cp |
| 91363 | Animal Ecophysiology | 6cp |

### Stages 3 and 4 – in 2000 and even years

***Autumn semester***

| | | |
|---|---|---|
| 91303 | Experimental Design in Ecology | 3cp |
| 91329 | Ecological Sampling | 3cp |
| | Elective[1]/second major | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 91307 | Community and Population Ecology | 3cp |
| 66409 | Surficial Processes and Products | 6cp |
| | Elective[1]/second major | 3cp |

Stages 5 and 6 – in 1999 and odd years

***Autumn semester***

| | | |
|---|---|---|
| 91306 | Terrestrial Ecosystems | 4cp |
| 91364 | Aquatic Ecology | 8cp |

***Spring semester***

| | | |
|---|---|---|
| | Electives[1]/second major | 12cp |

Stages 5 and 6 – in 2000 and even years

***Autumn semester***

| | | |
|---|---|---|
| 91318 | Ecological Modelling | 4cp |
| 91323 | Mapping and Remote Sensing | 4cp |
| | Elective[1]/second major | 4cp |

***Spring semester***

| | | |
|---|---|---|
| 91324 | Environmental Toxicology | 8cp |
| | Elective[1]/second major | 4cp |

1 For details of the electives available for the Environmental Biology degree, see Elective Options Table for the Environmental Biology and Environmental and Urban Horticulture courses.

**Note:** 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 weeks prior to semester.

# Bachelor of Science in Environmental and Urban Horticulture

***Course code: KB03***

*Course Director: Dr K A Johnson*

All students who commenced their studies before 1997 should refer to the note for continuing students at the beginning of the Undergraduate Courses section of this handbook.

The Bachelor of Science in Environmental and 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 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 1998, for example, the Terrestrial Ecosystems excursion was 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 full-time course may be extended by up to one year for students who elect to take the professional/industrial experience program leading to the additional award of Diploma in Scientific Practice.

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 was developed in close liaison with all branches of the industry and with the Horticulture School of the Ryde College of TAFE, and students who enter with an Associate Diploma in Horticulture or equivalent qualification are granted exemptions from a number of subjects.

Subjects are divided into core subjects and elective subjects, some of which may be combined to form a coherent second major strand. 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 37 credit points of elective/second major subjects. Students generally choose these subjects with a particular theme or area of expertise in mind. Examples of recommended electives are given in the Elective Options Table for Environmental Biology and Environmental and Urban Horticulture courses, however, it should be noted that timetable constraints may prevent the undertaking of some elective combinations. Students should also refer to the section on second majors in this handbook and consult the Course Director, Environmental and Urban Horticulture for advice on selecting electives and second majors.

**Elective/second major combinations** include a particular area of study by subjects available from within the biological and biomedical sciences, or by subjects from other parts of the Faculty of Science, other faculties or institutes of UTS, or, with the approval of the Associate Dean (Coursework Programs), other universities. All academic inquiries should be directed to:

Course Director, Environmental and Urban Horticulture
Dr Krystyna Johnson
Department of Environmental Sciences
telephone (02) 9514 4156
fax (02) 9514 4003
email Krystyna.Johnson@uts.edu.au

## Full-time program

### Stage 1

***Autumn semester***

| | | |
|---|---|---|
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 65012 | Chemistry 1A | 6cp |
| 91230 | Landscape Design | 3cp |
| 91231 | Horticulture 1 | 6cp |
| 91311 | Biology 1 | 6cp |

### Stage 2

***Spring semester***

| | | |
|---|---|---|
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 65022 | Chemistry 2A | 6cp |
| 91232 | Horticulture 2 | 6cp |
| 91312 | Biology 2 | 6cp |
| 91395 | Biocomputing | 3cp |

### Stage 3

***Autumn semester***

| | | |
|---|---|---|
| 91233 | Plant Production and Growth Media | 0cp |
| 91270 | Plant Physiology | 6cp |
| | Electives[1]/second major | 12cp |

### Stage 4

***Spring semester***

| | | |
|---|---|---|
| 91234 | Uses of Australian Plants | 6cp |
| 91237 | Plant Pathology | 6cp |
| 66409 | Surficial Processes and Products | 6cp |
| | Electives[1]/second major | 6cp |

### Stage 5

***Autumn semester***

| | | |
|---|---|---|
| 91207 | Plants in the Landscape | 8cp |
| 91229 | Horticultural Financial Management | 4cp |
| 91236 | Plant Tissue Culture | 4cp |
| | Electives[1]/second major | 8cp |

### Stage 6

***Spring semester***

| | | |
|---|---|---|
| 91224 | Horticultural Production Management | 4cp |
| 91225 | Open Space Management | 4cp |
| 91271 | Plant Genetics and Breeding | 8cp |
| | Electives[1]/second major | 8cp |

1 For details of the electives available for the Environmental and Urban Horticulture degree, see the Elective Options Table.

**Note:** 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***

| | | |
|---|---|---|
| 91231 | Horticulture 1 | 6cp |
| 91311 | Biology 1 | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 91232 | Horticulture 2 | 6cp |
| 91312 | Biology 2 | 6cp |

### Stage 2

***Autumn semester***

| | | |
|---|---|---|
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 65012 | Chemistry 1A | 6cp |
| 91230 | Landscape Design | 3cp |

***Spring semester***

| | | |
|---|---|---|
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 65022 | Chemistry 2A | 6cp |
| 91395 | Biocomputing | 3cp |

## Stages 3 and 4 – in 1999 and odd years

### *Autumn semester*

| | | |
|---|---|---|
| 91270 | Plant Physiology | 6cp |
| | Electives[1]/second major | 6cp |

### *Spring semester*

| | | |
|---|---|---|
| 91234 | Uses of Australian Plants | 6cp |
| | Electives[1]/second major | 6cp |

## Stages 3 and 4 – in 2000 and even years

### *Autumn semester*

| | | |
|---|---|---|
| 91233 | Plant Production and Growth Media | 6cp |
| | Electives[1]/second major | 6cp |

### *Spring semester*

| | | |
|---|---|---|
| 91237 | Plant Pathology | 6cp |
| 66409 | Surficial Processes and Products | 6cp |

## Stages 5 and 6 – in 1999 and odd years

### *Autumn semester*

| | | |
|---|---|---|
| 91207 | Plants in the Landscape | 8cp |
| | Elective[1]/second major | 4cp |

### *Spring semester*

| | | |
|---|---|---|
| | *either* | |
| 91271 | Plant Genetics and Breeding | 8cp |
| 91224 | Horticultural Production Management | 4cp |
| | *or* | |
| 91225 | Open Space Management | 4cp |
| | *plus* | |
| | Electives[1]/second major | 8cp |

## Stages 5 and 6 – in 2000 and even years

### *Autumn semester*

| | | |
|---|---|---|
| 91229 | Horticultural Financial Management | 4cp |
| 91236 | Plant Tissue Culture | 4cp |
| | *plus* | |
| | Elective[1]/second major | 4cp |

### *Spring semester*

| | | |
|---|---|---|
| | *either* | |
| 91271 | Plant Genetics and Breeding | 8cp |
| 91224 | Horticultural Production Management | 4cp |
| | *or* | |
| 91225 | Open Space Management | 4cp |
| | *plus* | |
| | Electives[1]/second major | 8cp |

[1] For details of the electives available for the Environmental and Urban Horticulture degree, see Elective Options Table.

**Note:** 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.

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

| Subject number | Subject name | Credit points | Semester A/S | Envir Biology | Urb Hort |
|---|---|---|---|---|---|
| 66101 | Earth Science 1 | 6 | A | 1 or 3 | 3 |
| 66204 | Field Studies 1 | 6 | S | 2 or 4 | 4 |
| 91109 | Microbial Ecology | 6 | A | 3 or 5 | 3 or 5 |
| 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 | 6 | C |
| 91303 | Experimental Design in Ecology | 3 | A | C | 3 |
| 91306 | Terrestrial Ecosystems | 4 | A | C | 5 |
| 91307 | Community and Population Ecology | 3 | S | C | 4 or 6 |
| 91309 | Australian Biota | 6 | S | C | 4 or 6 |
| 91324 | Environmental Toxicology | 8 | S | C | 6 |
| 91313 | Biochemistry 1 | 6 | A | 3 or 5 | 3 or 5 |
| 91314 | Microbiology 1 | 6 | A | 3 or 5 | 3 or 5 |
| 91318 | Ecological Modelling | 4 | A | C | 5 |
| 91320 | Biochemistry 2 | 6 | S | 6 | 4 or 6 |
| 91323 | Mapping and Remote Sensing | 4 | A | C | 5 |
| 91326 | Analytical Biochemistry | 6 | S | 6 | 4 or 6 |
| 91327 | Environmental Management Procedures | 4 | S | 6 | 6 |
| 91329 | Ecological Sampling | 3 | A | C | 3 or 5 |
| 91330 | Microbiology 2 | 6 | S | C | 6 |
| 91331 | Microbiology 3 | 8 | A | 5 | N/A |
| 91332 | Molecular Biology 1 | 8 | A | 5 | N/A |
| 91333 | Field Studies: Advanced Marine Sciences | 8 | A & S | 5 or 6 | 5 or 6 |
| 91335 | Molecular Biology 2 | 8 | S | 6 | N/A |
| 91347 | Toxic Materials in the Environment | 4 | S | 6 | 6 |
| 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 | 8 | | 5 or 6 | 5 or 6 |
| 91371 | Field Studies: Mountain Ecology | 8 | S | 5 or 6 | 5 or 6 |
| 91375 | Field Studies: Introductory Marine Sciences | 4 | A&S | 4 or 5 | 4 or 5 |
| 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 |
| 69337 | Special Reading Subject | 3 | A&S | 5 or 6 | 5 or 6 |
| 91283 | Undergraduate Research Project[1] | 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

3/4/5/6 = Stage at which elective recommended

C = Core subject for that course

N/A = Not available to students in this degree

1 Supervision form must be completed

**Notes:** Subjects recommended for particular stages 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.

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*

*Course Director: Associate Professor P F Logan*

This course is currently under review in 1998 and the documented program below may be subject to change in 1999.

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 primarily a preparation for secondary school science teachers of chemistry, physics and geology. Graduates find employment in private and public secondary schools. However, the opportunity also exists for graduates to seek employment in the relevant scientific discipline. Their prospects of gaining such employment would be enhanced by undertaking a more extensive and rigorous industrial training program in science leading to the additional award of Diploma in Scientific Practice.

The degree is fully recognised by the NSW Department of School Education and by professional scientific bodies. All academic inquiries should be directed to:

Course Director, Science Education
Associate Professor Peter Logan
Department of Applied Physics
telephone 9514 2194
fax 95142219
email Peter@phys.uts.edu.au

## Course program – Chemistry major

### Year 1

#### *Autumn semester*

| | | |
|---|---|---|
| 33190 | Mathematical Modelling for Science | 6cp |
| 65101 | Chemistry 1C | 6cp |
| 68101 | Physics 1C | 6cp |
| | *one of* | |
| 66101 | Earth Science 1 | 6cp |
| 67101 | Introduction to Materials | 6cp |
| 91311 | Biology 1 | 6cp |
| 91701 | Medical Science 1 | 6cp |

#### *Spring semester*

| | | |
|---|---|---|
| 33290 | Computing and Mathematics for Science | 6cp |
| 65201 | Chemistry 2C | 6cp |
| 68201 | Physics 2 | 6cp |
| | *one of* | |
| 67101 | Introduction to Materials | 6cp |
| 67303 | Mechanical Properties of Materials | 6cp |
| | *or* | |
| | Other approved subject | 6cp |

### Year 2

#### *Autumn semester*

| | | |
|---|---|---|
| 65202 | Organic Chemistry 1 | 6cp |
| 65306 | Analytical Chemistry 1 | 6cp |
| 65307 | Physical Chemistry 1 | 6cp |
| | Science elective | 6cp |

#### *Spring semester*

| | | |
|---|---|---|
| 65409 | Analytical Chemistry 2 | 6cp |
| 65411 | Inorganic Chemistry 1 | 6cp |
| 65410 | Chemical Safety and Legislation | 6cp |
| | Science elective | 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*

Professional/industrial experience

### Year 4

#### *Autumn semester*

| | | |
|---|---|---|
| | Electives | 24cp |

#### *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***

| | | |
|---|---|---|
| 33190 | Mathematical Modelling for Science | 6cp |
| 65101 | Chemistry 1C | 6cp |
| 68101 | Physics 1C | 6cp |
| | *one of* | |
| 66101 | Earth Science 1 | 6cp |
| 91311 | Biology 1 | 6cp |
| 91701 | Medical Science 1 | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 33290 | Computing and Mathematics for Science | 6cp |
| 65201 | Chemistry 2C | 6cp |
| 67101 | Introduction to Materials | 6cp |
| 68201 | Physics 2 | 6cp |

### Year 2

***Autumn semester***

| | | |
|---|---|---|
| 33390 | Mathematics and Scientific Software | 6cp |
| 68314 | Electronics | 6cp |
| 68311 | Physics 3 | 6cp |
| 68312 | Applied Physics 1 | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 33490 | Computational Mathematics and Physics | 6cp |
| 68411 | Physics 4 | 6cp |
| 68412 | Applied Physics 2 | 6cp |
| | Science elective | 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***

| | | |
|---|---|---|
| | Professional/industrial experience | |

### Year 4

***Autumn semester***

| | | |
|---|---|---|
| | Electives | 24cp |

***Spring semester***

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

## Course program – Earth Science major

### Year 1

***Autumn semester***

| | | |
|---|---|---|
| 33101 | Mathematics 1 (LS) | 3cp |
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 66101 | Earth Science 1 | 6cp |
| 65012 | Chemistry 1A | 6cp |
| 91311 | Biology 1 | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 33106 | Statistical Design and Analysis (2 sem) | 3cp |
| 66204 | Field Studies 1 | 6cp |
| 65022 | Chemistry 2A | 6cp |
| 91312 | Biology 2 | 6cp |
| | *either* | |
| 91395 | Biocomputing | 3cp |
| | *or* | |
| 31871 | Computing for Science | 3cp |

### Year 2

***Autumn semester***

| | | |
|---|---|---|
| 66304 | Earth Materials | 6cp |
| 66305 | Fold Belts and Cratons | 6cp |
| 68041 | Physics 1A | 6cp |
| | Science elective | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 66408 | Earth Resources | 6cp |
| 66407 | Mapping and Remote Sensing | 6cp |
| 66409 | Surficial Processes and Products | 6cp |
| | Science elective | 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***

| | | |
|---|---|---|
| | Professional/industrial experience | |

### Year 4

***Autumn semester***

| | | |
|---|---|---|
| | Electives | 24cp |

***Spring semester***

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

# Bachelor of Science/ Bachelor of Laws

***Course code: LL04***

*Course Director:*
*Associate Professor R T Buckney*

The BSc LLB degree course is aimed at producing graduates with professionally recognised qualifications in both science and law and who are well prepared to pursue a career in either field. Such graduates may choose to practice law in areas such as environmental law, patents and mining law where a strong background in science is of advantage. Alternatively they may choose to enter scientific careers, particularly as advisers, consultants or managers in industries where a knowledge of the law is of particular value.

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

The degree is a five-year full-time course and, subject to the fulfilment of the requirements described below, allows students to graduate with the separate degrees of Bachelor of Science and Bachelor of Laws. The study components and the requirements for course completion are as follows:

1. The law component comprises at least 144 credit points of study approved by the Faculty of Law.
2. The science component comprises at least 96 credit points of study approved by the Faculty of Science. For a student to be eligible for a separate Bachelor of Science degree the science component must meet the additional criteria specified in (a) – (c) below:
   (a) the science component must be sufficiently focused to enable the student to command a coherent and integrated body of theoretical and practical knowledge in at least one field of science;
   (b) within the total of 96 credit points, the value of science subjects that are normally offered in stages 1 and 2 of an undergraduate course of the Faculty of Science must not exceed 42 credit points; and
   (c) within the total of 96 credit points, the value of science subjects that are normally offered in stages 5 and 6 of an undergraduate course of the Faculty of Science must be at least 24 credit points.
3. On completion of the science component as set out in 2(a) – 2(c) above a student who has also completed at least 96 credit points of law subjects approved by the Faculty of Law will be eligible for the award of Bachelor of Science.
4. A student who qualifies for the award of Bachelor of Science according to 3 above will, on completion of the law component as approved by the Faculty of Law, be eligible for the award of Bachelor of Laws.
5. A student who completes 144 credit points of study approved by the Faculty of Law and 96 credit points of study approved by the Faculty of Science but does not satisfy the conditions set out in 2(a) – 2(c) above will be eligible for the award of Bachelor of Science/Bachelor of Laws (single testamur).

The conditions specified above imply that students are normally expected to specialise in a particular area of science in order to obtain relevant professional recognition and to proceed to a separate science degree. The specialist areas currently available to students are applied chemistry, applied physics, materials science, earth and environmental science, biomedical science, biotechnology, environmental biology, environmental and urban horticulture. A guide as to which subjects may form an appropriate study program in each of these areas is given after the general program structure.

Students are required to have their science program approved by the relevant Head of Department prior to the commencement of semester. Certain study options could involve timetabling difficulties and students may need to be flexible in arranging their study programs. All academic inquiries should be directed to:

Office of the Associate Dean (Coursework Programs)
Faculty of Science
telephone 9514 4044
fax 9514 4095

## Course program

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

### Stage 1

***Autumn semester***

| | | |
|---|---|---|
| 70113 | Legal Process and History | 10cp |
| 70105 | Legal Research | 4cp |
| | Approved Science subjects | 12cp |

### Stage 2

***Spring semester***

| | | |
|---|---|---|
| 70217 | Criminal Law | 6cp |
| 70211 | Law of Contract | 8cp |
| | Approved Science subjects | 12cp |

### Stage 3

***Autumn semester***

| | | |
|---|---|---|
| 70311 | Law of Tort | 8cp |
| 70616 | Federal Constitutional Law | 8cp |
| | Approved Science subjects | 6cp |

### Stage 4

***Spring semester***

| | | |
|---|---|---|
| 70318 | Personal Property | 4cp |
| 70317 | Real Property | 8cp |
| | Approved Science subjects | 12cp |

### Stage 5

***Autumn semester***

| | | |
|---|---|---|
| 70417 | Corporate Law | 8cp |
| 70617 | Administrative Law | 8cp |
| | Approved Science subjects | 6cp |

### Stage 6

***Spring semester***

| | | |
|---|---|---|
| 70516 | Equity and Trusts | 8cp |
| 76xxx | Elective Subject 1 (Faculty of Law) | 6cp |
| | Approved Science subjects | 12cp |

### Stage 7

***Autumn semester***

| | | |
|---|---|---|
| 71216 | Law of Evidence | 6cp |
| 71005 | Practice and Procedure | 4cp |
| | Approved Science subjects | 12cp |

### Stage 8

***Spring semester***

| | | |
|---|---|---|
| 71116 | Remedies | 6cp |
| 76xxx | Elective Subject 2 (Faculty of Law) | 6cp |
| | Approved Science subjects | 12cp |

### Stage 9

***Autumn semester***

| | | |
|---|---|---|
| 76xxx | Elective Subject 3 (Faculty of Law) | 6cp |
| 76xxx | Elective Subject 4 (Faculty of Law) | 6cp |
| | Approved Science subjects | 12cp |

### Stage 10

***Spring semester***

| | | |
|---|---|---|
| | Legal practice major (PLT) | 24cp |
| | *or* | |
| | Four Law electives | 24cp |

**Note:** Law core subject descriptions are included in this handbook. Students should consult the *1999 Faculty of Law Handbook* for Law elective subjects.

## Recommended Science strands[1,2]

### Applied Chemistry (96 credit points)

| | | |
|---|---|---|
| 65101 | Chemistry 1C | 6cp |
| 68101 | Physics 1C | 6cp |
| 65201 | Chemistry 2C | 6cp |
| 68201 | Physics 2 | 6cp |
| 33190 | Mathematical Modelling for Science | 6cp |
| 65410 | Chemical Safety and Legislation | 6cp |
| 65411 | Inorganic Chemistry 1 | 6cp |
| 65306 | Analytical Chemistry 1 | 6cp |
| 65409 | Analytical Chemistry 2 | 6cp |
| 65202 | Organic Chemistry 1 | 6cp |
| 65307 | Physical Chemistry 1 | 6cp |
| 65606 | Analytical Chemistry 3 | 6cp |
| 65607 | Physical Chemistry 2 | 6cp |
| 65508 | Organic Chemistry 2 | 6cp |
| 65509 | Inorganic Chemistry 2 | 6cp |
| | Science elective | 6cp |

### Applied Physics (96 credit points)

| | | |
|---|---|---|
| 33190 | Mathematical Modelling for Science | 6cp |
| 68101 | Physics 1C | 6cp |
| 33290 | Computing and Mathematics for Science | 6cp |
| 68201 | Physics 2 | 6cp |
| 33390 | Mathematics and Scientific Software | 6cp |
| 68311 | Physics 3 | 6cp |
| 33490 | Computational Mathematics and Physics | 6cp |
| 68411 | Physics 4 | 6cp |
| 68312 | Applied Physics 1 | 6cp |
| 68412 | Applied Physics 2 | 6cp |
| 68314 | Electronics | 6cp |
| 68512 | Applied Physics 3 | 6cp |
| 68611 | Electromagnetics and Optics | 6cp |
| 68511 | Quantum and Solid State Physics | 6cp |
| 68514 | Electronics and Interfacing | 6cp |
| | Science elective | 6cp |

### Materials Science (96 credit points)

| | | |
|---|---|---|
| 65101 | Chemistry 1C | 6cp |
| 67101 | Introduction to Materials | 6cp |
| 65201 | Chemistry 2C | 6cp |
| 67303 | Mechanical Properties of Materials | 6cp |
| 33190 | Mathematical Modelling for Science | 6cp |
| 68101 | Physics 1C | 6cp |
| 67305 | Polymer Science | 6cp |
| 67506 | Technical Ceramics | 6cp |
| 67407 | Physical Properties of Materials | 6cp |
| 67408 | Industrial Metallurgy | 6cp |
| 67304 | Physical Metallurgy | 6cp |
| 67306 | Industrial Ceramics | 6cp |
| 67608 | Composites | 6cp |
| 67606 | Corrosion and Degradation of Materials | 6cp |
| 67409 | Polymer Technology | 6cp |
| 65062 | Extractive Metallurgy | 6cp |

### Earth Science (96 credit points)

| | | |
|---|---|---|
| 66101 | Earth Science 1 | 6cp |
| 65101 | Chemistry 1C | 6cp |
| 66204 | Field Studies 1 | 6cp |
| 65201 | Chemistry 2C | 6cp |
| 66304 | Earth Materials | 6cp |
| 66407 | Mapping and Remote Sensing | 6cp |
| 66408 | Earth Resources | 6cp |
| 66305 | Fold Belts and Cratons | 6cp |
| 66034 | Groundwater Geology | 4cp |
| 66409 | Surficial Processes and Products | 6cp |
| 66508 | Crustal and Mantle Processes | 6cp |
| 66609 | Environmental and Quaternary Geology | 8cp |
| 66610 | Engineering Geology | 4cp |
| 66510 | Geophysics | 4cp |
| 66509 | Tectonics and Surface Dynamics | 4cp |
| | Science electives | 12cp |

### Biomedical Science (96 credit points)

| | | |
|---|---|---|
| 91701 | Medical Science 1 | 6cp |
| 65101 | Chemistry 1C | 6cp |
| 91702 | Medical Science 2 | 6cp |
| 65201 | Chemistry 2C | 6cp |
| 91314 | Microbiology 1 | 6cp |
| 91330 | Microbiology 2 | 6cp |
| 91351 | Immunology 1 | 3cp |
| 91355 | Haematology 1 | 3cp |
| 91313 | Biochemistry 1 | 6cp |
| 91320 | Biochemistry 2 | 6cp |
| 91326 | Analytical Biochemistry | 6cp |
| 91354 | Anatomical Pathology | 6cp |
| | Biomedical Science electives | 24cp |
| | Science electives | 6cp |

### Biotechnology (96 credit points)

| | | |
|---|---|---|
| 91701 | Medical Science 1 | 6cp |
| 65101 | Chemistry 1C | 6cp |
| 91702 | Medical Science 2 | 6cp |
| 65201 | Chemistry 2C | 6cp |
| 91314 | Microbiology 1 | 6cp |
| 91325 | Principles and Practice of Biotechnology | 3cp |
| 91330 | Microbiology 2 | 6cp |
| 91351 | Immunology 1 | 3cp |
| 91313 | Biochemistry 1 | 6cp |
| 91368 | Bioprocessing | 8cp |
| 91326 | Analytical Biochemistry | 6cp |
| 91332 | Molecular Biology 1 | 8cp |
| 91335 | Molecular Biology 2 | 8cp |
| 91369 | Applied and Environmental Microbiology | 8cp |
| | Science electives | 10cp |

**Environmental Biology (97 credit points)**

| | | |
|---|---|---|
| 91311 | Biology 1 | 6cp |
| 65101 | Chemistry 1C | 6cp |
| 91312 | Biology 2 | 6cp |
| 65201 | Chemistry 2C | 6cp |
| 91329 | Ecological Sampling | 3cp |
| 33106 | Statistical Design and Analysis (2 sem) | 6cp |
| 91307 | Community and Population Ecology | 3cp |
| 66409 | Surficial Processes and Products | 6cp |
| 91395 | Biocomputing | 3cp |
| 91270 | Plant Physiology | 6cp |
| 91303 | Experimental Design in Ecology | 3cp |
| 91309 | Australian Biota | 6cp |
| 91363 | Animal Ecophysiology | 6cp |
| 91306 | Terrestrial Ecosystems | 4cp |
| 91318 | Ecological Modelling | 4cp |
| 91324 | Environmental Toxicology | 8cp |
| 91323 | Mapping and Remote Sensing | 4cp |
| 91364 | Aquatic Ecology | 8cp |
| | Science electives | 3cp |

**Environmental and Urban Horticulture (96 credit points)**

| | | |
|---|---|---|
| 91231 | Horticulture 1 | 6cp |
| 91311 | Biology 1 | 6cp |
| 91232 | Horticulture 2 | 6cp |
| 91312 | Biology 2 | 6cp |
| 91230 | Landscape Design | 3cp |
| 91233 | Plant Production and Growth Media | 6cp |
| 91234 | Uses of Australian Plants | 6cp |
| 66409 | Surficial Processes and Products | 6cp |
| 91395 | Biocomputing | 3cp |
| 91236 | Plant Tissue Culture | 4cp |
| 91270 | Plant Physiology | 6cp |
| 91224 | Horticultural Production Management | 4cp |
| 91237 | Plant Pathology | 6cp |
| 91207 | Plants in the Landscape | 8cp |
| 91225 | Open Space Management | 4cp |
| 91271 | Plant Genetics and Breeding | 8cp |
| | Science electives | 8cp |

[1] These programs are indicative rather than prescriptive. Students may, with the approval of the Associate Dean or relevant Head of Department, undertake alternative programs in order to fulfil the academic requirements for the degree.

[2] The exact order in which the subjects are undertaken may vary depending upon timetable constraints and the number of science and law subjects each student elects to study in any one semester.

# Bachelor of Medical Science/Bachelor of Laws

***Course code: LL09***

*Course Director: Dr G Nicholson*

This BMedSc LLB degree course commenced in 1998 although students who commenced their BSc LLB degree (course code LL04) in 1997 and who elected to specialise in medical science may apply for transfer to this course.

The course is aimed at producing graduates with recognised qualifications in both medical science and law and who are well prepared to pursue a career in either field. The law is of special importance in many areas of medical science including medical and health practice, medical research, and industrial and commercial enterprise. Hence, graduates could choose to practise in areas of law, such as certain types of litigation or criminal proceedings, where a strong scientific background in human biology, behavioural science, neuroscience, pharmacology, and medical devices and diagnostics, is particularly advantageous. Alternatively, they could practise as scientists in areas where a knowledge of the law is of particular advantage. Such areas could include pharmaceutical or biotechnology companies, or public health administration.

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

The degree is a five-year full-time course and allows students to graduate with the separate degrees of Bachelor of Medical Science and Bachelor of Laws. The first of these degrees may be awarded upon the completion of the specified 96 credit points of Medical Science subjects provided that the student has also completed 96 credit points of Law subjects approved by the Faculty of Law. All academic inquiries should be directed to:

Course Director, Medical Science/Law
Dr Graham Nicholson
Department of Health Sciences
telephone 9514 2230/9514 2234
fax 9514 2228
email Graham.Nicholson@uts.edu.au

## Course program[1]

### Stage 1

***Autumn semester***

| | | |
|---|---|---|
| 70113 | Legal Process and History | 10cp |
| 70105 | Legal Research | 4cp |
| 91701 | Medical Science 1 | 6cp |
| 65101 | Chemistry 1C | 6cp |

### Stage 2

***Spring semester***

| | | |
|---|---|---|
| 70217 | Criminal Law | 6cp |
| 70211 | Law of Contract | 8cp |
| 91702 | Medical Science 2 | 6cp |
| 65201 | Chemistry 2C | 6cp |

### Stage 3

***Autumn semester***

| | | |
|---|---|---|
| 70311 | Law of Tort | 8cp |
| 70616 | Federal Constitutional Law | 8cp |
| 68101 | Physics 1C | 6cp |

### Stage 4

***Spring semester***

| | | |
|---|---|---|
| 70318 | Personal Property | 4cp |
| 70317 | Real Property | 8cp |
| 91704 | Behavioural Sciences | 6cp |
| 68201 | Physics 2 | 6cp |

### Stage 5

***Autumn semester***

| | | |
|---|---|---|
| 70417 | Corporate Law | 8cp |
| 70617 | Administrative Law | 8cp |
| 91313 | Biochemistry 1 | 6cp |
| 91703 | Physiological Systems | 6cp |

### Stage 6

***Spring semester***

| | | |
|---|---|---|
| 70516 | Equity and Trusts | 8cp |
| 76xxx | Elective Subject 1 (Faculty of Law) | 6cp |
| 91708 | Psychophysiology | 8cp |

### Stage 7

***Autumn semester***

| | | |
|---|---|---|
| 71216 | Law of Evidence | 6cp |
| 71005 | Practice and Procedure | 4cp |
| 91707 | Pharmacology 1 | 8cp |
| | Approved Science elective | 4cp |

### Stage 8

***Spring semester***

| | | |
|---|---|---|
| 71116 | Remedies | 6cp |
| 76xxx | Elective Subject 2 (Faculty of Law) | 6cp |
| 91709 | Pharmacology 2 | 8cp |
| 91705 | Medical Devices and Diagnostics | 6cp |

### Stage 9

***Autumn semester***

| | | |
|---|---|---|
| 76xxx | Elective Subject 3 (Faculty of Law) | 6cp |
| 76xxx | Elective Subject 4 (Faculty of Law) | 6cp |
| 91706 | Neuroscience | 8cp |

### Stage 10

***Spring semester***

| | | |
|---|---|---|
| | Legal practice major (PLT) | 24cp |
| | *or* | |
| | Four Law electives | 24cp |

[1] The order in which the subjects are undertaken may vary depending upon timetable constraints and the number of Science and Law subjects each student elects to study in any one semester. Advice should be sought from the Associate Dean (Coursework Programs) Faculty of Science or the Course Director, Medical Science/Law.

**Note:** Subject descriptions for all core Law subjects are included in this handbook. Students should consult the *1999 Faculty of Law Handbook* for elective Law subjects.

# Bachelor of Science/ Bachelor of Arts in International Studies

### *Course code: N004*

*Course Director:*
*Associate Professor R T Buckney*

The Faculty of Science, in collaboration with the Institute for International Studies, offers a combined degree program in Science and International Studies which is aimed at increasing students' awareness of international contexts and producing graduates who are well prepared for professional careers in science in an international setting.

The program is a five-year full-time course which links applied science studies with the study of a language and culture other than English, and the practice of science in other countries. It is available in association with the Bachelor of Science in the following fields:

Applied Chemistry
Applied Physics
Biomedical Science
Biotechnology
Earth and Environmental Science
Environmental and Urban Horticulture
Environmental Biology
Materials Science
Medical Science

Arrangements may also be made for combining the International Studies program with the Bachelor of Science (Honours) in

Applied Chemistry – Forensic Science though in this case the course length will be six years full time.

Details of all the above courses are given earlier in the Undergraduate Courses section of this handbook and it should be noted that students may also elect to undertake the professional/industrial experience program leading to the additional award of Diploma in Scientific Practice. This will normally extend the length of the combined degree course by one year.

The International Studies component of the degree comprises 96 credit points and requires students to study a major – a region or country specialisation – over a minimum of three years. Language and culture studies are undertaken in Sydney for at least two years after which students spend a period of study overseas. The following range of majors are available: Argentina, Australia and the Asia–Pacific Region, Chile, China, Croatia, East Asia, France, Germany, Greece, Indonesia, Italy, Japan, Korea, Malaysia, Mexico, Poland, Russia, Slovenia, South China, South-East Asia, Spain, Taiwan, Thailand, Ukraine and Vietnam. In general, the International Studies program has no prior language requirement, except for entry to the Poland, Slovenia, Ukraine and Vietnam majors which is restricted to students who have a sound working knowledge of the language of their selected specialisation, and the East Asia major which is restricted to students with a sound working knowledge of one of Cantonese, Chinese, Japanese or Korean.

The Institute for International Studies makes arrangements for students to spend two semesters of In-country Study at an institution of higher education abroad. The costs of tuition overseas and travel to the designated overseas institution are borne by UTS, all other costs being borne by the individual student.

## Admission

Students are normally admitted directly to the first year of the course but there is provision for students already enrolled in a Bachelor of Science degree to transfer to the combined degree program. Applications for transfer are decided on the basis of academic merit and the preparedness of the student for undertaking International Studies.

Students admitted to the first year of the course may select any of the Science programs listed above provided that their entry rank is equal to or better than the cut-off for the chosen program.

## Course program[1]

The following general pattern will be followed for each Pass combined degree in Science and International Studies. A different pattern, extending over six years, would apply to a combined degree involving the Bachelor of Science (Honours) in Applied Chemistry – Forensic Science, details of which will be worked out in consultation with the Head of the Department of Chemistry, Materials and Forensic Science.

All academic inquiries relating to the Science component of this course should be directed to the Office of the Associate Dean (Coursework Programs), Faculty of Science, telephone (02) 9514 4044, fax (02) 9514 4095. Any inquiries relating to the International Studies component of this course should be directed to the Institute for International Studies, telephone (02) 9514 1574.

### Year 1

***Autumn semester***

| | |
|---|---|
| Stage 1 F/T Science program | 24cp |

***Spring semester***

| | |
|---|---|
| Stage 2 F/T Science program | 24cp |

### Year 2

***Autumn semester***

| | |
|---|---|
| Stage 3/4 P/T Science program | 9 – 12cp |
| 50140 Modernisation and Social Change | 8cp |
| 971xxx Language and Culture 1 | 8cp |

***Spring semester***

| | |
|---|---|
| Stage 3/4 P/T Science program | 12 – 15cp |
| 972xxx Language and Culture 2 | 8cp |

### Year 3

***Autumn semester***

| | |
|---|---|
| Stage 3/4 P/T Science program | 12 – 15cp |
| 973xxx Language and Culture 3 | 8cp |

***Spring semester***

| | |
|---|---|
| Stage 3/4 P/T Science program | 9 – 12cp |
| 974xxx Language and Culture 4 | 8cp |
| 976xxx Contemporary Society | 8cp |

### Year 4

***Autumn semester***

| | |
|---|---|
| 977xxx In-country Study 1 | 24cp |

***Spring semester***

| | |
|---|---|
| 978xxx In-country Study 2 | 24cp |

Year 5

***Autumn semester***

| | |
|---|---|
| Stage 5 F/T Science program | 24cp |

***Spring semester***

| | |
|---|---|
| Stage 6 F/T Science program | 24cp |

[1] The Bachelor of Medical Science and the Bachelor of Science (Honours) in Applied Chemistry – Forensic Science are offered only on a full-time basis and there is no specified part-time program. Students undertaking these options in combination with International Studies must consult with the relevant Head of Department to determine their academic program in the second and third year of the combined degree.

**Note:** For descriptions of International Studies subjects please consult the *1999 Institute for International Studies Handbook*.

# Bachelor of Science/ Bachelor of Business[1]

***Course code: N006***

*Course Director:*
*Associate Professor R T Buckney*

The Faculty of Science, in collaboration with the Faculty of Business, offers a combined degree program in Science and Business which is designed to produce graduates who are well prepared for scientific practice in technically-oriented businesses or who are equipped to enter administration in scientific institutions.

The program is a four-year full-time course (8 years part-time), though students may complete earlier if they can include summer semester subjects in their program. The Business component of the program is available in association with the following Science programs:

Applied Chemistry
Applied Physics
Biomedical Science
Biotechnology
Earth and Environmental Science
Environmental Biology
Environmental and Urban Horticulture
Materials Science
Medical Science

Details of all of the above courses are given earlier in the Undergraduate Courses section of this handbook. Students must complete 96 credit points from each degree program, with subjects normally taken concurrently from both degrees. Completion of a science disciplinary strand is essential, as is the completion of the Business core subjects and a Business major. Students who meet the academic requirements may apply to enter the Bachelor of Science (Honours) programs.

[1] Subject to University approval.

## Admission

Students are normally admitted directly to the first year of the course but there is provision for students already enrolled in a Bachelor of Science or a Bachelor of Business degree to transfer to the combined degree program. Students currently enrolled in a Science or Business program will be permitted entry to the combined degree program if they satisfy either of the following criteria:

- they meet the entry requirement for the combined degree and have demonstrated satisfactory progress in their current program of study; or
- they have achieved a credit WAM (weighted average mark) over at least two stages of their current program.

Students admitted to the first year of the course may select any of the Science programs listed above provided that their entry rank is equal to or better than the cut-off for the chosen program.

## Course program

The general pattern of subjects is expected to be as follows, though students who have timetabling difficulties may apply to vary their program. Students are advised to take the part-time sequence of subjects as recommended above for each science course; they may enrol in full-time classes in these subjects and are not restricted to the part-time timetable.

Stage 1

***Autumn semester***

| | |
|---|---|
| Science foundation subjects | 12cp |
| Business core subjects | 12cp |

Stage 2

***Spring semester***

| | |
|---|---|
| Science foundation subjects | 12cp |
| Business core subjects | 12cp |

Stage 3

***Autumn semester***

| | |
|---|---|
| Science foundation subjects | 12cp |
| Business core subjects | 12cp |

Stage 4

***Spring semester***

| | |
|---|---|
| Science foundation subjects | 12cp |
| Business core subjects | 12cp |

Stage 5

***Autumn semester***

| | |
|---|---|
| Science Major subjects | 12cp |
| Business Major subjects | 12cp |

Stage 6

***Spring semester***

| | |
|---|---|
| Science Major subjects | 12cp |
| Business Major subjects | 12cp |

Stage 7

***Autumn semester***

| | |
|---|---|
| Science Major subjects | 12cp |
| Business Major subjects | 12cp |

Stage 8

***Spring semester***

| | |
|---|---|
| Science Major subjects | 12cp |
| Business Major subjects (including Business Strategy) | 12cp |

For further information please contact:

Office of the Associate Dean (Coursework Programs)
Faculty of Science
telephone (02) 9514 4044
fax (02) 9514 4095

**Note:** For further details of Business majors available please consult the *1999 Faculty of Business Handbook*.

# SECOND MAJORS

Students enrolled in a Bachelor of Science or Bachelor of Medical Science degree in the Faculty of Science are normally expected to undertake a second major as part of their course. Each second major comprises a coherent sequence of subjects offered by the Faculty of Science, another faculty of the University, or the Institute for International Studies. The purpose of the second major is to give students the opportunity to broaden their studies into other areas of interest or to pursue studies in particular disciplines to greater depth.

Examples of possible second majors are listed below but it should be noted that not all of them are necessarily appropriate to every course and that normal prerequisite conditions and timetabling constraints apply in all cases. Students should consult their Course Directors for advice on selecting second major strands.

## Faculty of Science

### *Environmental Biology*

| | | |
|---|---|---|
| 91311 | Biology 1 | 6cp |
| 91312 | Biology 2 | 6cp |
| 91303 | Experimental Design in Ecology | 3cp |
| 91329 | Ecological Sampling | 3cp |
| 91307 | Community and Population Ecology | 3cp |
| 91327 | Environmental Management Procedures | 4cp |

### *Earth Science*

| | | |
|---|---|---|
| 66101 | Earth Science 1 | 6cp |
| 66204 | Field Studies 1 | 6cp |
| 66304 | Earth Materials | 6cp |
| | ***plus one or more of the following to a total of not less than 24cp*** | |
| 66409 | Surficial Processes and Products | 6cp |
| 66610 | Engineering Geology | 4cp |
| 66034 | Groundwater Geology | 4cp |
| 66609 | Environmental and Quaternary Geology | 8cp |
| 66408 | Earth Resources | 6cp |
| 66407 | Mapping and Remote Sensing | 6cp |
| 66510 | Geophysics | 4cp |
| | (New geochemistry/organic geochemistry elective for SUCOGG) | 4cp |

### *Chemistry for non-Chemistry majors*

| | | |
|---|---|---|
| 65306 | Analytical Chemistry 1 | 6cp |
| 65409 | Analytical Chemistry 2 | 6cp |
| 65202 | Organic Chemistry 1 | 6cp |
| 65508 | Organic Chemistry 2 | 6cp |

### *Applied Chemistry for Chemistry majors*

*at least four of the following*

| | | |
|---|---|---|
| 65521 | Aspects of Medicinal Chemistry | 6cp |
| 65523 | Chemical Process Control (new) | 6cp |
| 67606 | Corrosion and Degradation of Materials | 6cp |
| 65621 | Environmental Chemistry | 6cp |
| 65062 | Extractive Metallurgy | 6cp |

### *Medical Science*

| | | |
|---|---|---|
| 91701 | Medical Science 1 | 6cp |
| 91702 | Medical Science 2 | 6cp |

*plus at least two of*

| | | |
|---|---|---|
| 91313 | Biochemistry 1 | 6cp |
| 91314 | Microbiology 1 | 6cp |
| 91703 | Physiological Systems | 6cp |
| 91704 | Behavioural Sciences | 6cp |
| 91705 | Medical Devices and Diagnostics | 6cp |

### *Biochemistry*

This second major is suitable for students in the Physical, Chemical and Environmental Sciences courses.

| | | |
|---|---|---|
| 91313 | Biochemistry 1 | 6cp |
| 91320 | Biochemistry 2 | 6cp |
| 91326 | Analytical Biochemistry | 6cp |
| 91344 | Clinical Biochemistry 1 | 8cp |

### *Microbiology*

This second major is suitable for students in the Physical, Chemical and Environmental Sciences courses.

| | | |
|---|---|---|
| 91314 | Microbiology 1 | 6cp |
| 91330 | Microbiology 2 | 6cp |

*plus any 2 of*

| | | |
|---|---|---|
| 91331 | Microbiology 3 | 8cp |
| 91332 | Molecular Biology 1 | 8cp |
| 91338 | Clinical Bacteriology | 8cp |
| 91352 | Eukaryotic Microbiology | 8cp |

### *Immunology*

This second major is suitable for students in the Physical, Chemical and Environmental Sciences courses.

| | | |
|---|---|---|
| 91313 | Biochemistry 1 | 6cp |
| 91314 | Microbiology 1 | 6cp |
| 91351 | Immunology 1 | 3cp |
| 91359 | Immunology 2 | 8cp |

### *Molecular Biology*

This second major is suitable for students in the Physical, Chemical and Environmental Sciences courses.

| | | |
|---|---|---|
| 91313 | Biochemistry 1 | 6cp |
| 91314 | Microbiology 1 | 6cp |
| 91332 | Molecular Biology 1 | 8cp |
| 91335 | Molecular Biology 2 | 8cp |

### *Electronics and Computer Interfacing*

This second major is of particular benefit to scientists who need to measure and record data from instrumentation using a microcomputer. The major progresses from digital electronic circuitry to microcomputer architecture and then to transducers and devices necessary for interfacing to the real world.

| | | |
|---|---|---|
| 68201 | Physics 2 | 6cp |
| 68312 | Applied Physics 1 | 6cp |
| 68314 | Electronics | 6cp |
| 68514 | Electronics and Interfacing | 6cp |

### *Experimental Methods in Applied Science*

This second major provides students with skills in optical instrumentation, temperature measurement, vacuum technology, electromagnetic techniques, X-ray analysis, electron microscopy and scientific data analysis.

| | | |
|---|---|---|
| 68201 | Physics 2 | 6cp |

*plus three or more of the following*

| | | |
|---|---|---|
| 68311 | Physics 3 | 6cp |
| 68312 | Applied Physics 1 | 6cp |
| 68412 | Applied Physics 2 | 6cp |
| 68512 | Applied Physics 3 | 6cp |

### *Pathophysiology*[1]

This second major is for students in the Physical, Chemical and Environmental Sciences courses.

| | | |
|---|---|---|
| 91703 | Physiological Systems | 6cp |
| 91354 | Anatomical Pathology | 6cp |
| 99539 | Pathophysiology A | 6cp |
| 99540 | Pathophysiology B | 6cp |

### *Neurophysiology*[1]

(for non-BMedSc courses)

| | | |
|---|---|---|
| 91703 | Physiological Systems | 6cp |
| 91704 | Behavioural Sciences | 6cp |
| 91706 | Neuroscience | 8cp |
| 91708 | Psychophysiology | 8cp |

[1] Students wishing to do these second majors must have taken Medical Science 1 (or Biology 1) and Medical Science 2 (or Biology 2) in Stages 1 and 2.

### *Pharmacology*

This second major is for students in the Biomedical Science and Biotechnology courses.

| | | |
|---|---|---|
| 91703 | Physiological Systems | 6cp |
| 91707 | Pharmacology 1 | 8cp |
| 91709 | Pharmacology 2 | 8cp |

## Faculty of Mathematical and Computing Sciences

### *Statistics*

This second major is suitable for students in Biological and Medical Science programs.

| | | |
|---|---|---|
| 35254 | Health Statistics | 6cp |
| 35252 | Statistics 2 | 6cp |
| 35353 | Regression Analysis | 6cp |
| 35356 | Design and Analysis of Experiments | 6cp |

This second major is suitable for students in physical, chemical, earth and environmental sciences programs.

| | | |
|---|---|---|
| 35151 | Statistics 1 | 6cp |
| 35252 | Statistics 2 | 6cp |
| | *together with any two of* | |
| 35353 | Regression Analysis | 6cp |
| 35355 | Quality Control | 6cp |
| 35356 | Design and Analysis of Experiments | 6cp |
| 35361 | Probability and Stochastic Processes | 6cp |

### *Mathematics*

This second major is suitable for students in physical, chemical, earth and environmental sciences programs.

| | | |
|---|---|---|
| 35212 | Linear Algebra | 6cp |
| 35231 | Differential Equations | 6cp |
| 35241 | Optimisation 1 | 6cp |
| 35281 | Numerical Analysis 1 | 6cp |

## Faculty of Engineering and/or Faculty of Mathematical and Computing Sciences

### *Computing and Computer Systems*

An individually designed second major in computing and/or computer systems for students in Applied Physics programs can be arranged in consultation with the Course Director of the Applied Physics program and, where necessary, appropriate staff from the Faculty of Engineering or the Faculty of Mathematical and Computing Sciences. These subjects are normally taken after completing the core computing subjects taken by all applied physics students.

Example 1

| | | |
|---|---|---|
| 48440 | Software Development 2 | 6cp |
| 48450 | Operating Systems | 6cp |
| 48451 | Digital Systems | 6cp |
| 48570 | Data Acquisition and Distribution | 6cp |

Example 2

| | | |
|---|---|---|
| | *at least 24 credit points from the following* | |
| 31415 | Principles of Software Development A | 6cp |
| 31425 | Principles of Software Development B | 6cp |
| 31426 | Systems Software and Networks | 6cp |
| 31428 | Quantitative Modelling | 6cp |
| 31429 | Procedural Programming | 6cp |
| 31748 | Programming on the Internet | 4cp |
| 31904 | Systems Programming | 4cp |

## Faculty of Business

### *Management Practice*

This second major is designed for students who wish to gain knowledge of the management process, including management and communication skills, employment relations practice, management of business processes and managing the strategy process.

| | | |
|---|---|---|
| 21440 | Management Skills | 6cp |
| 21306 | International Employment Relations | 6cp |
| 21131 | Business Process Management | 6cp |
| 21630 | Managing the Strategy Process | 6cp |

### *Small and Medium Enterprise Management*

This second major prepares students for a management role in the small and medium enterprise business sector by providing an understanding of the peculiarities of small and new businesses, which differentiate them from large corporations and government enterprises. This second major is offered at the City campus on demand and partially at the Kuring-gai campus on demand.

| | | |
|---|---|---|
| 21131 | Business Process Management | 6cp |
| 21409 | Entrepreneurship and Innovation | 6cp |
| 21082 | Small and Medium Enterprise Management | 6cp |
| 22566 | Accounting for Small Business 1 | 6cp |

### *Leisure Management*

This second major provides an understanding of the role of leisure in contemporary society, focusing on the management and marketing of leisure services. This second major is offered at the Kuring-gai campus only.

| | | |
|---|---|---|
| 27126 | Leisure in Australia | 6cp |
| 27216 | Leisure Services Management | 6cp |
| 27523 | Leisure and Tourism Planning | 6cp |
| | *plus one of the following* | |
| 27628 | Law for Leisure, Sport and Tourism | 6cp |
| 27306 | Marketing of Leisure Services | 6cp |
| 27179 | Festivals and Special Events | 6cp |
| 27316 | Leisure and Fitness Centre Operations | 6cp |

### *Tourism Management*

This second major provides students with a systematic framework for understanding the tourism phenomenon in Australia. This second major is offered at the Kuring-gai campus only.

| | | |
|---|---|---|
| 27184 | Introduction to Tourism Systems | 6cp |
| 27648 | The Tourism Industry | 6cp |
| 27706 | Tourism Management | 6cp |
| | *plus one of the following* | |
| 27628 | Law for Leisure, Sport and Tourism | 6cp |
| 27185 | Introduction to Tourist Behaviour | 6cp |
| 27642 | Tourism Services Marketing | 6cp |
| 27523 | Leisure and Tourism Planning | 6cp |

## Faculty of Nursing

### *Health Services Management*

This second major is designed to provide skills, knowledge and understanding of management as it relates to health services and settings. This second major is offered at the Kuring-gai campus only.

| | | |
|---|---|---|
| 92112 | Health Care in Australia | 6cp |
| 92113 | Trends in Health Care | 6cp |
| 92114 | Health Services Management | 6cp |
| 92115 | Planning and Evaluating Health Services | 6cp |

## Faculty of Humanities and Social Sciences/Faculty of Education

### *Aboriginal Studies*

| | | |
|---|---|---|
| 015110 | Aboriginal Culture and Philosophies | 8cp |
| 52220 | Aboriginal Social and Political History | 8cp |
| 52239 | Aboriginal People and the Media | 8cp |

## Faculty of Humanities and Social Sciences

### *Communication and Information*

| | | |
|---|---|---|
| | *at least three of the following* | |
| 50105 | Communication and Information Environments | 6cp |
| 50106 | Media, Information and Society | 6cp |
| 50125 | Communication and Audience | 8cp |
| 50126 | Information and the Organisation | 8cp |
| 50127 | International Communication | 8cp |
| 50130 | Organisation Change and Communication | 8cp |

### *Information*

| | | |
|---|---|---|
| | *at least three of the following* | |
| 50112 | Information in Society | 6cp |
| 50113 | Information Resources | 6cp |
| 50143 | Research Methods and Data Analysis | 8cp |
| 50144 | Organising and Retrieving Information | 8cp |
| 50146 | Internet and Electronic Information Networking | 8cp |
| 50147 | Creating User Documentation | 8cp |

### *Public Communication*

| | | |
|---|---|---|
| | *at least three of the following* | |
| 50118 | Public Communication Processes | 6cp |
| 50119 | Public Communication Challenges | 6cp |
| 50519 | Public Relations Principles | 8cp |
| 50610 | Public Relations Strategies | 8cp |
| 50161 | Advertising Production and Criticism | 8cp |
| 50162 | Advertising Communication Strategies | 8cp |

Electives are also available in the following areas. Please consult the *1999 Faculty of Humanities and Social Sciences Handbook* for further information http://www.uts.edu.au/div/publications/hss/faculty/toc.html or telephone 9514 2300 for further details.

- Communication and English Language Studies
- Cultural Studies
- Journalism
- Social Inquiry and Change
- Social, Political and Historical Studies
- Women's Studies
- Writing

## Faculty of Education

Second majors are available through the Faculty of Education in the following areas:

- Art
- Educational Computing
- Education
- English
- History
- Music
- Personal Development, Health and Physical Education

For further information please contact:

Associate Professor M Cosgrove
Faculty of Education
telephone 9514 5282
fax 9514 5556

# 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, a Graduate Diploma and several 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 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 Clinical Biochemistry

Biochemical Analysis (KB81)
Clinical Biochemistry (KB79)
Medical Biochemistry (KB82)

### Graduate Certificates in Coastal Resource Management (KB69)[1]

### Graduate Certificates in Ecotoxicology[2]

Field Methods in Ecotoxicology (KB84)
Laboratory Methods in Ecotoxicology (KB83)
Management in Ecotoxicology (KB85)
Principles of Ecotoxicology (KB77)

### Graduate Certificates in Medical Microbiology

Diagnostic Bacteriology (KB88)
Medical Microbiology (KB86)
Molecular Microbiology (KB87)
Parasitology and Mycology (KB89)

### Graduate Certificates in Occupational Health and Safety

Occupational Health and Safety (P053)
Occupational Health and Safety Management (P054)

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[1] Interdisciplinary course run by the Faculty of Science in collaboration with the Faculties of Engineering; Business; Law; and Design, Architecture and Building. Modified programs will be offered subject to University approval.

[2] In collaboration with the NSW Environment Protection Authority.

## Attendance

The Graduate Certificate courses in Coastal Resource Management, Ecotoxicology, Medical Microbiology and Clinical Biochemistry normally consist of two or three subjects offered over one semester for up to nine hours per week. Offered at the postgraduate level, these courses 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.

## 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 Certificates in Clinical Biochemistry

There are three graduate certificates in clinical biochemistry. They are: Graduate Certificate in Clinical Biochemistry, Graduate Certificate in Biochemical Analysis and Graduate Certificate in Medical Biochemistry. Each of these is to be completed as one semester of formal coursework.

## Admission requirements

Admission to these courses is open to science graduates of approved tertiary institutions where biochemistry has been a significant component of the degree, or persons with equivalent qualifications. Key computing skills are also a requirement. Places will be offered on academic merit. All academic inquiries are to be directed to:

Course Director, Clinical Biochemistry
Dr Ralph Orwell
Department of Cell and Molecular Biology
telephone 9514 4098
fax 9514 4003
email Ralph.Orwell@uts.edu.au

# Graduate Certificate in Clinical Biochemistry

***Course code: KB79***

***Available in Autumn semester***

| | | |
|---|---|---|
| 91410 | Principles of Clinical Biochemistry | 8cp |
| 91417 | Clinical Laboratory Management | 4cp |

# Graduate Certificate in Biochemical Analysis

***Course code: KB81***

***Available in Autumn semester***

| | | |
|---|---|---|
| 91426 | Analytical Techniques in Clinical Biochemistry | 8cp |
| 91474 | Statistics in Bioscience | 4cp |

# Graduate Certificate in Medical Biochemistry

***Course code: KB82***

***Available in Spring semester***

| | | |
|---|---|---|
| 91411 | Biochemical Pathophysiology | 8cp |
| 91467 | Clinical Biochemistry Advanced Aspects | 8cp |

# Graduate Certificate in Coastal Resource Management

***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. The subjects undertaken by individual candidates will be drawn from those offered in the Master's program, the combination of subjects being determined by a candidate's needs and academic background.

All academic inquiries should be directed to one of the:

Course Directors, Coastal Resource Management

Associate Professor Ken Brown
telephone 9514 4042 or 9514 4393
fax 9514 4079
email Kenneth.Brown@uts.edu.au

or

Dr Peter Ralph
telephone 9514 4070
fax 9514 4003
email Peter.Ralph@uts.edu.au

# Graduate Certificates in Ecotoxicology

There are four graduate certificates in ecotoxicology, with two offered in each semester, that are designed to provide training in specific areas of ecotoxicology. They are: Graduate Certificate in Principles of Ecotoxicology, Graduate Certificate in Laboratory Methods in Ecotoxicology, Graduate Certificate in Field Methods in Ecotoxicology, and Graduate Certificate in Management in Ecotoxicology. Each of these is to be completed as one semester of formal coursework, with a student load of 12 credit points per semester. Most classes are conducted at the St Leonards campus.

## Admission requirements

Admission to these courses is open to graduates with degrees in biological sciences, chemistry, agriculture, pharmacy, engineering or equivalent disciplines. Computing skills in the use of word processing, spreadsheet, simple graphics, email, and accessing the Internet, are required for submission of assignments and reports. English language levels are as required by the University.

All academic inquiries are to be directed to:

Course Director, Ecotoxicology
Ms Alex Pulkownik
Department of Environmental Sciences
Room GH 5.19c
telephone 9514 4035
fax 9514 4003
email a.pulkownik@uts.edu.au

# Graduate Certificate in Principles of Ecotoxicology

***Course code: KB77***

This Graduate Certificate course is an introductory course in ecotoxicology that deals with the sources, chemistry and effects of toxic substances on the biota and the use of bioassay as a means of assessing their toxicity.

***Available in Autumn semester***

| | | |
|---|---|---|
| 91468 | Introduction to Ecotoxicology | 8cp |
| | *and either* | |
| 91493 | Biosystems | 4cp |
| | *or* | |
| 91474 | Statistics in Bioscience | 4cp |

# Graduate Certificate in Laboratory Methods in Ecotoxicology

***Course code: KB83***

This Graduate Certificate is designed to acquaint the student with the variety of laboratory-based methods used to assess the biochemical and physiological responses in plants and animals to the entry, transformation and removal of toxic substances.

***Available in Autumn semester***

| | | |
|---|---|---|
| 91469 | Laboratory Methods in Ecotoxicology | 12cp |

# Graduate Certificate in Field Methods in Ecotoxicology

***Course code: KB84***

This Graduate Certificate is designed to introduce students to the field investigation methodology used in ecotoxicology and to the elements of appropriate experimental design and analysis.

***Available in Spring semester***

| | | |
|---|---|---|
| 91470 | Field Methods in Ecotoxicology | 8cp |
| 91440 | Experimental Design and Methods | 4cp |

# Graduate Certificate in Management in Ecotoxicology

***Course code: KB85***

This Graduate Certificate is designed to provide students with an understanding of the principles underlying environmental assessment and management, and of the application of ecotoxicology to long term environmental management in general.

***Available in Spring semester***

| | | |
|---|---|---|
| 91494 | Ecosystem Assessment | 6cp |
| 91495 | Environmental Risk Assessment and Management | 6cp |

# Graduate Certificates in Medical Microbiology

There are four graduate certificates in medical microbiology, with two offered in each semester. They are: Graduate Certificate in Medical Microbiology, Graduate Certificate in Molecular Microbiology, Graduate Certificate in Diagnostic Bacteriology, and Graduate Certificate in Parasitology and Mycology. Each of these is to be completed as one semester of formal coursework.

## Admission requirements

Admission to these courses is open to science graduates of approved tertiary institutions where microbiology has been a significant component of the degree, or persons with equivalent qualifications. Key computing skills are also a requirement. Places will be offered on the basis of academic merit. Employment experience in a microbiology laboratory is advantageous, but not mandatory. All academic inquiries are to be directed to:

Course Director, Medical Microbiology
Dr Iain Stevenson
Department of Cell and Molecular Biology
telephone 9514 4154
fax 9514 4003
email Iain.Stevenson@uts.edu.au

# Graduate Certificate in Medical Microbiology

***Course code: KB86***

***Available in Autumn semester***

| | | |
|---|---|---|
| 91480 | Epidemiology and Disease Control | 6cp |
| 91417 | Clinical Laboratory Management | 4cp |

# Graduate Certificate in Molecular Microbiology

***Course code: KB87***

***Available in Autumn semester***

| | | |
|---|---|---|
| 91417 | Clinical Laboratory Management | 4cp |
| 91488 | Molecular Microbiology | 8cp |

# Graduate Certificate in Diagnostic Bacteriology

***Course code: KB88***

***Available in Spring semester***

| | | |
|---|---|---|
| 91454 | Diagnostic Bacteriology | 8cp |
| 91481 | Current Topics in Clinical Microbiology | 4cp |

# Graduate Certificate in Parasitology and Mycology

***Course code: KB89***

***Available in Spring semester***

| | | |
|---|---|---|
| 91455 | Human Parasitology and Mycology | 8cp |
| 91481 | Current Topics in Clinical Microbiology | 4cp |

## Graduate Certificate in Occupational Health and Safety

***Course code: P053***

This program involves an appropriate selection of subjects from those offered in the Master's program. For information contact:

Course Coordinator
Dr Deirdre Cobbin
Department of Health Sciences
telephone 9514 2231 or 9514 2227
fax 9514 2228
email Deirdre.Cobbin@uts.edu.au

## Graduate Certificate in Occupational Health and Safety Management

***Course code: P054***

This program involves an appropriate selection of subjects from those offered in the Master's program. For information contact:

Course Director
Dr Deirdre Cobbin
Department of Health Sciences
telephone 9514 2231 or 9514 2227
fax 9514 2228
email Deirdre.Cobbin@uts.ed.au

# GRADUATE DIPLOMA COURSE

The Faculty offers a Graduate Diploma in Hydrogeology and Groundwater Management (N061).

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 Course Director who will make a recommendation to the Faculty of Science 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 3.2.7 (see the UTS *Postgraduate Student Handbook*).

## Graduate Diploma in Hydrogeology and Groundwater Management

***Course code: N061***

*Course Director: Professor M J Knight*

This course is designed for students working in the area of groundwater resource management.

### Admission requirements

Applicants should hold a 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. Distance mode study is also offered.

## Duration

The course requires block-release attendance of three blocks of two weeks 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. This course is also available in Distance Mode and has a similar residential component to the Master of Science in Hydrogeology and Groundwater Management.

## 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[1]
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

[1] This is a non-credit subject available to students whose computing background requires strengthening.

For further information contact:

Course Director, Hydrogeology and Groundwater Management
Professor M J Knight
telephone 9514 1984
fax 9514 1985
email Groundwater.Management@uts.edu.u

# MASTER'S DEGREES (BY COURSEWORK)

| | |
|---|---|
| Master of Coastal Resource Management[1] | KB59 |
| Master of Health Science in Traditional Chinese Medicine | NH61 |
| Master of Occupational Health and Safety Management | P055 |
| Master of Occupational Health and Safety Management (Honours) | P057 |
| Master of Science in Clinical Biochemistry | KB55 |
| Master of Science (Honours) in Clinical Biochemistry | KB61 |
| Master of Science in Ecotoxicology[2] | KB52 |
| Master of Science (Honours) in Ecotoxicology[2] | KB62 |
| Master of Science in Hydrogeology and Groundwater Management | N057 |
| Master of Science in Medical Microbiology | KB57 |
| Master of Science (Honours) in Medical Microbiology | KB60 |

[1] Interdisciplinary course run by the Faculty of Science in collaboration with the Faculties of Engineering; Business; Law; and Design, Architecture and Building.

[2] 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, will be seen as making unsatisfactory progress and will have their registration discontinued. Students may appeal against such discontinuation of registration under Rule 3.3.8, see the *UTS Calendar* or online at http://www.uts.edu.au/div/publications/policies/rules/contents.html

## 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 Coastal Resource Management

***Course code: KB59***

*Course Directors: Associate Professor K R Brown, Dr P Ralph*

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.

## Objectives

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 coastal 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. 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.

## Duration

The course can be completed over two 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 one-year full-time option for the Master's course are available.

## Admission requirements

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.

The 1999 program comprises the following subjects. Students should contact the Course Director to determine what subjects are on offer in each academic semester, and their appropriate attendance pattern.

(Including Summer and Winter teaching periods)

| | | |
|---|---|---|
| 98702 | Coastal Ecosystems | 4cp |
| 98704 | Biotic Resources | 4cp |
| 98707 | Topics in Coastal Management (2 sem) | 4cp |
| 98709 | Urban Stormwater Management | 6cp |
| 98711 | Coastal Resource Policy | 6cp |
| 98716 | Geological Resources | 4cp |
| 98718 | Pollution Assessment | 4cp |
| 91478 | Economics of Coastal Resources | 4cp |
| 91479 | Coastal Zone Law | 4cp |
| 98703 | Public Administration and Management | 4cp |
| 98705 | GIS and Resources Assessment | 4cp |

| | | |
|---|---|---|
| 98706 | Coastal Planning | 4cp |
| 98708 | Environmental Risk Assessment | 6cp |
| 98713 | Coastal Processes | 6cp |
| 98204 | Tourism, Recreation and Natural Resource Management | 4cp |

**Note:** Students who, on the basis of their prior learning, qualify for exemption from one or more subjects may be required to undertake other subjects of equal value. Recommended substitute subjects are:

| | | |
|---|---|---|
| 17205 | Project Management Studies | |
| 17516 | Environment and Infrastructure 1 | 4cp |
| 17522 | Environment and Infrastructure 2 | 4cp |
| 21720 | Employment Relations | 6cp |
| 21722 | Leadership and Management | 6cp |
| 21724 | Human Resource Management | 6cp |
| 21766 | Managing Community Organisations | 6cp |
| 21767 | Environment of Community Organisations | |
| 27714 | Tourism Attractions Management | 6cp |
| 27757 | Ecotourism Planning and Management | 6cp |
| 27773 | Guiding and Interpretation Management | 6cp |
| 49124 | Water Quality Management | 6cp |
| 49126 | Land Resource and Environmental Management | 6cp |
| 49452 | Environmental Management | 6cp |
| 59337 | Sociology and Planning | 2cp |
| 59336 | Politics and Planning | 2cp |
| 66017 | Geopollution Management | 5cp |
| 66025 | Contaminated Site Management | 5cp |

For further information contact one of the:

Course Directors, Coastal Resource Management

Associate Professor Ken Brown
telephone 9514 4042/4393
fax 9514 4079
email Kenneth.Brown@uts.edu.au

or

Dr Peter Ralph
telephone 9514 4070
fax 9514 4003
email Peter.Ralph@uts.edu.au

# Master of Health Science in Traditional Chinese Medicine

### *Course code: NH61*

*Course Director: Associate Professor C Rogers*

**No intake in 1999.**

This course is available to graduates in acupuncture or Chinese herbal medicine or equivalent, with an intake in even years only. Applications from practitioners of acupuncture or Chinese herbal medicine who do not hold an undergraduate degree will be assessed on an individual basis; prior learning and professional experience in Traditional Chinese Medicine will be recognised for course entry provided that it is deemed equivalent to that required for normal entry. The course is offered on a part-time basis over four semesters.

## Part-time program

### Stage 1

#### *Autumn semester*

| | | |
|---|---|---|
| 99599 | Principles of Chinese Herbal Medicine | 8cp |
| 99600 | Graduate Clinic Level 1 (CHM) | 4cp |

#### *Spring semester*

| | | |
|---|---|---|
| 99601 | Principles of Botany | 4cp |
| 99602 | Principles of Pharmacognosy | 3cp |
| 99603 | Classical Herbalism | 3cp |
| 99604 | Graduate Clinic Level 2 (CHM) | 2cp |

### Stage 2

#### *Autumn semester*

| | | |
|---|---|---|
| 99605 | Herbal Prescriptions | 5cp |
| 99594 | Chinese Herbal Practice 1 | 6cp |
| 99595 | Graduate Clinic Level 3 (CHM) | 2cp |

#### *Spring semester*

| | | |
|---|---|---|
| 98596 | Chinese Herbal Practice 2 | 6cp |
| 99597 | Graduate Clinical Internship (CHM) | 5cp |

For further information contact:

Course Director
Traditional Chinese Medicine
telephone 9514 2500
fax 9281 2267
email Carole.Rogers@uts.edu.au

# Master of Occupational Health and Safety Management

***Course code: P055***

*Course Director: Dr D Cobbin*

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.

## Objectives

The behavioural objectives of the course are to enable graduates of the Master of Occupational Health and Safety Management 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

In general the course is offered on a part-time basis over two years, and will require attendance at the University's City campus, Broadway, for eight hours per week. 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. Depending on availability of subjects it may be possible to complete the course in one year on a full-time basis.

## 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.

Students should consult the Course Director to determine what subjects are on offer in each academic semester.

Subjects available in 1999 are as follows:

| | | |
|---|---|---|
| 69312 | Occupational Hazard Analysis | 6cp |
| 69324 | Biological Hazards and Toxicology | 3cp |
| 69325 | Data Analysis in Occupational Health and Safety | 3cp |
| 69336 | Evaluating OHS (Construction Industry) | 6cp |
| 69343 | Occupational Health and Safety Management | 3cp |
| 69311 | Occupational Health and Safety in Society | 3cp |
| 69313 | Organisational Behaviour and Communication | 3cp |
| 69335 | People and the Physical Environment | 3cp |
| 69341 | Risk Management | 6cp |
| 69342 | Legal Aspects of Occupational Health and Safety | 3cp |

Remaining subjects in the program (not offered in 1999) are:

| | | |
|---|---|---|
| 69332 | Chemical Safety Management | 3cp |
| 69334 | Occupational Health Services | 3cp |
| 69323 | Human Factors/Ergonomic Design | 3cp |

For further information contact:

Course Director, Occupational Health and Safety Management
Dr D Cobbin
telephone 9514 2231
fax 9514 2228
email Deirdre.Cobbin@uts.edu.au

# Master of Occupational Health and Safety Management (Honours)

***Course code: P057***

*Course Director: Dr D Cobbin*

This course involves all the coursework requirements of the Master of Occupational Health and Safety Management plus an additional year to undertake a substantial research project in an area of particular interest and/or relevance to the student. Students would be permitted to transfer to the Master's Honours program only if they achieved a credit average or better in the coursework. The 24 credit points to be completed in the Honours program involve the following subjects, each allocated 12 credit points:

| | | |
|---|---|---|
| 69351 | Occupational Health and Safety Project | 12cp |
| 69353 | Research Proposal (Occupational Health and Safety) | 12cp |

Persons who already have a Master of Occupational Health and Safety Management degree or equivalent from this or another university are able to enter the Master's Honours program with advanced standing. They would normally be required to complete one semester of appropriate coursework at credit level or better before undertaking the research project.

For further information contact:

Course Director, Occupational Health and Safety Management
Dr D Cobbin
telephone 9514 2231 or 9514 2227
fax 9514 2228
email D.Cobbin@uts.edu.au

# Master of Science in Clinical Biochemistry

***Course code: KB55***

*Course Director: Dr R Orwell*

This course is designed to provide advanced level professional education and training in clinical biochemistry for professional scientists employed in clinical laboratories, including those currently in senior laboratory positions. The program includes visits to specialised laboratories and engages the services of specialists in different fields of clinical biochemistry from outside the University.

## Objectives

By completing this course students will acquire the theoretical background and practical skills required by the practising clinical biochemist, including:

- diagnostic biochemical analysis in an advancing technological environment;
- statistical and computer techniques for data handling and quality control;
- application of new developments in biomedical science to pathology;
- administration and management of a clinical laboratory, leading to an appreciation of the role of modern clinical biochemistry laboratories in diagnosis and patient care.

## Duration

The course involves one year full-time or two years' part-time attendance.

## Admission requirements

Candidates may be admitted to the course with any of the following:

1. a three year undergraduate degree plus two years' appropriate work experience;
2. a four year undergraduate Honours degree in a relevant field; or
3. evidence of general and professional qualifications equivalent to 1 or 2 above.

## Full-time program

***Autumn semester***

| | | |
|---|---|---|
| 91410 | Principles of Clinical Biochemistry | 8cp |
| 91426 | Analytical Techniques in Clinical Biochemistry | 8cp |
| 91417 | Clinical Laboratory Management | 4cp |
| 91474 | Statistics in Bioscience | 4cp |

***Spring semester***

| | | |
|---|---|---|
| 91411 | Biochemical Pathophysiology | 8cp |
| 91467 | Clinical Biochemistry Advanced Aspects | 8cp |
| 91419 | Case Studies in Clinical Biochemistry | 8cp |

## Part-time program

Stage 1

***Autumn semester***

| | | |
|---|---|---|
| 91410 | Principles of Clinical Biochemistry | 8cp |
| 91474 | Statistics in Bioscience | 4cp |

***Spring semester***

| | | |
|---|---|---|
| 91411 | Biochemical Pathophysiology | 8cp |
| 91467 | Clinical Biochemistry Advanced Aspects | 8cp |

Stage 2

***Autumn semester***

| | | |
|---|---|---|
| 91417 | Clinical Laboratory Management | 4cp |
| 91426 | Analytical Techniques in Clinical Biochemistry | 8cp |

***Spring semester***

| | | |
|---|---|---|
| 91419 | Case Studies in Clinical Biochemistry | 8cp |

For further information contact:

Course Director, Clinical Biochemistry
Dr R Orwell
telephone 9514 4098
fax 9514 4003
email Ralph.Orwell@uts.edu.au

# Master of Science (Honours) in Clinical Biochemistry

***Course code: KB61***

*Course Director: Dr R Orwell*

The Honours degree consists of 48 credit points of study: 24 credit points of coursework and a 24 credit point project. The coursework component will consist of subjects chosen according to the applicant's educational background and will normally consist of subjects selected from those in the Master's program. The project is chosen in consultation with an academic supervisor, which may be undertaken in an approved laboratory or other suitable location under the supervision of a member of staff of the Department of Cell and Molecular Biology.

Candidates who have completed Master's level study in a relevant field with a credit average and at least one-third of the subjects passed at distinction level or better, may be admitted to the Honours program. Depending on applicants' educational backgrounds, exemptions may be granted from some of the coursework component.

## Full-time program

***Autumn semester***

| | | |
|---|---|---|
| | Coursework subjects | 24cp |

***Spring semester***

| | | |
|---|---|---|
| 91466 | Individual Research Project – Clinical Biochemistry F/T | 24cp |

## Part-time program

Stage 1

***Autumn semester***

| | | |
|---|---|---|
| | Coursework subjects | 12cp |

***Spring semester***

| | | |
|---|---|---|
| 91458 | Individual Research Project – Clinical Biochemistry P/T | 12cp |

Stage 2

***Autumn semester***

| | | |
|---|---|---|
| | Coursework subjects | 12cp |

***Spring semester***

| | | |
|---|---|---|
| 91458 | Individual Research Project – Clinical Bochemistry P/T | 12cp |

# Master of Science in Ecotoxicology

***Course code: KB52***

*Course Director: Ms A Pulkownik*

Ecotoxicology is the science which deals with the toxicity of chemicals in the environment and their impact on 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 ecotoxicology has, therefore, an intrinsic management goal.

This course provides relevant postgraduate education and training in the developing science of ecotoxicology and is offered in conjunction with the Centre for Ecotoxicology. The 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.

Two programs are available. The Master of Science is a 48 credit point program (coursework only), while the MSc (Hons) is a 48 credit point program with 24 credit points from the coursework component of the Master of Science program and a research project of 24 credit points. The seven subjects in the coursework program cover the essential knowledge and skills for the practising ecotoxicologist, and comprise lectures, tutorials, and supervised laboratory and field work.

## Objectives

The objectives of the course are to provide students with:

- specialist knowledge in the field of ecotoxicology;
- understanding of the mechanism of action and impact of toxic chemicals on the biota;
- skills to design and implement toxicological tests on a variety of organisms and to interpret the results;
- skills to apply analytical techniques and field assessment methodology to evaluate the impact of toxic materials in the environment;
- decision-making skills needed for sound ecosystem assessment and environmental risk assessment and management.

## Duration

Both courses are offered on a full-time or part-time basis. The duration of the Master of Science in Ecotoxicology program in the full-time mode is two semesters or one year, with attendance of 18 hours per week. In the part-time mode the attendance pattern is nine hours per week, over four semesters, or two years. The Master of Science (Honours) in Ecotoxicology comprises 24 credit points from the coursework component of the Master of Science and a one semester full-time or two semesters' part-time project.

## Admission requirements

1. Admission to the course is open to graduates with three year degrees in the biological sciences, chemistry, agriculture, pharmacy, engineering or equivalent disciplines, plus two years appropriate work experience; or a four year Honours degree in a relevant field; or to candidates with general or professional experience equivalent to the above.
2. Admission to the course will involve a selection process and may require personal interviews.
3. Prospective students should have adequate computing skills to be able to use word processing, spreadsheet and simple graphics software packages, email and access the Internet. All assignments and reports will be expected to be submitted in typed or word-processed format. Bridging courses in computing skills can be recommended by the University prior to entry.
4. Prospective students should be proficient in English at the level required by the University (if applicable).
5. Individual subject exemptions may be granted on the basis of previous relevant study or demonstrated employment experience. No more than eight credit points of exemption will be granted. Where subject equivalents to more than eight credit points of previous learning are demonstrated, alternative postgraduate subjects or special assignments will be prescribed by the Course Director.
6. Candidates who have completed Master's level study in a relevant field with a credit average and at least one-third of the subjects passed at distinction level or better, may be admitted to Honours. Depending on applicants' educational backgrounds, exemptions may be granted from some of the coursework component.
7. Students who have completed the requirements for the Master of Science degree in Ecotoxicology at UTS can transfer to the Master's (Honours) in Ecotoxicology with exemption from the coursework subjects.

## Full-time program

### *Autumn semester*

| | | |
|---|---|---|
| 91468 | Introduction to Ecotoxicology | 8cp |
| 91469 | Laboratory Methods in Ecotoxicology | 12cp |
| | *either* | |
| 91493 | Biosystems[1] | 4cp |
| | *or* | |
| 91474 | Statistics in Bioscience[1] | 4cp |

### *Spring semester*

| | | |
|---|---|---|
| 91470 | Field Methods in Ecotoxicology | 8cp |
| 91440 | Experimental Design and Methods | 4cp |
| 91494 | Ecosystem Assessment | 6cp |
| 91495 | Environmental Risk Assessment and Management | 6cp |

## Part-time program

### Stage 1

### *Autumn semester*

| | | |
|---|---|---|
| 91468 | Introduction to Ecotoxicology | 8cp |
| | *either* | |
| 91493 | Biosystems[1] | 4cp |
| | *or* | |
| 91474 | Statistics in Bioscience[1] | 4cp |

### *Spring semester*

| | | |
|---|---|---|
| 91470 | Field Methods in Ecotoxicology | 8cp |
| 91440 | Experimental Design and Methods | 4cp |

### Stage 2

### *Autumn semester*

| | | |
|---|---|---|
| 91469 | Laboratory Methods in Ecotoxicology | 12cp |

### *Spring semester*

| | | |
|---|---|---|
| 91494 | Ecosystem Assessment | 6cp |
| 91495 | Environmental Risk Assessment and Management | 6cp |

[1] Subjects will be prescribed according to educational background of the entrant.

All academic inquiries may be directed to:

Course Director, Ecotoxicology
Ms Alex Pulkownik
Department of Environmental Science
Room GH5.19c
telephone 9514 4035
fax 9514 4003
email A.Pulkownik@uts.edu.au

# Master of Science (Honours) in Ecotoxicology

***Course code: KB62***

*Course Director: Ms A Pulkownik*

## Full-time program (1 year)

Stage 1

***Autumn semester***

Coursework subjects 24cp

Stage 2

***Spring semester***

91497 Ecotoxicology Project F/T 24cp

## Part-time program (2 years)

Stage 1

***Autumn semester***

Coursework subjects 12cp

***Spring semester***

Coursework subjects 12cp

Stage 2

***Autumn semester***

91496 Ecotoxicology Project P/T 12cp

***Spring semester***

91496 Ecotoxicology Project P/T 12cp

# Master of Science in Hydrogeology and Groundwater Management

***Course code: N057***

*Course Coordinator: Professor M J Knight*

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.

## Duration

The course requires block-release attendance of three blocks of two weeks 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. The course is also available in Distance Mode which has an additional residential component.

## Admission requirements

Applicants must hold a four-year science degree from UTS or an equivalent qualification.

## Attendance

The course is offered on the basis of block-release attendance pattern and students may extend their enrolment over more than one year. Distance mode study is also available.

## 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[1]
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

[1] This is a non-credit subject available to students whose computing background requires strengthening.

For further information contact:

Course Director, Hydrogeology and Groundwater Management
Professor M J Knight
telephone 9514 1984
fax 9514 1985
email groundwater.management@uts.edu.au

# Master of Science in Medical Microbiology

### *Course code: KB57*

*Course Director: Dr I 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 involvement of relevant staff from several major Sydney hospitals. The formal coursework consists of lectures, tutorials and supervised laboratory work, some of which may be conducted at hospitals or other laboratories in Sydney. Assessment will be by major assignments, seminar and presentations and in a few cases, formal examination. 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.

Employment experience in a medical microbiology laboratory, while not a mandatory admission requirement, is desirable.

## 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.

## Duration

The program can be completed in one year of full-time or two years of part-time attendance.

## Admission requirements

Candidates may be admitted to the course with any of the following:

1. a three year undergraduate degree plus two years appropriate work experience;
2. a four year undergraduate Honours degree in a relevant field; or
3. evidence of general and professional qualifications equivalent to 1 or 2 above.

## Full-time program

### *Autumn semester*

| | | |
|---|---|---|
| 91480 | Epidemiology and Disease Control | 6cp |
| 91417 | Clinical Laboratory Management | 4cp |
| 91487 | Research Methodology | 6cp |
| 91488 | Molecular Microbiology | 8cp |

### *Spring semester*

| | | |
|---|---|---|
| 91481 | Current Topics in Clinical Microbiology | 4cp |
| 91454 | Diagnostic Bacteriology | 8cp |
| 91455 | Human Parasitology and Mycology | 8cp |
| 91457 | Immunological Response to Infection | 4cp |

## Part-time program

Stage 1

***Autumn semester***

| | | |
|---|---|---|
| 91480 | Epidemiology and Disease Control | 6cp |
| 91487 | Research Methodology | 6cp |

***Spring semester***

| | | |
|---|---|---|
| 91454 | Diagnostic Bacteriology | 8cp |
| 91457 | Immunological Response to Infection | 4cp |

Stage 2

***Autumn semester***

| | | |
|---|---|---|
| 91488 | Molecular Microbiology | 8cp |
| 91417 | Clinical Laboratory Management | 4cp |

***Spring semester***

| | | |
|---|---|---|
| 91455 | Human Parasitology and Mycology | 8cp |
| 91481 | Current Topics in Clinical Microbiology | 4cp |

For further information contact:

Course Director, Medical Microbiology
Dr I Stevenson
telephone 9514 4154
fax 9514 4003
email Iain.Stevenson@uts.edu.au

# Master of Science (Honours) in Medical Microbiology

***Course code: KB60***

*Course Director: Dr I Stevenson*

The Honours degree consists of 48 credit points of study: 24 credit points of coursework and a 24 credit point project. For internal applicants, at least 24 credit points of the Master of Science in Medical Microbiology subjects must have been completed at a satisfactory academic level before admission to the Master's (Honours) program is considered. The coursework component will consist of subjects chosen according to the applicant's educational background and will normally consist of subjects selected from those in the Master's program. The project is undertaken either in an approved local laboratory or other suitable location or in the Department of Cell and Molecular Biology's laboratories, in each case under the supervision of a member of the Department's academic staff. For projects in an external laboratory, there may also be a co-supervisor from that laboratory.

Candidates who have completed Master's level study in a relevant field with a credit average and at least one-third of the subjects passed at distinction level or better, may be admitted to the Honours program. Depending on applicants' educational backgrounds, exemptions may be granted from some of the coursework component.

## Full-time program (1 year)

Stage 1

***Autumn semester***

| | | |
|---|---|---|
| Coursework subjects | | 24cp |

Stage 2

***Spring semester***

| | | |
|---|---|---|
| 91492 | Research Project – Medical Microbiology F/T | 24cp |

## Part-time program (2 years)

Stage 1

***Autumn semester***

| | | |
|---|---|---|
| Coursework subjects | | 12cp |

***Spring semester***

| | | |
|---|---|---|
| Coursework subjects | | 12cp |

Stage 2

***Autumn semester***

| | | |
|---|---|---|
| 91491 | Research Project – Medical Microbiology P/T | 12cp |

***Spring semester***

| | | |
|---|---|---|
| 91491 | Research Project – Medical Microbiology P/T | 12cp |

# 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 ecotoxicology
- 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 contact:

Office of the Associate Dean (Research)
telephone 9514 2490
fax 9514 1656

## 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 Science | N053 |
| Master of Science (Hydrogeology and Groundwater Management) | N056 |

## 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

| | |
|---|---|
| Science | N054 |
| Hydrogeology and Groundwater Management | N055 |

# Subject descriptions

## Guide to subject descriptions

The subject descriptions 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.

## 49550

### Computing for Groundwater Specialists

*Note: This subject does not carry academic credit.*

Provides the computing background needed for students with varying degrees of computer literacy. Topics covered include DOS and WINDOWS operating systems, databases, spreadsheets, word processing, statistical and graphical packages with applications relating to groundwater processes.

## 49551

### Surface Hydrology and Groundwater

*6cp*

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

*6cp*

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 DOS and WINDOWS operating systems, databases, spreadsheets, word processing, elements of geostatistics and graphical packages with applications related to groundwater processes, groundwater computing project.

## 49555

### Groundwater Modelling

*6cp*

The subject provides the computer modelling tools required for practical groundwater resource management underpinned by an adequate appreciation of the underlying theory and computer algorithms. Topics include conceptual modelling, analytical modelling, numerical modelling and solution algorithms applied to the governing differential equations. Emphasis is placed on finite difference and finite element methods. Applications to groundwater resource studies, borefield management, optimisation problems.

Assessment: continuous assessment involving assignments, problems and short examinations.

## 60101

### Chemistry and Materials Science

*6cp*

The objectives of the subject are to develop: an understanding of why engineers require a fundamental understanding of chemistry and materials; a solid science foundation for further engineering studies; an understanding of the fundamentals of chemistry and materials terminology and nomenclature in order to facilitate the working relationship of engineers, chemists and materials scientists; an ability to identify and solve chemical problems in engineering projects; and an ability to relate the properties of engineering materials in environmental and in manufacturing fields.

Topics include: chemical bonding of materials – electronic structure of materials, fundamental bonding concepts, chemical reactions; materials science and engineering – classification of materials, structure property relationship, mechanical properties, ferrous and non-ferrous alloys, engineering ceramics, polymers and composites, materials degradation and materials selection; industrial organic chemistry – hydrocarbons, spontaneous reactions, electrochemical cells, electrolysis, electroplating industrial processes, corrosion theory, application and protection.

## 60777

### Master's Thesis (Hydrogeology and Groundwater Management) F/T

## 60778

### Master's Thesis (Hydrogeology and Groundwater Management) P/T

## 60811

### Professional Scientific Practice A

*6cp; undertaken by learning contract; prerequisites: satisfactory completion of at least two years of an approved Bachelor program; corequisite: engagement in an approved program of industrial training leading to a minimum of 30 weeks of work*

This subject is one of two subjects which constitute the Diploma in Scientific Practice and a learning contract must be negotiated between the student and the Industrial Training Coordinator. Approved industrial experience is supplemented by a program designed to enhance the student's appreciation of the technical, organisational, social, cultural, ethical and legislative dimensions of workplace practice in science. This subject is normally taken during the first half of the student's industrial training. It focuses on the attributes required in a successful application for work placement, the orientation to workplace practices and the analysis of the student's early workplace experiences. This subject may include an assessment of the student's work by the workplace supervisor.

## 60812

### Professional Scientific Practice B

*6cp; undertaken by learning contract; prerequisites: 60811 Professional Scientific Practice A; satisfactory completion of at least two years of an approved Bachelor program; corequisite: a minimum of 30 weeks of approved industrial training*

This subject is one of two subjects which constitute the Diploma in Scientific Practice and a learning contract must be negotiated between the student and the Industrial Training Coordinator. Approved industrial experience is supplemented by a program designed to enhance the student's appreciation of the technical, organisational, social, cultural, ethical and legislative dimensions of workplace practice in science. This subject is normally taken during the second half of the student's industrial training. It will focus on the student's overall experience of work and his/her appreciation of the wider dimensions of work. This subject includes an assessment of the student's work by the workplace supervisor.

## 60987

### PhD Thesis P/T

## 60988

### PhD Thesis F/T

## 65012

### Chemistry 1A

*6cp; 6hpw; while there are no prerequisites for this subject, it is expected that students will have passed NSW HSC 2-unit Chemistry, the UTS Chemistry Bridging course, or equivalent.*

This subject is an introduction to some fundamental concepts in chemistry. Topics covered are: chemicals and chemical reactions; atomic structure; periodic table; chemical bonding; enthalpy changes in chemical reactions; and the structures and properties of solids. There is a laboratory program which complements the learning experiences in the lectures and tutorials. Other important aims of this subject are to enhance students' thinking

skills, to foster their abilities to work cooperatively with their peers and to assist in the development of their communication skills.

## 65022

### Chemistry 2A

*6cp; 6hpw; prerequisite: 65012 Chemistry 1A*

This subject builds on, and expands the knowledge and understanding of, 65012 Chemistry 1A. It seeks thereby to give students completing one full-time year a broad and general understanding of inorganic, organic and physical chemistry concepts, knowledge and practice.

The organic chemistry topics covered are: alkanes, alkenes, alkynes and aromatic hydrocarbons; alcohols, phenols and ethers; aldehydes, ketones, carboxylic acids and their derivatives; amines; organic halogen compounds; stereochemistry. The physical chemistry concepts are: reaction kinetics; chemical equilibrium; and acid-base theory.

The laboratory work seeks to impart practical skills and to demonstrate the theory and reactions taught. The subject aims to enhance students' thinking skills, to foster their ability to work cooperatively with their peers, and to assist in the development of their communication skills.

## 65062

### Extractive Metallurgy

*6cp; 6hpw; prerequisites: all Stage 1, 2 and 3 subjects in the Applied Chemistry or Materials Science degree programs*

Occurrence of minerals. Comminution and the theory of time particles. Extractive metallurgy including physical separation methods, flotation, hydrometallurgy and pyrometallurgy.

## 65101

### Chemistry 1C

*6cp; 6hpw; assumed knowledge: core of HSC 2-unit chemistry or equivalent*

This subject is an introduction to some fundamental concepts in chemistry. Topics covered are: chemicals and chemical reactions; atomic structure; periodic table; chemical bonding; enthalpy changes in chemical reactions; and the structures and properties of solids. The subject is designed for students with a strong background in chemistry and accordingly the topics are covered to a greater depth than in 65012 Chemistry 1A. There is a laboratory program which complements the learning experiences in the lectures and tutorials. Other important aims of this subject are to enhance students' thinking skills, to foster their abilities to work cooperatively with their peers and to assist in the development of their communication skills.

## 65201

### Chemistry 2C

*6cp; 6hpw; prerequisite: 65101 Chemistry 1C or equivalent*

This subject builds on the foundation studies in 65101 Chemistry 1C. Topics covered are: chemical equilibrium; acid-base theory; complex ions; electrochemistry; chemical kinetics; structure and bonding in carbon chemistry; chemical reactions of carbon compounds. There is a laboratory program which complements the learning experiences in the lectures and tutorials. The subject also aims to enhance students' thinking skills, to foster their ability to work cooperatively with their peers, and to assist in the development of their communication skills.

## 65202

### Organic Chemistry 1

*6cp; 6hpw; prerequisite: 65201 Chemistry 2C or equivalent*

Organic Chemistry 1 builds on material in 65201 Chemistry 2C. It is primarily concerned with the structures and chemical reactions of the common families of organic compounds. Other major topics include stereochemistry and infra spectroscopy. Lecture and tutorial material is complemented by a closely integrated set of laboratory experiences.

## 65241

### Principles of Forensic Science

*6cp; 4hpw*

This subject provides a broad and sound overview of forensic science. It is designed to introduce the different disciplines, principles and concepts peculiar to forensic science. It covers, in the forensic context, the following areas: history, general definitions and concepts, sub-disciplines, methodology and methods, introduction to crime scene, trace typology, function of the expert, legal system, judicial admissibility, ethical considerations, interpretation of forensic evidence. Lectures are complemented by tutorials/workshops involving guest speakers. Principles of Forensic Science is a core subject for the Forensic Science course and an elective for students in other related courses.

## 65306

### Analytical Chemistry 1

*6cp; 5–6hpw; prerequisite: 65201 Chemistry 2C or equivalent*

Lecture, laboratory and computer-aided instruction components of the course cover: (a) spectroscopic methods of analysis including ultraviolet-visible spectroscopy, nuclear magnetic resonance spectroscopy, mass spectrometry; (b) separation techniques including solvent extraction, distillation; precipitation, and a range of chromatographic methods; (c) volumetric techniques including acid-base, redox, non-aqueous, and potentiometric methods; and (d) errors, calibration and interpretation of analytical data.

## 65307

### Physical Chemistry 1

*6cp; 4.5hpw; prerequisites: 65201 Chemistry 2C and 33190 Mathematical Modelling for Science*

This subject is designed to provide students with a working knowledge of chemical thermodynamics and optical spectroscopy which can then be applied to other subjects within the course. Students are introduced to fundamental concepts in both spectroscopy and thermodynamics and learn how to apply these principles in problem-solving situations. Lectures are complemented by tutorials and relevant practical experiments.

## 65341

### Forensic Imaging

*6cp; 5hpw; prerequisites: all stage 1 subjects in the Forensic Science degree; 65241 Principles of Forensic Science; priority will be given to students enrolled in the Forensic Science course*

This subject is specifically designed for forensic science students. It covers application of light theory in forensic science (absorption/reflection, UV, IR, diffusion, episcopic coaxial illumination, polarised light, photoluminescence etc.), technical and forensic photography (use of large and medium format and single lens reflex cameras), image treatment, optical and electron microscopy, comparison microscopy. Lectures are complemented by an extensive practical program given in the form of workshops. Potential elective students must consult the subject coordinator, Dr Claude Roux on telephone 9514 1718 before enrolling in this subject.

## 65409

### Analytical Chemistry 2

*6cp; 4.5hpw; prerequisite: 65306 Analytical Chemistry 1*

Lecture and laboratory topics covering: separation techniques; gas chromatography; instrumentation. Sample preparation and derivatisation. Columns-packed and bonded phase. GC detectors and their application. HPLC: Basic theory and instrumentation. Sample preparation. Normal and reversed phase columns. Ion-pair chromatography and gel permeation chromatography. Ion exchange resins and chromatography. Method validation and quality assurance. Electrophoresis: plate and capillary. Laboratory automation: robotic techniques. Auto samplers. Post-column derivatisation methods.

## 65410

### Chemical Safety and Legislation

*6cp; 3hpw; prerequisite: 65201 Chemistry 2C or equivalent*

*NSW Occupational Health and Safety Act* and role of various governmental agencies. Toxic effects of chemicals. Classification of dangerous goods. Precautionary labels and material safety data sheets. Corrosives, oxidisers and explosives. Compressed gases. Personal protective equipment PPE in the laboratory. Waste. Good laboratory practice. Good manufacturing practice. QC/QA issues.

## 65411

### Inorganic Chemistry 1 (Transition Metal Chemistry)

*6cp; 4.5hpw; prerequisite: 65201 Chemistry 2C or 65022 Chemistry 2A or equivalent*

Transition metals: electron configurations and oxidation states. Fundamentals of coordination chemistry. Crystal field theory. Spectral and magnetic properties of metal complexes. Chelating agents and applications in analytical chemistry, industrial processes and medicine.

## 65508

### Organic Chemistry 2 (Structure Elucidation and Synthesis)

*6cp; 4.5hpw; prerequisite: 65202 Organic Chemistry 1*

This subject builds on previous studies of organic chemistry and demonstrates the use of combined chemical and spectroscopic methods UV, IR, NMR and MS in structural elucidation of organic compounds. It also aims

to develop the ability to make planned use of simpler organic reactions in the multistage synthesis of new aliphatic and aromatic compounds. The lectures will be complemented by a relevant practical program and tutorial sessions.

## 65509

### Inorganic Chemistry 2 (New Inorganic Materials)

*6cp; 4.5hpw; prerequisite: 65411 Inorganic Chemistry 1 (Transition Metal Chemistry)*

Structures of inorganic solids: crystallography and x-ray diffraction. Inorganic materials: biominerals, clathrates, new carbons, and aluminosilicates. Introductory organometallic chemistry: carbonyls and alkyls. Organometallic compounds as catalysts in industrial organic chemistry.

## 65541

### Physical Evidence 1

*6cp; 6hpw; prerequisites: 65241 Principles of Forensic Science; 65341 Forensic Imaging*

This subject covers the nature, value and relevance of several types of physical evidence. It follows on from 65241 Principles of Forensic Science and 65341 Forensic Imaging. It covers fingerprint detection and identification; miscellaneous individual traces, tooth marks, lip prints, nail marks etc.; path marks, footwear impression, tyre impression etc.; weapons including firearms, bullet/cartridge identification, gunshot residues, firing distance; motor vehicle globes and other light; miscellaneous trace evidence, matches, cigarettes/tobacco, building and safe insulation materials cordage, buttons, wood, and glass. Lectures are complemented by a practical program involving mock cases.

## 65542

### Forensic Toxicology 1

*6cp; 4hpw; prerequisite: 65306 Analytical Chemistry 1; corequisites: 65508 Organic Chemistry 2 (Structure Elucidation and Synthesis) and 91141 Biological Evidence*

The subject is designed as an introduction to the fundamentals of forensic toxicology. It involves specific forensic material, general pharmacology and toxicology. The practical component is designed to reinforce topics covered in lectures and seeks to give students experience in analytical problems specific to biological systems, which relies to some extent on the techniques they learnt in both 65306 Analytical Chemistry 1 and 91141 Biological Evidence. The subject also gives students an overview of State and Federal laws concerning licit and illicit drugs and poisons.

## 65606

### Analytical Chemistry 3

*6cp; 4.5hpw; prerequisite: 65306 Analytical Chemistry 1*

Lecture and laboratory topics covering: (a) electrochemical analysis methods, ion selective electrodes, calibration methods, standard addition etc. (b) spectroscopic methods such as AA, ICP, ICP/MS and XRF; trace analysis and matrix effects; (c) estimation of uncertainty in analytical chemistry, accuracy, precision gross errors, sensitivity, selectivity and linearity; (d) error propagation in analytical chemistry, systematic and random errors.

## 65607

### Physical Chemistry 2

*6cp; 4.5hpw; prerequisites: 65307 Physical Chemistry 1; 65411 Inorganic Chemistry 1 (Transition Metal Chemistry)*

Rates of chemical reactions, including order determination and rate laws. The use of analytical techniques to monitor reaction course. Activation energy and the effect of temperature on reaction rates. Basic electrochemical concepts. Molar conductivity and applications. Nature of the electrical double layer, single electrode potentials, thermodynamics and electrode equilibria. Pourbaix diagrams; Debye-Huckel theory; Butler-Volmer and Tafel relationships. Electrochemistry of energy conservation. Electrochemistry of corrosion processes.

## 65621

### Environmental Chemistry (new)

*6cp; 6hpw; prerequisites: all Stage 4 subjects of the Applied Chemistry course; 65409 Analytical Chemistry 2 or equivalent*

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.

## 65641

### Physical Evidence 2

*6cp; 6hpw; prerequisite: 65541 Physical Evidence 1*

This subject complements the material covered in 65541 Physical Evidence 1. It covers forensic analysis of soil, paint, fibres, hairs and documents. Lectures are complemented by an extensive practical program involving mock cases. At the end of this subject, the students should be able to select appropriate analytical procedures, analyse, interpret and write an expert witness report describing the forensic analysis of the material covered in 65541 Physical Evidence 1 and 65641 Physical Evidence 2.

## 65642

### Forensic Toxicology 2

*6cp; 4hpw; prerequisites: 65542 Forensic Toxicology 1; 65508 Organic Chemistry 2 (Structure Elucidation and Synthesis)*

The subject is designed and delivered as an advanced course covering specific aspects of forensic toxicology. These aspects are approached from a practical perspective, dealing in some depth with analytical details of the areas covered. The subject is designed to be taught alongside 65741 Chemistry and Pharmacology of Illicit Drugs, enabling the pharmacology and toxicology of drugs such as cannabis, amphetamines, opiates and cocaine, to be taught in parallel with other aspects of these drugs.

## 65741

### Chemistry and Pharmacology of Illicit Drugs

*6cp; 5hpw; prerequisites: 65508 Organic Chemistry 2 (Structure Elucidation and Synthesis); 65409 Analytical Chemistry 2*

This subject aims to familiarise students with the pharmacology, chemistry, methods of analysis and legal status of a wide range of drugs of abuse. It examines the pharmacology of the various classes of drugs opioids; amphetamine and other stimulants; hallucinogens; cannabis; miscellaneous drugs including alcohol and tobacco products; route of synthesis and profiling of drugs to determine route of manufacture; sampling and analysis protocols; State and Federal legislation covering the manufacture and importation of certain drugs; case studies; and social issues.

## 65742

### Fire and Explosion Investigation

*6cp; 3hpw; prerequisite: 65641 Physical Evidence 2*

This subject seeks to show how a systematic scientific examination of a fire or explosion scene can lead to the establishment of its origin and cause. It covers general definitions; fire insurance and crime statistics; combustion process, external and internal scene examination, fire origin and cause determination; physical properties of materials, gases, aerosols; spontaneous combustion; kitchen fires, cigarettes, heaters, motor vehicle fires, electric appliances; accelerants, explosives; sniffers and canines; and computer modelling of fires.

## 65743

### Complex Forensic Cases (Chemistry)

*6cp; 6hpw; prerequisites: 65641 Physical Evidence 2; 65642 Forensic Toxicology 2; and 91141 Biological Evidence; corequisite: 79991 Complex Forensic Cases (Law)*

This subject is designed as an advanced practical course where the students apply techniques and principles gained in previous forensic subjects to the analysis of mock cases. It aims to familiarise the students with the management of a complex forensic case involving more than one type of evidence. It involves forensic analysis of material previously studied, preparation of expert witness reports and preparation for presenting evidence in a court environment.

## 65854

### Honours (Chemistry)

*2 semesters, 24cp per semester; prerequisite: BSc in Applied Chemistry or equivalent 3 year degree*

Study designed to enhance the skills and knowledge necessary for research in chemistry. The principal activity is an individual research project in which the student, under supervision, plans and undertakes investigations in an area of interest. The data collected are then subjected to analysis and interpretation under the guidance of the supervisor. Students learn to define objectives and aims, work to available time and resources, use appropriate research methods, critically assess information and develop complex arguments in detail. The findings of the research project are presented in a structured and integrated thesis which comprises the main assessment component.

## 65856

### Forensic Research Project

*24cp; at least 25hpw; prerequisites: all Stage 1–7 subjects*

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.

## 66014

### Hydrogeology

*6cp*

Provides a knowledge of geological occurrence and hydraulics of groundwater flow, exploration techniques, extraction engineering and borefield 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. The focus is on seismic, electrical and electromagnetic methods.

## 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: site assessment methodology, physical, chemical and biological properties and behaviour of contaminants, health issues, risk assessment, site assessment technology. Please see http://groundwater.ncgm.uts.edu.au/ncgm/ or contact the subject coordinator, telephone (02) 9514 2614.

## 66034

### Groundwater Geology

*4cp; prerequisites: 66101 Earth Science 1; 66409 Surficial Processes and Products; 33101 Mathematics 1 LS or equivalent; 65101 Chemistry 1C or equivalent*

Basic concepts of hydrogeology; effective porosity, hydraulic conductivity of geologic materials, occurrence and flow of water in aquifers and soils; the unsaturated zone; regional groundwater concepts. Elements of aqueous geochemistry. Water wells.

## 66062

### Earth Systems and the Environment

*This is an elective subject available to students in faculties other than Science.*
*4cp; 2hpw*

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 I

*6cp; 6hpw*

The dynamic Earth; Earth materials; Earth structure and the evolution of the continents, the oceans and the atmosphere; geological history – what the rock layers are telling us; the time sequencing of major events which shaped our planet; the development of life forms and geological controls on these; introduction to landscape development; geological hazards; goundwater; engineering geology; resource and environmental geology. Weekly practical classes cover a wide range of skills in map reading; examination and description of sediment, minerals, rocks and fossils; geological interpretation. These are complimented by three full-day field excursions or equivalent.

## 66204

### Field Studies I

*6cp; 3hpw for eight weeks and a seven-day field excursion; students wishing to take this subject as an elective should consult the Course Director for the Earth and Environmental Science program*

An introduction to field techniques in the earth and environmental sciences. Topographic and other maps; introduction to air photographs and satellite imagery; land tenure; ethics and safety in the field. Methods for systematic study – gridding, transects, maps and plans on the local scale. Thematic maps. Basic geological and soil mapping. Biogeology. Sampling and data recording techniques. Surficial deposits. Stratigraphic principles. Tracing landscape changes through time. Much of the subject, which will include a one-week excursion, will be taught in the field.

## 66304

### Earth Materials

*6cp; equivalent to 6 hrs/week for 13 weeks formal work delivered in flexible mode; prerequisites:: 33101 Mathematics I (LS); 65012 Chemistry IA or equivalent; 66101 Earth Science I; corequisite: 68041 Physics IA*

Students will be introduced to the rocks and minerals that are found at or near the surface of the Earth. The subject will cover the techniques and methodologies used to identify and classify minerals and rocks in hand specimen and thin section. An introduction to the chemistry of minerals and rocks is also undertaken. 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; introduction to nature of magma and its cooling behaviour, magmatic differentiation, sources of magma; 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 associations. Macroscopic (hand specimen) and microscopic description of minerals and rocks.

## 66305

### Fold Belts and Cratons

*6cp; equivalent to 6 hrs/week for 13 weeks formal work delivered in flexible mode; prerequisites: 66101 Earth Science I; corequisite: 66304 Earth Materials.*

Stress and strain in rocks. Classification of common geological structures including folds, faults, joints, and foliations. Assemblages of imposed structures at different crustal levels. Deformation in space and time. Present day deformation and its relationship to plate boundaries. Relationship between metamorphism, the emplacement of large plutonic masses and plate setting. Presentation, manipulation and interpretation of structural data on maps, cross-sections and stereo nets. Use of the Mohr circle.

## 66407

### Mapping and Remote Sensing

*6cp; 3hpw and a 10-day field excursion; prerequisites: 66204 Field Studies 1; 66305 Fold Belts and Cratons; 66304 Earth Materials*

Properties of EM radiation and interaction with Earth's atmosphere. Qualitative and quantitative analysis and interpretation of aerial photographs. Data acquisition and use in scientific surveys. Satellite imagery including Landsat TM and SPOT data. Microwave radar and thermal imaging. Use of high resolution aeromagnetic data in mapping. Computer-based image enhancement and interpretation of digital data. Introduction to geographic information systems. Subject includes an extended field excursion dealing the collection of field data, and preparation of maps and reports detailing interpretation of the data.

## 66408

### Earth Resources

*6cp; 7hpw; prerequisite: 66304 Earth Materials; corequisite: 66409 Surficial Processes and Products*

Introduction to the nature of ore bodies including genesis and classification. Laboratory investigation of ore deposits. Introduction to exploration methods and reserve estimation for mineral deposits. World energy market, geology of fossil fuels deposits including coal and associated strata, oil, natural gas and synfuels derived from oil shale, tar sands and other petroliferos sediments. Concepts of exploration and resource estimation. Alternate energy sources and their viability.

## 66409

### Surficial Processes and Products

*6cp; 6hpw plus a four-day excursion; prerequisites: 66101 Earth Science 1; 65101 Chemistry 1C or equivalent; 91311 Biology 1*

Formation of soil and its characteristics. Soil classification and distribution in Australia. Biota of Australian soils and their role in the ecosystem function. Plant soil interactions. Soil function in ecosystem determination and structure. Fundamentals of sedimentary materials and their classification. Hydrodynamics and the processes of sediment transport and deposition. Sediments as substrates: sediment/biota interactions and their function in palaeoecological reconstructions. Process/response sedimentary models and the sedimentology of the principal depositional environments including fluvial, marginal and marine systems.

## 66508

### Crustal and Mantle Processes

*8cp; prerequisites: 66304 Earth Materials; 66305 Fold Belts and Cratons*

Subject to approval.

Mantle-crust interactions as expressed by igneous activity at ocean ridges, intra-plate settings and subduction zones. High pressure metamorphic processes and products at convergent margins. Crustal processes responsible for the formation of metamorphic rocks and sedimentary basins. Basic concepts of thermodynamics and experimental geology are introduced during the subject. A significant part of the assessment involves completion of an individual project which aims to develop investigation skills and use of analytical equipment.

## 66509

### Tectonics and Surface Dynamics

*4cp; prerequisite: 66101 Earth Science 1*

Subject to approval.

Modern plate boundaries and their evolution. Tectonic elements of the Earth; plate boundary and intraplate tectonics. Tectonic development of Australia including its surrounding oceans. Interactions between tectonics and climate, ocean dynamics, plant and animal biogeography, and erosion. Natural hazards.

## 66510

### Geophysics

*4cp; prerequisites: 68041 Physics 1A or equiavlent; 66101 Earth Science 1; 66408 Earth Resources*

Subject to approval.

Review of solid earth geophysics including seismicity, magnetism, and gravity. Geophysical techniques applied to subsurface investigation of engineering, environmental and exploration sites, including resistivity, gravity, magnetics and seismic refraction and reflection techniques. Down-hole geophysics techniques. Two-day field excursion.

## 66608

### Mineral Science Project

*2cp; 2hpw*

A report and seminar prepared by the student on the mineral science project.

## 66609

### Environmental and Quaternary Geology

*8cp; prerequisite: 66409 Surficial Processes and Products*

Subject to approval.

Quaternary allocyclic factors that influence Earth systems and their consequences. Milankovich cycles, ice ages, eustatic fluctuations and climate change: recordings of these in earth systems, their resulting elucidation, and the consequences of these and other major influences on the geosphere-biosphere. 'Greenhouse' concepts and their relationship and responses to natural and anthropogenic input. Geologic hazards and their recognition, management and alleviation. Pollution and anthopogenic interference with earth systems and the problems that arise. Recognition of these environmental problems and methods for their control and remediation.

## 66610

### Engineering Geology

*4cp; prerequisites: 66101 Earth Science 1; 66409 Surficial Processes and Products; 33101 Mathematics 1 LS or equivalent; 65101 Chemistry 1C or equivalent*

Subject to approval.

Chemical weathering and clay mineralogy. Rheological properties of rocks and soils. Engineering rock mass concepts and classification. Engineering site investigations, aspects of testing of soils and rocks. Soil and rock slope stability; concepts of urban development.

## 66651

### Convergent Margin Tectonics

*SUCOGG Elective*
*3cp; flexible*
*Staff involved: Professor E C Leitch (UTS), P G Lennox (UNSW) and K Klepeis (University of Sydney)*

Students are expected to develop an understanding of modern convergent margins and the manifestation of their ancient equivalent preserved in orogenic belts. The subject covers basic tectonic elements, temporal and spatial variability of modern margins. The regional geology of the New England Fold Belt or the Lachlan Fold Belt, two of the major tectonic elements of the Tasman Fold Belt System of Australia, are covered in detail as examples of ancient margins. The module provides a synthesis of data derived from many geological sub-disciplines and allows students to bring information together from many of their previous subjects in order to develop an overall view of the development of a large section of continental crust.

Coordinator: Professor E C Leitch
email Evan.Leitch@uts.edu.au

## 66653

### Applied Clastic Basin Analysis

*SUCOGG Elective*
*3cp; flexible*
*Staff involved: Associate Professor Greg Skilbeck (UTS)*

A review of the principles of seismic and sequence stratigraphy, including the problems and pitfalls. An examination of clastic sedimentary environments with particular emphasis on sandstone body deposition and orientation within a sequence stratigraphy framework. Applications of genetic/sequence stratigraphy are examined in exercises using real seismic and well data. On the accompanying field trip, outcrop of fluvial, near-shore, shallow and deep marine environments are examined to demonstrate the three-dimensional nature of deposits.

Coordinator: Associate Professor Greg Skilbeck
email Greg.Skilbeck@uts.edu.au

## 66654

### Research Developments in Geoscience

*3cp; elective subject for Earth and Environmental Science students*

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.

## 66854

### Honours (Geoscience)

*2 semesters, 24cp per semester; prerequisite: BSc in Earth and Environmental Science or equivalent 3 year degree*

Subject to approval.

Study designed to enhance skills and knowledge in undertaking scientific research in geology. Comprises 12 credit points of electives in a specialist field and a 36 credit point equivalent individual research project where the student, under supervision, defines a problem in an area of interest, and then collects, analyses and interprets data to solve this problem. Students learn to define objectives and aims, work to available time and resources, use appropriate research methods, critically assess information and to develop complex arguments in detail. The findings of the research project are presented in a structured and integrated thesis which comprises the main assessment component. Research ethics and scientific method are emphasised.

## 66855

### Honours (Environmental Science)

*2 semesters, 24cp per semester; prerequisite: BSc in Earth and Environmental Science or equivalent 3 year degree*

Subject to approval.

Study designed to enhance skills and knowledge in undertaking research in environmental science. Comprises 12 credit points of electives in a specialist field and a 36 credit point equivalent individual research project where the student, under supervision, defines a problem in an area of interest, and then collects, analyses and interprets data to solve this problem. Students learn to define objectives and aims, work to available time and resources, use appropriate research methods, critically assess information and to develop complex arguments in detail. The findings of the research project are presented in a structured and integrated thesis which comprises the main assessment component. Research ethics and scientific method are emphasised.

## 66941

### Applied Palaeontology

*SUCOGG Elective*
*3cp; flexible*
*Staff involved: Professor John Talent, Associate Professors Barry Webby and Ruth Mawson, Dr Glenn Brock (Macquarie University)*

An introduction to applied methods of dealing with a selection of stratigraphically important fossil groups. The subject aims to give students an awareness of what can be gleaned from the fossils they might find in their field area and to enhance students' skills in practical palaeontological methods. The subject includes practical experience in problem solving involving at least six stratigraphically important groups of fossils.

Coordinator: Associate Professor Ruth Mawson
email rmawson@laurel.ocs.mq.edu.au

## 66942

### Palaeobiology Part I

*SUCOGG Elective*
*3cp; flexible*
*Staff involved: Professor John Talent and Associate Professor Ruth Mawson (Macquarie University)*

In this subject, students will be able to extend their awareness of the problems concerning invertebrate fossil communities. Student will gain an awareness of the importance of form and structure of fossil invertebrates and will enhance their skills in critical evaluation. Of particular importance will be the study of evolutionary palaeontology with features such as shell form, musculature, vision, and buoyancy of extinct invertebrates; coloniality and models of phylogeny.

Coordinator: Associate Professor Ruth Mawson
email rmawson@laurel.ocs.mq.edu.au

## 66943

### Coastal Environmental Assessments

*SUCOGG Elective*
*3cp; flexible*
*Staff involved: Associate Professor A D Albani and Dr P C Rickwood (UNSW) and Dr E Frankel (UTS).*

Students will learn how to carry out a coastal environmental assessment of a target area. The subject deals specifically with the coastal fringe which is under ever increasing pressure from urbanisation and industrialisation. An understanding of the relationship between

benthic foraminifera, sediments, sediment geochemistry and the water masses will be covered. The construction and testing of databases, including the use of complex numeric databases to evaluate human impact on the coastal environments, are included. Sampling analytical techniques, including statistical analyses of the databases are presented through the use of case studies.

Coordinator: Associate Professor A D Albani (UNSW)
email a.albani@unsw.edu.au

## 66944

### Coal Exploration and Mining Geology

*SUCOGG Elective*
*3cp; flexible*
*Staff involved: Associate Professor C R Ward, Mr G H McNally, Mr D Palmer (UNSW).*

This subject aims to develop familiarity with the techniques of coal deposit evaluation, and the use of geology in coal mining operations. Topics covered include geological evaluation of coal deposits, the relation between quality factors and coal preparation, marketing and use; geological and geophysical methods in coal exploration programs; significance of geological features in the design, development and operation of underground and open-cut coal mines, and the evaluation of environmental impacts of coal mining. A combination of coal analysis and testing programs; coal petrology and petrographic analysis; relationship of coal properties to utilisation processes; introduction to mining methods and coal preparation technology; geological and geophysical methods for coal exploration and mine-site studies; mechanical behaviour of rock masses in surface and underground mine situations; subsidence and environmental impact evaluation; introduction to geological database and modelling systems will be covered.

Coordinator: Associate Professor Colin Ward (UNSW)
email C.Ward@unsw.edu.au

## 66947

### Carbonates in Petroleum Exploration

*SUCOGG Elective*
*3cp; flexible*
*Staff involved: Professor Peter Davies (Sydney University) and Dr Ed Frankel (UTS).*

The subject defines and emphasises the importance and relevance of carbonate rocks and environments in petroleum exploration. It includes a global coverage of carbonate build-up types, diagenesis, plays and the seismic expression of carbonate sequences. The program includes study of the origin and formation of carbonate rocks including modern carbonate depositional environments and settings, carbonate sedimentation, carbonate platforms, global factors that influence carbonate materials, marine and terrestrial depositional environments, accumulation rates, cyclicity and sequences, composition and classification of carbonate sediments and rocks, components of carbonate materials, classification of carbonate materials, carbonate build-ups including allocyclic factors that affect build-up growth, ambient sea and substrate conditions, sea level changes; autocyclic factors that affect build-up growth including biotic community structure and composition, growth rates, buildup types, e.g. i) Tropical high energy, shallow water reefs, carbonate platform facies associations, framework, and sediments, ii) Tropical low energy, Great Barrier Reef, framework and sediments, and iii) Temperate low energy, diagenesis and textures in carbonate materials including processes, porosity and cementation, hand specimen and microscope recognition. Recognition of carbonates in seismic section and typical log responses in carbonate sequences are also examined in order to establish exploration models.

Coordinator: Dr E Frankel
email E.Frankel@uts.edu.au

## 66949

### Palaeobiology Part II

*SUCOGG Elective*
*3cp; flexible*
*Staff involved: Professor John Talent and Associate Professor Ruth Mawson (Macquarie University)*

In this subject students will extend their knowledge of problems concerning vertebrates, with emphasis on the development of critical skills in the evolutionary palaeontology and the science of form in vertebrates. Special emphasis will be given to palaeoengineering (including jaw mechanics, flight etc.) and approaches to physiology and sociobiology of extinct vertebrates and the evolution of the brain.

Coordinator:
Associate Professor Ruth Mawson
email rmawson@laurel.ocs.mq.edu.au

## 66950

### Geochemical Analysis Techniques and Applications

*SUCOGG Elective*
*3cp; flexible*
*Staff involved: Dr N J Pearson, Professor S Y O'Reilly and Professor T H Green (Macquarie University) and Professor W L Griffin (CSIRO)*

The aim of this subject is to familiarise students with the various analytical techniques used in geochemical analysis, concentrating on the facilities available to SUCOGG. Students will develop a basic working knowledge of the principles and procedures used in the evaluation and manipulation of geochemical data and will have the opportunity to gain practical experience in the application of geochemical data to a diverse range of petrological problems. The subject is relevant to students planning a career in petrology because advances in instrumentation and the development of new techniques are producing an abundance of geochemical data and an understanding of these analytical techniques is necessary to remove the 'black-box' aura and to create a greater appreciation of the quality of the results. This is critical to the interpretation of geochemical data, and the significance attained when propagated in petrogenetic models.

The program includes a review of analytical techniques (XRF, electron microprobe, mass spectrometry, laser Raman spectroscopy, XRD, proton microprobe, ICP-MS, high P-T experimental apparatus), planning of an analytical program, sample preparation, basic X-ray theory, errors and analysis statistics, fundamental data manipulation (calculation of structural formulae, mineral end-members, CIPW norm), data presentation, introduction to advanced geochemical software.

Coordinator: Dr N J Pearson (Macquarie University), email norm.pearson@mq.edu.au

## 66952

### An Introduction to Phase Diagrams and Thermobarometry

*SUCOGG Elective*
*3cp; flexible*
*Staff involved: Dr Geoffrey Clarke (University of Sydney) and Associate Professor Bas Hensen*

In this subject students will learn how whole rock and mineral geochemical data may be used to quantitatively constrain the P–T–X conditions that formed some common metamorphic rocks, and the application of phase diagrams to common metamorphic problems. Topics such as elementary thermodynamic theory, use of data that has already been acquired through electron microprobe analysis of rock thin sections, and the principles of Schreinemakers analysis will be covered. At the end of the subject students should have sufficient knowledge of, and confidence in, thermobarometric and phase diagram methods to (1) competently analyse a given metamorphic rock; (2) describe the minerals present in terms of their composition and potential end-members; (3) apply common, experimentally calibrated thermometers and barometers; and (4) construct simple phase diagrams that complement quantitative methods of analysis. Since the conditions of formation of many common mineral assemblages may not be precisely defined, a thermobarometric method that uses an approach involving an internally consistent thermodynamic data set will also be introduced and applied.

Coordinator:
Dr Geoffrey Clarke (University of Sydney)
email geoffc@mail.usyd.edu.au

## 66953

### Interpretation of 2D and 3D Seismic Reflection Data

*SUCOGG Elective*
*3cp; flexible*
*Staff involved: Mr D Palmer (UNSW), Associate Professor C G Skilbeck (UTS)*

In this subject students will develop skills and knowledge about the interpretation of seismic reflection data for petroleum exploration and coal mine planning, using interactive computer software (SeisVision by GeoGraphix). The program will include introductory seismic data processing, spatial and temporal resolution, 3D Migration, the design of 3D surveys, display of the 3D seismic data volume, vertical and horizontal sections, attributes, phase, and colour, structural interpretation, horizon picking, fault mapping, depth conversion, stratigraphic interpretation, horizontal time sections, horizon flattening, reservoir analysis.

Coordinator: Mr Derecke Palmer (UNSW), email d.palmer@unsw.edu.au

## 66954

### Processing of Seismic Reflection and Ground Penetrating Radar Data

*SUCOGG Elective*
*3cp; flexible*
*Staff involved: Mr D Palmer (UNSW), Professor Iain Mason (Sydney University), Dr Karsten Gohl, (Macquarie University)*

The subject develops familiarity and skills in routine processing of time series data recorded for seismic reflection and ground penetrating radar surveys. Topics include: a review of fundamental theory, analogue and digital signals, aliasing, the Fourier transform, bandwidth, the impulse response, convolution, correlation, introduction to seismic unix, general command structure, self documentation, examining trace headers, displaying with SU, spectral analysis with SU, frequency filtering with SU, velocity filtering with SU, common midpoint sorting, velocity analysis, normal moveout corrections, stacking, migration.

Coordinator: Mr Derecke Palmer (UNSW), email d.palmer@unsw.edu.au

## 66955

### Geological and Structural Interpretation of Potential Field Data

*SUCOGG Elective*
*3cp; flexible*
*Staff involved: Dr M Lackie (Macquarie University), Dr P G Lennox/Mr D Palmer (UNSW)*

The subject develops familiarity and skills in the geological interpretation of aeromagnetic, radiometric and gravity data. Topics dealt with in the subject include a review of fundamentals of petrophysics, sampling, resolution, and spatial aliasing, image presentation, high and low pass filters, the geometric skeleton, definition of discrete magnetic units, definition of discontinuities and contacts, separation of shallow and deep sources, dip indicators, geological classification of aeromagnetic patterns, the third dimension, structural history and modelling with 'Noddy'.

Coordinator: Dr M Lackie
(Macquarie University)
email mlackie@laurel.ocs.mq.edu.au

## 66956

### Deformation Processes

*SUCOGG Elective*
*3cp; flexible*
*Staff involved: Dr David Durney (Macquarie University)*

This subject gives an overview of mechanisms of deformation and mass-transfer which affect common rock types (structural petrology) and simple concepts of progressive deformation (kinematics). Examples are mainly from low-grade metamorphic environments, but many of the concepts apply to higher grades as well. Expected outcomes include being able to analyse and report microstructures associated with tectonic deformation and veining in silicate and carbonate rocks, and to gain an appreciation of flow types and how structures may develop through time. The subject will be relevant to field or laboratory studies of deformed rocks (including orebody host-rocks) wherever cleavage, veining, metasomatism, shearing or multiple deformation are present. The subject covers topics such as intracrystalline (dislocation) and intercrystalline (solution-transfer) deformation mechanisms and mass transfer processes; deformation mechanism microstructures and controls. Mineral growth textures and their modification; types of vein growth. Practical work includes an examination of neocrystallization textures and cleavage structures.

Coordinator: Dr D W Durney
(Macquarie University)
email ddurney@atlas.es.mq.edu.au

## 66957

### Introduction to Geostatistical Data Analysis

*SUCOGG Elective*
*3cp; flexible*
*Staff involved: Dr R Dietmar Mueller (University of Sydney)*

Basic principles of statistical data analysis in geoscience; data collection and preparation, univariate statistics including graphical and numerical description, probability, the normal distribution, inference, analysis of variance multivariate statistics including bivariate scatter, correlation coefficient and bivariate regression with special emphasis on geoscientific applications.

Coordinator: Dr R Dietmar Mueller
(University of Sydney)
email dietmar@es.su.oz.au

## 67023

### Materials Technology

*3cp; prerequisite: 68031 Engineering Physics 1 (Electrical)*

This subject develops students' familiarity with commonly used electrical engineering material so that they can 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; perequisites: 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: 65101 Chemistry 1C or equivalent*

An introduction to materials science, providing a foundation in 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.

## 67303

### Mechanical Properties of Materials

*6cp; prerequisite: 33190 Mathematical Modelling for Science; 67101 Introduction to Materials*

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: 67303 Mechanical Properties of Materials; 67101 Introduction to Materials*

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; prerequisites: 65201 Chemistry 2C; 67101 Introduction to Materials or equivalent*

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

### Industrial Ceramics

*6cp; 6hpw; prerequisites: 67101 Introduction to Materials; 65201 Chemistry 2C*

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; 68201 Physics 2; 33190 Mathematical Modelling for Science; 65201 Chemistry 2C*

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 by 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*

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*

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.

## 67506

### Technical Ceramics

*6cp; 6hpw; prerequisites: 67306 Industrial Ceramics; 67303 Mechanical Properties of Materials*

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.

## 67508

### Surface Chemistry of Materials

*6cp; 5hpw; prerequisites: completion of up to and including Stage 3 of the Applied Chemistry or Materials Science degree courses*

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 by 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 of coatings and adhesives.

## 67606

### Corrosion and Degradation of Materials

*6cp; 6hpw; prerequisites: 67408 Industrial Metallurgy; 67506 Technical Ceramics; 67409 Polymer Technology*

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.

## 67608

### Composites

*6cp; 4hpw; prerequisites: 67303 Mechanical Properties of Materials; 67409 Polymer Technology; 67506 Technical Ceramics; 67408 Industrial Metallurgy*

The subject draws together the concepts the students have developed on metals, ceramics and polymers and applies them to the incorporation of these materials to form composites in order to develop material properties that are unobtainable in the monolithic counterparts. Appreciation of why composites are used and what advantages they can give the designer/engineer over monolithic materials are given. Students will gain a basic knowledge of composite design and cost analysis in the use of composites. In addition students will obtain an understanding of the processing methods used to produce composite parts. Also included is an examination of the decision-making processes that materials scientists employ to originate, evolve and produce a device. Material selection and specification is examined and is not limited to composite materials.

## 67854

### Honours (Materials Science)

*2 semesters, 24cp per semester; prerequiste: BSc in Materials Science or equivalent 3 year degree*

Study designed to increase skills and knowledge necessary for research in materials science. The student selects an individual research project and, under supervision, formulates a research plan for a problem in an area of interest. Planning is based upon a critical review of the technical literature and methodologies. Appropriate goals are set within definite time frames and resources to ensure the objectives are fulfilled. Students gain practical experience in applying advanced analytical methods through sophisticated instrumentation to characterise the structural aspects and properties of the material under investigation. Data collected from these measurements are evaluated by testing the statistical significance and establishing empirical relationships between experimental variables. Interpretation of the data and the establishment of models from accepted modern theories to explain the empirical findings enhance the creative skills of the student. The findings of the research project are presented in a structured and integrated thesis which comprises the main assessment.

## 68036

### Physical Modelling

*6cp; prerequisites: NSW HSC 2 unit Mathematics is assumed, and HSC 2 unit Physics is recommended; corequisite: 33132 Mathematical Modelling 1*

The objectives of the subject are to develop a conceptual basis in mechanics, thermal physics, waves and optics, electric and magnetic fields; problem solving skills; an appreciation of the role of modelling in understanding and describing the natural world; the basic techniques of physical measurement, data analysis and verification of models; technical communication skills; an ability to use physical concepts in a mathematical formulation and apply those concepts to engineering problems.

Topics include: mechanics – vectors, motion (linear and rotational), Newton's laws, circular motion, friction, energy, momentum, elasticity and fluids at rest and in motion; heat and thermodynamics – kinetic theory, temperature, heat capacity, heat transfer, ideal gas, first law and Carnot cycle; waves – including superposition of waves, light and EM spectrum; optics – mirrors, lenses, optical instruments, optical and wave behaviour; electric and magnetic fields – elctrostatistics, magnetism and magnetic materials, magnetic fields, electromagnetism and electromagnetic applications.

## 68038

### Advanced Mathematics and Physics

*6cp; prerequisites: 68036 Physical Modelling; 33130 Mathematical Modelling 1; 33230 Mathematical Modelling 2; 48510 Introduction to Electrical Engineering; 48520 Electronics*

The objectives of the subject are to develop the mathematical skills and foundations required to describe a range of electrical engineering and engineering science systems; provide an introductory understanding of key concepts in modern physics that underpin modern electrical engineering technologies; equip students with a basic understanding of the dielectric and magnetic properties of key

electrical engineering materials and introduce some fundamental insights into select electronic and photonic devices and transducers.

Topics include: boundary value problems, value problems, solution of select partial differential equations, separation of variables, vector calculus, physical attributes, Greens and Stokes' theorems, field and potential operators, Cauchy-Reimann conditions, functions of a complex variable, basic analytical properties, harmonic functions, Cauchy's integral formula, contour integrals and residues, conformal transformations and mapping, photons and electrons as quantum entities, energy levels in atoms, molecules and semiconductors, absorption and emission transitions and electron momentum, the p-n junction.

## 68041

### Physics 1A

*6cp; 6hpw*

General introduction to mechanics, wave motion, optics, thermal physics, properties of matter and modern physics.

## 68101

### Physics 1C

*6cp; 6hpw*

This is a foundation physics subject primarily for students in the physical sciences. It covers the fundamentals of dynamics and statics, fluid mechanics, thermal physics, electricity and waves. Students are introduced to the basic techniques of measurement.

## 68201

### Physics 2

*6cp; 6hpw; prerequisite: 68101 Physics 1C*

This subject covers the fundamentals of electrostatics, electromagnetism, optics and atomic and nuclear physics, as well as extending the Physics 1C coverage of mechanics, thermal and fluids.

## 68311

### Physics 3

*6cp; 5hpw; prerequisites: 33190 Mathematical Modelling for Science or equivalent; 68201 Physics 2; corequisite: 33290 Computing and Mathematics for Science*

This subject builds on the concepts introduced in earlier physics material, employing first year mathematical techniques to extend the understanding and modelling of mechanics and optics, and embrace the exciting developments of modern physics. This provides the foundation for later core physics subjects. Mechanics topics will include the generalisation of kiematics to 3D motion, orbital mechanics and the dynamics of complex systems. Optics studies will include refraction, lenses, dispersion of light, aberrations, polarisation and scattering phenomena. Modern physics will study the basic properties of the atom, radioactivity and relativity, leading into a foundation study of quantum mechanics. Elective modules of interest to medical science students may be available. The emphasis of the subject is theoretical but laboratory work will be extended from the explorative first year treatment to optical experimentation, study of radioactivity and computer simulation of dynamical systems.

## 68312

### Applied Physics 1

*6cp; 5hpw; prerequisites: 68201 Physics 2; 33290 Computing and Mathematics for Science*

This subject covers three main areas of activity, electromagnetism, the practical implementation of physical concepts and the analysis of experimental data. The concepts of electricity, electromagnetism and electrical measurements are developed and used as the context to explore the processes of science and scientific investigation and emphasising skills such as experimental design, scientific writing and analysis of experimental data. This is a key to providing students with the confidence, skills and flexibility to design, implement and analyse scientific experiments.

## 68314

### Electronics

*6cp; 5hpw; prerequisites: 68201 Physics 2 and 33290 Computing and Mathematics for Science*

This subject will develop students' understanding of the basic building blocks of electronic circuits. Review of circuit theory,

semiconductors theory, diodes and bipolar transistors, transistors as switches and linear devices, introduction to digital electronics, logic gates, latches and counters, frequency characteristics and feedback in amplifiers, operational amplifiers. Hands on learning, guided discovery activities in laboratory context. The subject may be offered jointly with the Engineering subject 48520 Electronics. This is team taught by Applied Physics staff and thus can be taken either semester.

## 68401

### Quantum Physics 1

*3cp; 3hpw; prerequisites: 68301 Physics 3; 33172 Science Mathematics 2; 33173 Science Mathematics 3*

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. Orthonomality, interpretation of solutions.

## 68402

### Applied Mechanics

*3cp; 3hpw; prerequisites: 68201 Physics 2; 33221 Engineering Mathematics 2A*

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*

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; thermocouple, optical pyrometer, resistance thermometry.

## 68405

### Vacuum and Thin Film Physics

*3cp; 3hpw; prerequisite: 68201 Physics 2*

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.

## 68411

### Physics 4

*6cp; 5hpw plus 1 flexible; prerequisites: 68311 Physics 3; 33290 Computing and Mathematics for Science; 33390 Mathematics and Scientific Software or equivalent*

The subject fulfils two important functions, namely, to round off the study of classical and fluid mechanics and to build a solid foundation in quantum mechanics for future subjects. Twentieth century technologies of jet propulsion, energy-absorbing materials, nuclear power and lasers are explored through classical and fluid mechanics and vibration, quantum and nuclear physics, including the solution of the one-dimensional Schroedinger equation. Elective modules of interest to medical science students may be available. Although the emphasis of this subject is mostly theoretical, there will be the opportunity for laboratory work in nuclear physics. The use of computer packages for qualitative and quantitative analysis of mechanics and waves is a central feature.

## 68412

### Applied Physics 2

*6cp; 5hpw; prerequisite: 68201 Physics2 or equivalent; 33290 Computing and Mathematics for Science or equivalent*

This subject will develop students' organisational skills and provide opportunities to apply the experimental design skills of Applied Physics 1 to larger scale investigations. The broad topic areas covered are thermodynamics, vacuum and thin film technology, energy technology and sustainability, and project management. There is a high experimental component, and small group project work will allow students to develop their project management skills. At this stage of the course there is an expectation that students will take the opportunity to further develop their independent learning skills. Self access resources and the use of the Physics Resources Centre will be a key component of this subject.

## 68501

### Nuclear Physics

*3cp; 3hpw; prerequisite: 68401 Quantum Physics 1*

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*

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.

## 68505

### Solid-state Physics

*3cp; 3hpw; prerequisite: 68401 Quantum Physics 1*

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.

## 68511

### Quantum and Solid-state Physics

*6cp; 5hpw; prerequisites: 68411 Physics 4; 33490 Computational Mathematics and Physics*

This subject will highlight the fundamental nature of quantum mechanics and its application to the understanding of solids. Potential wells, eigenstates and eigenvalues, solutions to SWE in 3 dimensions, LCAO, band theory, electrons and phonons in solids will be explored. Applications of the theory in 1D and 2D devices, the interaction between electromagnetic waves and solids and the quantum mechanical basis for the LASER will also be a key feature. You do not have to be Einstein to understand the quantum mechanical basis of the LASER nor its importance to modern life. A major assignment will be computational and will utilise software skills developed in 33490 Computational Mathematics and Physics.

## 68512

### Applied Physics 3

*6cp; 5hpw; prerequisites: 68312 Applied Physics 1 (or equivalent experimental design experience)*

The purpose of this 'capstone' applied physics subject is to provide the opportunity for students to experience applied physics research. Students will be able to develop skills in cutting edge research techniques. Exact topics covered will vary depending on availability of staff. For example, X-ray diffraction, atomic force microscopy, scanning electron microscopy, solar energy materials, advanced optical characterisation, lighting, energy, medical imaging, and parallel computing could be offered. A few background lectures may take place though the subject will be predominantly project and laboratory based. The subject would be a suitable elective for students in all branches of the physical sciences.

## 68514

### Electronics and Interfacing

*6cp; 5hpw; prerequisites: 68314 Electronics or 8520 Electronics (or equivalent instrumentation experience)*

The subject will further develop students' understanding of computer interfacing in applied physics and science in general. You will learn how to construct functioning interfaces and the role of digital electronics. Digital electronics, computer interfacing, and the use of the LabView package will be the main components of the subject. A sequence of small projects will involve the design and construction of circuits and interfaces and is a key feature of the subject. This subject would be useful to students in science courses who have an interest in developing their skills in the instrumentation and interfacing areas. Your project work can be oriented to your needs and interests.

## 68515

### Technology and Innovation Forum

*3cp; 3hpw; prerequisite: one industrial experience period*

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.

## 68557

### Advanced Electron Microscopy Techniques

*4cp; 3hpw; prerequisites: 68301 Physics 3; 68302 Applied Optics; 33330 Physical Mathematics*

Image formation in an electron microscope. Diffraction theories. Contract 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*

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*

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.

## 68611

### Electromagnetics and Optics

*6cp; 5hpw; perequisites: 68201 Physics 2; 33490 Computational Mathematics and Physics or equivalent*

The subject's purpose is to consolidate the emphasis on optics and its applications in the course. The development of an understanding of electromagnetic theory and some of its key features, and its relevance to modern telecommunications will benefit scientists and engineers. The subject seeks to consolidate students' understanding of the theory of electromagnetism in the modern world. The topics include derivation, and application, of Maxwell's equations, energy transfer by waves, guided waves and optical fibre technology, optical instrumentation, diffraction and spatial filtering techniques. The emphasis of this subject is conceptual. Students will also engage in an extensive laboratory program in experimental optics. Computer simulation and data visualisation techniques will underpin the electromagnetics theory. Students will be encouraged to explore topics of interest through project activities.

## 68854

### Honours (Physics)

*2 semesters, 24cp per semester; prerequisite: BSc in Applied Physics or equivalent 3 year degree*

Study designed to enhance the skills and knowledge necessary for research in physics. The principal activity is an individual research project in which the student, under supervision, plans and undertakes investigations in an area of interest. The data collected are then subjected to analysis and interpretation under the guidance of the supervisor. Students learn to define objectives and aims, work to available time and resources, use appropriate research methods, critically assess information and develop complex arguments in detail. The findings of the research project are presented in a structured and integrated thesis which comprises the main assessment component.

## 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*

### 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 (Management)**

*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 Master's in Occupational Health and Safety Management*

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.

## 69337

### Special Reading Subject

*3cp; no formal class contact hours; prerequisite: normally completion of one year of a science course*

This subject aims to extend students' capability to independently access information sources, possibly in conjunction with experimental or theoretical project work, and to communicate the results of these studies effectively. It may be undertaken only following prior negotiation on the part of the student with a full-time member of academic staff of the relevant department regarding individual supervision and, in addition, requires special permission of the Associate Dean (Coursework Programs).

## 69341

### Risk Management

*6cp; 4hpw*

Risk management is the term applied to a logical and systematic method of identifying, analysing, assessing, treating, monitoring and communicating risks associated with any activity, function or process in a way that will enable organisations to minimise losses and maximise opportunities.

At successful completion of this subject students will have demonstrated that they:

- understand and are able to implement the Australian/New Zealand Standard 4360 in the context of occupational health and safety;
- understand the systems associated with the application of risk management in organisations.

## 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.

## 91109

### Microbial Ecology

*6cp; 6hpw; prerequisite: 91312 Biology 2*

Nature of micro-organisms and major microbial groups. Nutritional and physical factors that influence microbial growth and function. Microbial growth and survival strategies in natural environments. Aquatic and terrestrial environments as microbial habitats. Development of microbial populations and communities in ecosystems. Characteristics and dynamics of stable and unstable communities. Microbial role in biogeochemical cycling of nutrients. Plant-microorganism associations, including both beneficial and antagonistic relationships. Environmental microbiology of economic issues – public health, waste treatment, site bioremediation.

## 91141

### Biological Evidence

*6cp; 5hpw; prerequisite: 65241 Principles of Forensic Science; priority will be given to students enrolled in the Forensic Science course*

This subject introduces the nature, value and relevance of biological materials as forensic evidence. Different methods for the identification of various biological samples are examined along with the techniques which are used to classify, differentiate and identify the source of biological material. The analysis and interpretation of DNA evidence are emphasised. Lectures are complemented by an extensive practical program including collection procedure, use of PC technology and population statistics. Potential elective students must consult the subject coordinator Dr Tamara Sztynda on telephone 9514 4157 before enrolling in this subject.

## 91150

### Biology and Ecology

*6cp; 6hpw*

The principals of biology and ecology for students majoring in Environmental Engineering and other fields. Structure and function of cells, cell divisions and the role of genetic material in cell function; biodiversity – the classification, distinguishing characteristics of plants, animals and microorganisms and their economic, medical and ecological importance; the physiology of higher plants and mammals and the effects of environmental pollution and disturbance; the principals of population and community ecology, the structure and function of aquatic and terrestrial ecosystems; the effects and management of human impacts on natural ecosystems.

## 91207

### Plants in the Landscape

*8cp; 6hpw; prerequisite: 91233 Plant Production and Growth Media or equivalent*

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 or equivalent*

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.

## 91225

### 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.

## 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*

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*

This subject introduces students to a wide variety of plant materials used in urban (environmental) horticulture. Plant materials studied include annual, perennial, herbaceous, wood, 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*

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 1A or equivalent; 91312 Biology 2*

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 2A or equivalent; corequisite: 91309 Australian Biota*

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 park. There is also a 3-day field trip during a study week.

## 91236

### Plant Tissue Culture

*4cp; 3hpw; prerequisite: 91109 Microbial Ecology or 91314 Microbiology 1*

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: 91270 Plant Physiology*

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*

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; prerequisites: 91237 Plant Pathology; 91270 Plant Physiology*

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*

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*

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*

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*

This subject is an elective which should normally be taken during the final semester of study for the Environmental Biology or Environmental and 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; 3pw; prerequisites: 91312 Biology 2; 91395 Biocomputing; 33106 Statistical Design and Analysis or equivalent*

The principles and practice of biological experimentation. The essential steps in experimental design and analysis, and their roles. The source 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, chi square.

## 91304

### Honours (Biological and Biomedical Sciences)

*2 semesters, 24cp per semester; prerequisites: BMedSc or BSc in Biomedical Science, Biotechnology, Environmental Biology, Environmental and Urban Horticulture or equivalent 3 year degree*

Study designed to enhance the skills and knowledge necessary for research in the biological and biomedical sciences. The principal activity is an individual research project in which the student, under supervision, plans and undertakes investigation in an area of interest. The data collected are then subjected to analysis and interpretation under the guidance of the supervisor. Students learn to define objectives and aims, work to available time and resources, use appropriate research methods, critically assess information and develop complex arguments in detail. The findings of the research project are presented in a structured and integrated thesis which comprises the main assessment component.

## 91305

### Honours (Biological and Biomedical Sciences) (2yrs)

*4 semesters, 12cp per semester; prerequisites: BMedSc or BSc in Biomedical Science, Biotechnology, Environmental Biology, Environmental and Urban Horticulture or equivalent 3 year degree*

See 91304 above.

## 91306

### Terrestrial Ecosystems

*4cp; 3hpw; prerequisites: 91309 Australian Biota; 91307 Community and Population Ecology; 91329 Ecological Sampling*

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*

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 field excursion which could be conducted before commencement of semester.

## 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. This subject may include a field excursion.

## 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 1

*6cp; 6hpw; prerequisites: 91701 Medical Science 1 or 91311 Biology 1; 65022 Chemistry 2A or equivalent*

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 1

*6cp; 6hpw; prerequisite: 91702 Medical Science 2 or 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; 91702 Medical Science 2 or equivalent; 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.

## 91318

### Ecological Modelling

*4cp; 3hpw; prerequisite: 91307 Community and Population Ecology*

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.

## 91320

### Biochemistry 2

*6cp; 6hpw; prerequisite: 91313 Biochemistry 1*

The control of cellular biochemical processes. Metabolism, protein metabolism, amino acid metabolism, purine and pyrimidine metabolism. Integration of metabolic pathways, tissue specialisation. Enzymology, enzyme kinetics, vitamins and cofactors, enzyme regulation. Protein specialisation. Membrane structure and function, membrane transport, channels and pumps. Cell signalling pathways. Intracellular transport. Cell defence mechanisms and detoxification pathways. Cell growth and development of cancer.

## 91323

### Mapping and Remote Sensing

*4cp; 3hpw; prerequisites: 91395 Biocomputing; 91303 Experimental Design in Ecology; 91329 Ecological Sampling*

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*

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

### Principles and Practice of Biotechnology

*3cp; 3hpw; prerequisites: 91313 Biochemistry 1; 91314 Microbiology 1*

This subject provides an overview of the business of biotechnology including the financing, establishment and management of biotechnology companies and the legislation and regulation (patents, intellectual property,

biosafety) of biotechnology. The underlying technologies and economics as exemplified by molecular biology, protein engineering, fermentation technology, processing and quality control are considered and specific examples of biotechnology industries are examined with an emphasis on the Australian perspective.

## 91326

### Analytical Biochemistry

*6cp; 6hpw; prerequisite: 91313 Biochemistry 1*

Modern methods in biochemical analysis emphasising instrumentation, underlying principles, aims and strategies. Spectroscopic methods; spectrophotometry, spectrofluorometry, flame emission and absorption photometry, magnetic resonance, mass spectrometry. Chromatography principles and practice, GLC, HPLC. Electrophoresis, centrifugation; applications to nucleic aids and proteins. Cryoscopic osmometry. Electrochemical methods; potentiometry and ion electrodes, polarography. Introduction to radiochemistry. Immunoassay methods.

## 91327

### Environmental Management Procedures

*4cp; 3pw; prerequisites: completion of Stages 1–4 of the Environmental Biology or Environmental and Urban Horticulture courses or equivalent*

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.

## 91329

### Ecological Sampling

*3cp; 3hpw; prerequisites: 91312 Biology 2; 33105 Introductory Biometrics or equivalent; 91395 Biocomputing*

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. This subject may include a field excursion.

## 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 quantification. 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*

Introduction to the basis of present day molecular biology. Key concepts and procedures underlying DNA manipulation methods in the molecular biology laboratory, including the isolation of nucleic acids and the molecular cloning, selection and analysis of recombinant DNA. Topics covered include: DNA and RNA isolation; restriction enzymes; DNA ligation; transformation of DNA into cells; cloning strategies; southern, northern and western blotting; and an introduction to DNA sequencing and the PCR. Lectures, tutorials, practicals and assignments are fully integrated so that topics are covered extensively and are delivered by alternative teaching modes. These modes include flexible learning practices such as the provision of

similar information by way of lectures, practical experimentation, teaching video tutorials, and problem assignments, the last of these involving the use of Internet Molecular Biology Sites and UTS MacVector software. Students will be expected to become adept at retrieving and analysing nucleic acid and protein sequences from databases. Flexible assessment is used for the purpose of accommodating variations in the competence and diligence of students in the different assessment tasks.

## 91333

### Field Studies: Advanced Marine Sciences

*8cp; (includes a nine day excursion to Heron Island in July); prerequisites: completion of Stages 1–4 of an appropriate Science program; 91375 Field Studies: Introductory Marine Sciences*

During this advanced excursion, students will examine in detail the ecology and geology of a coral reef environment. As part of the study students will carry out individual research projects on a selected part of the reef environment. The excursion requires pre-reading preparation and the presentation of a report after completion of the field work.

The subject draws upon the academic experience of staff from other institutions as well as UTS to provide material covering a range of aspects concerning the marine environment including chemical, biological, geological and physical oceanography, in addition to the biology of fishes, benthic fauna, plants and sediments.

## 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, pasteurellae, 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 of an appropriate Science program*

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.

## 91351

### Immunology 1

*3cp; 3hpw; prerequisites: 91354 Anatomical Pathology; 9114 Microbiology 1 or 91313 Biochemistry 1*

This subject is designed to introduce the basic concepts of immunology. It is structured in such a way 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; 6hpw; 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; antiparasitic therapy.

## 91354

### Anatomical Pathology

*6cp; 6hpw; prerequisites: 91312 Biology 2; 91702 Medical Science 2 or 91317 Human Biology; 65022 Chemistry 2A*

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 1

*3cp; 3hpw; prerequisites: 91354 Anatomical Pathology; 91314 Microbiology 1 or 91313 Biochemistry 1*

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 1*

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 1*

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: 91312 Biology 2; corequisite: 91309 Australian Biota*

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.

## 91364

### Aquatic Ecology

*8cp; 6hpw; prerequisites: 91270 Plant Physiology or equivalent; 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 micro-organisms 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: Semiarid 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 semiarid 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.

## 91375

### Field Studies: Introductory Marine Sciences

*4cp; 3hpw; (run over 6-day excursion to Jervis Bay or similar south coast area of NSW, offered once each year in January/February); prerequisite: satisfactory completion of stages 1–4 of the Environmental Biology or Earth and Environmental Science degree programs or equivalent*

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; 33106 Statistical Design and Analysis or equivalent; 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 1*

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.

## 91382

### Introduction to Biological Fluids

*3cp; 2hpw; prerequisites: 65306 Analytical Chemistry 1 or equivalent; 65542 Forensic Toxicology 1 or equivalent; corequisite: 65642 Forensic Toxicology 2 or equivalent*

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.

## 91395

### Biocomputing

*3cp; 3hpw; prerequisite: 1 semester of the subject 33106 Statistical Design and Analysis*

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 (Coursework Programs).

## 91410

### Principles of Clinical Biochemistry

*8cp; 5hpw*

Introduction to core concepts in clinical biochemistry and their practical implementation. Laboratory hazards. Appropriate statistical methods for quality control of laboratory results; reference intervals; diagnostic sensitivity and specificity. Pre-analytical procedures. Quantitative analysis as exemplified by urine analysis, serum anions and cations and the spectroscopic identification of normal and abnormal haemoglobin pigments. Blood sugar estimations and abnormalities of carbohydrate metabolism. Principles of clinical enzymology with particular reference to the steps required for method optimisation. Serum proteins as an aid to the diagnosis and monitoring of disease. Liver function testing. Principles of automation. Introduction to the clinical biochemistry literature.

## 91411

### Biochemical Pathophysiology

*8cp; 5hpw*

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 acid-base balance, and kidney function. Purine metabolism and uric acid. Abnormalities of lipid metabolism. Introductory endocrinology, including the hypothalmic-pituitary axis and

adrenal and thyroid function testing. Radioimmunoassay and related techniques and their role in hormonal evaluation with special emphasis on thyroid function. Gastrointestinal disorders and malabsorption syndromes. Introduction to applications of recombinant DNA techniques in clinical biochemistry. Laboratory-based project to evaluate two alternative methods of estimating a given biochemical analyte in a biological fluid.

## 91412

### Biomedical Sciences 1

*10cp; 6hpw*

This subject may be undertaken only with special permission of the Course Director, Clinical Biochemistry.

## 91413

### Biomedical Sciences 2

*10cp; 6hpw*

This subject may be undertaken only with special permission of the Course Director, Clinical Biochemistry.

## 91414

### Analytical Biochemistry Project 1

*5cp; 3hpw*

This subject may be undertaken only with special permission of the Course Director, Clinical Biochemistry.

## 91415

### Analytical Biochemistry Project 2

*6cp; 3hpw*

This subject may be undertaken only with special permission of the Course Director, Clinical Biochemistry.

## 91417

### Clinical Laboratory Management

*4cp; 3hpw; prerequisite: 91410 Principles of Clinical Biochemistry*

Organising, operating, staffing and controlling the clinical diagnostic laboratory. Procedure and equipment evaluation; reporting and accreditation. A perspective of accounting and financial control; legal and ethical considerations and constraints.

## 91419

### Case Studies in Clinical Biochemistry

*8cp; 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 interrelationships, and the necessity for considering a patient's complete case history in order to gain a true perspective.

## 91426

### Analytical Techniques in Clinical Biochemistry

*8cp; 5hpw*

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, electron paramagnetic resonance, nuclear magnetic resonance. Separation methods: chromatography, electrophoresis, centrifugation. Electrochemical methods: potentiometry and ion-selective electrodes, polarography Biosensors. Immunoassay strategies. Introduction to radiochemical tracers. Molecular biology techniques: DNA analysis and gene probes. Errors in analysis. Implications of biochemical equilibria and kinetics in terminal and fixed point analysis.

## 91440

### Experimental Design and Methods

*4cp; 3hpw*

Logic of scientific experiments; elements of experimental design; sampling strategies and data collection; data analysis. Construction and interpretation of statistical models; multivariate pattern analysis. Experimental design considerations for impacted sites.

## 91454

### Diagnostic Bacteriology

*8cp; 6hpw*

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 the

staphylococci, streptococci, corynebacteria, mycobacteria, neisseria, enteric bacteria, pasteurellae, pseudomonads, aeromonads, vibrios and spirochaetes. Antibiotics and antibiotic sensitivity testing; resistance mechanisms. Pathogens of veterinary significance. Molecular techniques for diagnosis and identification.

## 91455

### Human Parasitology and Mycology

*8cp; 6hpw*

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. Biotechnological applications of fungi.

## 91457

### Immunological Responses to Infection

*4cp; 3hpw*

The structure of the subject essentially follows the course of the body's immune reaction to infection, from initial non-specific events to adaptive responses and immunological memory. The concepts of foreignness recognition and infection response are stressed. Practical sessions give students insight into the serological and cellular methods that underlie serological analysis. Contemporary immunological issues are explored in interactive teaching sessions.

## 91458

### Individual Research Project – Clinical Biochemistry – P/T

*24cp; 2 semesters*

This investigative study component of the Master of Science (Honours) in Clinical Biochemistry extends over two semesters which should preferably be consecutive. Students are expected to formulate a written proposal which nominates the topic of the study. The study will normally consist of a laboratory-based investigation, but may also be an investigation of an epidemiological problem, of quality assurance, or of management in the clinical biochemistry laboratory. It may also be an extensive study based on published sources. The topic of the study should relate to current problems or developments in the field of clinical biochemistry practice. The project will be completed in accordance with Science Faculty rules for Master's degrees by coursework.

## 91466

### Individual Research Project – Clinical Biochemistry – F/T

*24cp*

This investigative study component of the Master of Science (Honours) in Clinical Biochemistry extends over one semester. Students are expected to formulate a written proposal which nominates the topic of the study. The study will normally consist of a laboratory-based investigation, but may also be an investigation of an epidemiological problem, of quality assurance, or of management in the clinical biochemistry laboratory. It may also be an extensive study based on published sources. The topic of the study should relate to current problems or developments in the field of clinical biochemistry practice. The project will be completed in accordance with Science Faculty rules for Master's degrees by coursework.

## 91467

### Clinical Biochemistry – Advanced Aspects

*8cp; 5hpw; prerequisite: 91410 Principles of Clinical Biochemistry; corequisite 91411 Biochemical Pathophysiology*

Specialised aspects of clinical biochemistry. Primary and secondary liver diseases. Biochemical detection of acute myocardial infarction. Metabolism of catecholamine and detection of phaeochromocytomas. Biochemistry of porphyrins and screening tests for porphyria. Foeto-placental function tests. Immunological methods. Toxicology and drug metabolism: modern methods for screening, identification and quantification of drugs of abuse. Approved protocols for the evaluation of instruments. Inborn errors of metabolism. Immunoassay design. Disorders of the adrenal gland.

## 91468

### Introduction to Ecotoxicology

*8cp; 6hpw*

Basic principles of ecotoxicology; ecological systems and processes; overview of current environmental issues. Classes of toxic substances in the environment, their sources, chemistry and effects on biota at various levels

of organism, community, population and ecosystem. Toxicity testing as a tool for assessing toxic effects of chemicals on biota. Acute and chronic tests, test design, selection of test organisms, test protocols, outcomes and limitations, with examples of standard tests using plants and animals. Microcosms, mesocosms.

## 91469

### Laboratory Methods in Ecotoxicology

*12cp; 9hpw*

Application of analytical laboratory techniques in determining ecotoxicological responses at cellular and subcellular level. Biochemical mechanisms involved in entry, transformation and removal of toxic substances in plants, animals and micro-organisms. Physiological and cellular responses to toxicants, biomarkers, applications of molecular biology in ecotoxicology. Environmental toxicology of mammalian systems – toxicokinetics, target organ toxicity, teratology, mutagenesis, carcinogenesis.

## 91470

### Field Methods in Ecotoxicology

*8cp; 6hpw*

Physicochemical behaviour of pollutants in the environments. Impact of toxic chemicals on communities and populations; interactive effects of pollutants; bioaccumulation and biotransformation. Sampling methods for biomonitoring of soils, air, plants and animals; quality control in sampling. Biological indices and biomarkers suitable for field testing.

## 91474

### Statistics in Bioscience

*4cp; 3hpw*

Review of parametric and non-parametric statistics; population distributions, tests of significance, selection of suitable statistical tests; analysis of variance, correlation and regression analysis; distribution free tests, probit analysis. Use of major computer packages (SPSS, Minitab) for statistics.

## 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*

This subject will familiarise students with the legal regime relating to the environmental quality of coastal resources. The roles of federal, state and local government in legislating to protect the coastal zone will be considered. Particular areas of law that are relevant to the coastal zone include planning and development controls, pollution laws, conservation of wildlife and heritage, fisheries management, marine pollution etc. The impact of international law, particularly the law of the sea and recent agreements concerning climate change, biodiversity etc. will be considered.

## 91480

### Epidemiology and Disease Control

*6cp; 3hpw*

Public health microbiology. Basic epidemiological principles; mathematical formulation of epidemics; sociological aspects. Randomised control (double-bind) trials, cohort and case-control studies, descriptive and descriptive analytical surveys. Prevention and control measures (antibiotics, vaccines, vaccination procedures and vaccination programs) and their success as judged by the various trials and surveys performed.

## 91481

### Current Topics in Clinical Microbiology

*4cp; 2hpw*

Classes in this subject will be wide ranging in the field of medical microbiology and will be presented by staff from UTS and invited guest lecturers. A survey of selected topics in clinical microbiology will be undertaken, but the precise mix of topics will vary from year to year. A range of current problems, and recent developments, will be presented.

## 91487

### Research Methodology – Medical Microbiology

*6cp; 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

*8cp; 2hpw lectures plus total of 40 hrs of laboratory work/visits during semester*

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. Applications of molecular biology in the diagnostic laboratory for organism identification and characterisation.

## 91491

### Research Project – Medical Microbiology P/T

*24cp; 2 semesters*

An individual research project in an area of specific interest or a work-related topic. The project topic will be developed in advance in consultation with the Course Director and other academic staff involved in the teaching of the Master's degree program.

## 91492

### Research Project – Medical Microbiology F/T

*24cp; 1 semester*

As for 91491 Research Project – Medical Microbiology P/T.

## 91493

### Biosystems

*4cp; 3hpw*

Characteristics of living things; classification of organisms; cell structure and function; genetics and evolution. Ecological concepts; interaction of organisms, communities, populations. Animal and plant responses to natural and human-induced stresses in aquatic and terrestrial environments.

## 91494

### Ecosystem Assessment

*6cp; 5hpw*

Principles of environmental monitoring; natural and stress-imposed variability in ecosystems; spatial and temporal variability; demographic parameters. Toxicity data from bioassay, field and toxicity tests as a basis for environmental quality guidelines and for bioremediation procedures.

## 91495

### Environmental Risk Assessment and Management

*6cp; 5hpw*

Environmental legislation and regulation at State and federal level, international environmental conventions; environmental management issues; significance of socioeconomic factors on decision making in environmental matters; environmental impact assessment – objectives, contents and procedures; risk assessment procedures, ERA, application of Australian/New Zealand Standard on risk management; requirement for Australian state of environment reporting; hazard assessment and contaminated sites; remediation, disposal, minimisation.

## 91496

### Ecotoxicology Project (P/T)

*24cp, over two semesters; equivalent to 91475 Environmental Toxicology Project P/T and 91476 Environmental Toxicology Project F/T; prerequisites include all the coursework subjects in Master of Science in Ecotoxicology, generally at a credit level.*

Project may take the form of experimental investigations, design studies, extensive critical reviews or other suitable activities. Projects can be carried out at the student's workplace, after obtaining the necessary approvals, so that candidates have some introduction to professional practice. In that case, a member of academic staff at UTS will be appointed as internal supervisor, while a co-supervisor may be appointed from that laboratory. In some cases, if a suitable project can be identified, international or interstate students can return to their normal workplace to carry out the project. All projects will be completed in accordance with the rules for Master's degrees by coursework.

## 91497

### Ecotoxicology Project (F/T)

*24cp, equivalent to 91475 Environmental Toxicology Project P/T and 91476 Environmental Toxicology Project F/T; prerequisites include all the coursework subjects in Master of Science in Ecotoxicology, generally at a credit level.*

As for 91496 Ecotoxicology Project (P/T).

## 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 (Coursework Programs).

## 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 (Coursework Programs).

## 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.

## 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 micro-organisms and the significance of microbial activities for engineering or processes involving environmental impacts. The subject provides an overview of the growth characteristics of micro-organisms and the environmental factors which influence their growth. Micro-organisms 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

### Medical Science 1

*6cp; 6hpw*

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

### Medical Science 2

*6cp; 6hpw prerequisite: 91701 Medical Science 1*

This subject completes the coverage of the anatomy and physiology of the body systems begun in 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 Medical Science 2*

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 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; prerequisites: 33106 Statistical Design and Analysis or equivalent; 91703 Physiological Systems*

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: 68041 Physics 1A or 68101 Physics 1C; 91703 Physiological Systems*

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, oximetering 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*

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 1

*8cp; 6hpw (average); prerequisites: 91313 Biochemistry 1; 91703 Physiological Systems*

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*

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*

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.

## 91775

### Master of Science Thesis F/T

## 91776

### Master of Science Thesis P/T

## 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 a student's academic record to indicate employment while studying, Professional Experience subjects do not incur a HECS liability.

## 95556

### Technology, Society and Change

*6cp; prerequisites: 48 credit points*

The subject will consist of three to four modules which engage students in an interdisciplinary approach to understanding the relationships and interdependence between society, technology and change. Students will identify the need, power and limitations of theory which explain and shape interfaces between technology and society. Critical analyses of case studies which illustrate these objectives will provide a base on which to construct a conceptual framework which enables students to evaluate social and technological developments and change.

## 98204

### Tourism, Recreation and Natural Resource Management

*4cp; 3hpw*

Examines the management issues arising from the use of coastal areas for leisure and tourism. Natural areas such as coasts are significant sites for recreation and tourist activities. The continued sustainability comes from appropriate management of people use; the impacts and implications of this use for the natural coastal systems, and the development of techniques that will allow this use to continue.

## 98702

### Coastal Ecosystems

*4cp*

This subject introduces the basic ecological principles students shall need for the understanding and appreciation of coastal issues. As such it applies those principles to the practical study of issues in marine, estuarine and tropical reef environments with real hands-on experience. Material covered includes a range of aspects concerning the marine environment including chemical, biological, geological, and physical oceanography, in addition to the biology of corals and fishes, benthic fauna, plants and sediments. Lectures are complemented by an extensive field program, and assessment is gained by final written exam and project reports. The subject is taught primarily as an excursion to either Jervis Bay (February) or Herron Island (normally July).

## 98703

### Public Administration and Management

*4cp; 3hpw*

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.

## 98704

### Biotic Resources

*4cp; 3hpw*

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 ESD of coastal resources will be addressed. NSW and Australian practices shall be examined in relation to best practices elsewhere. Normally taught in an intensive mode which will involve excursions as well as classroom instructions.

## 98705

### GIS and Resources Assessment

*4cp*

The principles of baseline surveys, biomonitoring, and impact assessment in systems such as mangroves, saltmarshes, seagrass beds, estuarine and lagoon waters and sediments, and marine systems will be developed. These principles will be addressed in the context of environmental assessment using both GIS and remote sensing. Background to both GIS and remote sensing technologies will be discussed.

## 98706

### Coastal Planning

*4cp*

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.

### 98707

### Topics in Coastal Management

*4cp*

A detailed seminar program normally over two semesters. Topics relevant to the current political agenda, local and state government needs, and the international scene, relevant to integrated coastal management. Normally weekly, some topics shall be held over to a workshop format over several days as needed.

Alternatives include participation in relevant workshops and/or conferences.

### 98708

### Environmental Risk Assessment

*6cp*

This subject provides an introduction to methods of risk assessment in an environmental context. An understanding of the concepts of risk perception, risk communication and risk acceptability is developed. Legal issues in risk management are also discussed. The subject is relevant to the modification or engineering of risks and has application to environmental management, impact assessment and auditing.

### 98709

### Urban Stormwater Management

*6cp*

This subject develops understanding of the nature of pollution processes and levels in urban situations, and of engineering systems for the reduction of pollution, particularly in receiving waters. Students consider pollution management systems in terms of social and environmental requirements and the rationale for design and implementation of remedial measures.

### 98711

### Coastal Resource Policy

*6cp*

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. Discussion of 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. A critical review of coastal policy within Australia and including various international approaches is made.

### 98713

### Coastal Processes

*6cp*

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.

### 98716

### Geological Resources

*4cp; 3hpw*

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.

### 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 cleanup strategies will be introduced, and the role of regulatory and management agencies considered.

### 99502

### Foundations of TCM

*6cp; 5hpw*

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*

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; corequisite: 99576 Advanced Chinese Diagnosis*

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.

## 99521

### Clinical Acupuncture

*5cp; 5hpw; prerequisites: all subjects of Stage 5; corequisites: all acupuncture subjects of Stage 6*

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 credit points 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 UTS College of Traditional Chinese Medicine 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 Certificate Course

*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 UTS College of Traditional Chinese Medicine 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 or 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*

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 UTS College of Traditional Chinese Medicine which provides low-cost acupuncture services to the public.

## 99539

### Pathophysiology A

*6cp; 6hpw; prerequisite: 99570 Health Sciences 2*

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 B

*6cp; 6hpw; prerequisite: 99539 Pathophysiology A*

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.

## 99542

### Project Workshops

*3cp; 2hpw; prerequisite: 91607 Research Methods 1; corequisite: 91608 Research Methods 2*

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. This is a flexible learning component of the course that encourages 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.

## 99543

### *Qi Gong:* Its Use in Acupuncture

*3cp; 3hpw*

*Qi gong* is an ancient aspect of health care in traditional Chinese medicine that is re-emerging 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).

## 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 1

*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 1

*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: 99502 Foundations of TCM*

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 and is offered in a flexible learning format.

## 99561

### Clinical Theory and Clinic – Level 1 (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 1 (TCM)*

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 1 (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 1 (TCM)*

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 1

*6cp; 6hpw*

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 tissue 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*

This subject extends the student's 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 1 (and Treatment Techniques)

*6cp; practicals and tutorials: 4hpw; workshops: 14 hours; prerequisites: all subjects of Stage 1; corequisite: 99564 The Physiology of Qi*

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*

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; prerequisites: all subjects of Stage 1; corequisite: 99566 Introduction to Botany*

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*

Clinical training is provided through the clinical program of the UTS College of Traditional Chinese Medicine 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*

Clinical training is provided through the clinical program of the UTS College of Traditional Chinese Medicine 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*

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*

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*

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*

Clinical training is continued through the UTS College of Traditional Chinese Medicine.

## 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*

Clinical training is continued through the UTS College of Traditional Chinese Medicine.

## 99576

### Advanced Chinese Diagnosis

*6cp; 6hpw; prerequisite: 99571 Chinese Diagnosis; corequisite: 99511 History and Philosophy of TCM*

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.

## 99541

### 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; 99576 Advanced Chinese Diagnosis*

This subject revisits and extends the student's 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 UTS College of Traditional Chinese Medicine.

## 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; 99576 Advanced Chinese Diagnosis*

This subject revisits and extends the student's knowledge of script writing of Chinese herbal formulae. Clinical training is continued through the clinical program of the UTS College of Traditional Chinese Medicine.

## 99578

### Microsystems

*6cp; 5hpw; prerequisite: 99576 Advanced Chinese Diagnosis; corequisite: 99582 Clinic – Level 5 (A&M) and Advanced Treatment Techniques*

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 1 hours (over 2 semesters); prerequisites: all subjects of Stage 4*

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 Formula; 99540 Pathophysiology B*

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 1

*6cp; 6hpw; prerequisites: all acupuncture subjects of Stage 4*

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*

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 is continued through the clinical program of the UTS College of Traditional Chinese Medicine.

## 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*

This subject extends the student's ability to dispense Chinese herbs within the clinical setting. Clinical training is continued through the clinical program of the UTS College of Traditional Chinese Medicine.

## 99584

### Clinical Features of Disease

*6cp; 4hpw; prerequisite: 99540 Pathophysiology B*

This subject builds on the theoretical material offered in Health Science 1 & 2. It also develops the student's 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*

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*

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*

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*

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 UTS College of Traditional Chinese Medicine.

## 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*

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 UTS College of Traditional Chinese Medicine.

## 99590

### Special Topics in TCM (Intermodal and Professional)

*8cp; 6hpw; prerequisite: 99585 Disease States*

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.

## 99591

### Practice Management

*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.

## 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*

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 UTS College of Traditional Chinese Medicine which provide low-cost TCM services to the public.

## 99593

### Honours Project

*48cp (over 2 semesters); prerequisites: 91608 Research Methods 2; 99542 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.

## 99594

### Chinese Herbal Practice 1

*6cp; flexible learning program; prerequisites: all TCM units of Stage 2*

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 gastro-intestinal conditions.

## 99595

### Graduate Clinic Level 3 (TCM)

*2cp; Graduate Clinical Assistant Level 3: 10 hours; prerequisites: all units of Stage 2; corequisites: all units of Stage 3*

Clinical training is continued under the guidance of an experienced practitioner at the clinics of the College of Traditional Chinese Medicine. This subject is especially directed towards providing the student with confidence to undertake a full internship in the following semester.

## 99596

### Chinese Herbal Practice 2

*6cp; flexible learning program; prerequisites: all TCM units of Stage 3*

Chinese herbal medicine involves the diagnosis of specific disorders, and the discrimination of variations within these diagnosed disorders. This subject builds on work undertaken in 99594 Chinese Herbal Practice 1.

## 99597

### Graduate Clinic Internship (CHM)

*5cp; Graduate internship 25 hours as a supervised practitioner; prerequisites: all units of Stage 3; corequisites: all units of Stage 4*

The graduate herbal clinician will undertake 25 hours of supervised practise in the UTS Chinese herbal clinics.

## 99598

### Master's Project – Traditional Chinese Medicine – P/T

*24cp; 2 semesters*

The Master's 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.

## 99599

### Principles of Chinese Herbal Medicine

*8cp; flexible learning program*

This subject offers foundation knowledge and skills for the practice of Chinese herbal medicine. As a graduate subject it is predicated by an extensive knowledge of Traditional Chinese Medical theory. It provides an introduction to the basic concepts of Chinese herbalism and its application.

## 99600

### Graduate Clinic Level 1 (CHM)

*4cp; Graduate Clinical Assistant Level 1: 10 hours, dispensing workshop 2 x 4; corequisite: 99599 Principles of Chinese Herbal Medicine*

Students complete a workshop program that enables them to undertake basic herbal dispensing in the UTS clinic. Clinical training is provided through the clinical program of the College of Traditional Chinese Medicine at the specialist TCM centre provided by the University which is open to the general public.

## 99601

### Principles of Botany

*4cp; flexible learning program*

A basic knowledge of botany and botanical terminology is essential for the understanding of Chinese herbal medicine. This subject provides the students with a grounding in plant identification, the parts of plants, and familiarity with their growing requirements.

## 99602

### Principles of Pharmacognosy

*3cp; 2hpw; prerequisites: subjects of Stage 1 of the Master's of Health Science in Traditional Chinese Medicine*

The student 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.

## 99603

### Classical Herbalism

*3cp; flexible learning program; prerequisites: subjects of Stage 1*

This subject surveys historical writings and classical texts that form the basis of modern Chinese herbal medicine.

### 99604

**Graduate Clinic Level 2 (CHM)**

*2cp; Graduate Clinical Assistant Level 2: 10 hours; prerequisites: all units of Stage 1; corequisites: all units of Stage 2*

Clinical training is provided through the clinical program of the College of Traditional Chinese Medicine at the specialist TCM centre provided by the University which is open to the general public.

### 99605

**Herbal Prescriptions**

*5cp; flexible learning program; prerequisites: all subjects of Stage 2*

This subject analyses the Chinese herbal formulae utilised in TCM to treat illness. The major herbal formulae are evaluated together with their appropriate application. Students are encouraged to discriminate between various treatment strategies.

### 99606

**Clinical Internship (A&M/INT.ST) A**

*6cp*

This program is equivalent to 50 per cent of the credit points requirement for 99538 Clinical Internship (A&M) and is taken in China in a supervised outpatient clinic.

### 99607

**Clinical Internship (A&M/INT.ST) B**

*6cp*

As for 99606 above.

# SUBJECTS OFFERED FOR FACULTY OF NURSING STUDENTS

### 91518

**Physiological Foundations of Health 1**

*6cp; Bioscience component 4hpw Physical Science component 2hpw*

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, vases 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*

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 acidbase 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 1

*6cp; 6hpw*

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 through the gastrointestinal tract, the urinary tract, the respiratory tract and the genital tract; diseases acquired parenterally either by 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*

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; principle 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; 2pw*

Enables students to understand the nature of social relationships in the school and how these affect teacher and student behaviour; the education system in New South Wales and the role of the Federal Government in education; how social characteristics influence the educational outcomes of certain social groups; 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.

## 023191

### Secondary Practicum 1

*Offered by the Faculty of Education*
*1 2cp; 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*
*1 2cp; 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.

## 27757

### Ecotourism Planning and Management

*Offered by the Faculty of Business*
*Postgraduate*
*6cp*

Addresses the range of management and planning issues appropriate to the operationalisation ecotourism in Australian society. Provides students with an understanding of key aspects of ecotourism projects and operations. Explores principles and practices for commercial and public agencies that work but still include the underlying principles and ethics of ecotourism. Examines the management skills that are needed to establish a successful ecotourism project or operation. Considers issues such as ethical marketing and community relationships. Explores the context for management, planning and operation in this area such as conservation, protected area management and organisational relationships in the tourism industry.

## 27773

### Guiding and Interpretation Management

*Offered by the Faculty of Business*
*Postgraduate*
*6cp*

Develops students' skills as interpretative tourism guides and in understanding the management of this area of a company/agency. Focuses on the roles of leadership and small group communication to develop an understanding of the skills that are required of a guide and to manage this area. Explores interpretation and the forms it takes in areas such as heritage, museums and protected areas, to enable students to meet the needs and expectations of potential clients when operating or managing guiding. Presents environmental, outdoor and experiential education methods and techniques to develop skill in the areas of guiding and interpretation such as an understanding of ecological concepts, risk management, liability. An experiential learning approach based in a variety of settings, particularly the outdoors, will be used.

## 31871

### Computing for Science

*Offered by the Faculty of Mathematical and Computing Sciences*
*3cp; 3hpw; prerequisites: 31870 Introduction to Microcomputers; 33170 Basic Science Mathematics or equivalent subjects*

Structured programming. Elements of C: variables, control structures and formatting. File handling in C. 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.

## 33106

### Statistical Design and Analysis

*Offered by the Faculty of Mathematical and Computing Sciences*
*6cp; 2 semesters; 3hpw*

This subject runs over two semesters and provides the theory and techniques needed in the design and analysis of experiments in the natural sciences. It covers descriptive statistics, measures of location and dispersion, commonly used discrete and continuous distributions and simple random sampling. Statistical tests, both parametric and distribution free, are presented for a variety of designs, including paired trials, completely randomised design, block designs and designs with interaction terms or covariates. The

analysis of linear, multiple and polynomial regression models is also presented, together with appropriate diagnostic techniques to determine the validity of the models.

## 33130

### Mathematical Modelling I

*Offered by the Faculty of Mathematical and Computing Sciences*
*6cp*

This subject will develop all the standard ideas of single variable calculus, but will use specific physical models to provide a context for the mathematical concepts. The material will appear for different purposes and in a different order to standard presentations. There are ties to experiments done in basic physics subjects to further reinforce the relevance of the mathematical concepts.

## 33190

### Mathematical Modelling for Science

*Offered by the Faculty of Mathematical and Computing Sciences*
*6cp; 6hpw; no formal prerequisite but a knowledge of 2 Unit HSC Mathematics is assumed*

Subject to approval.

Functions and their relationship to scientific experiments. Differentiability. Differential equations arising from scientific problems. Solution by series. Radioactive decay and exponential functions. Oscillatory motion and trigonometric functions. Integration. The logarithm function. Inverse functions. Inverse trigonometric functions. Solution of differential equations by integration and inverse functions. The computer algebra system *Mathematica* will be used for symbolic, graphical and numerical computations.

## 33230

### Mathematical Modelling 2

*Offered by the Faculty of Mathematical and Computing Sciences*
*6cp; prerequisite: 33130 Mathematical Modelling I*

This subject will develop concepts of linear algebra and multivariable calculus, but using motivational examples more than is usual. Such examples include production problems, overdamped motion, the concepts of work and rotational motion and various concepts such as centres of mass and moments of inertia. The concepts of probability will be introduced and motivated by focusing on the determination of the reliability of a system of components, such as – electric circuit for fire detection, a suspension bridge or an engine's lubrication system. Subject material will include variance, skewness and kurtosis, probability distributions, conditional probability and bivariate probability.

## 33290

### Computing and Mathematics for Science

*Offered by the Faculty of Mathmatical and Computing Sciences*
*6cp; 6hpw; prerequisite: 33190 Mathematical Modelling for Science*

In the computing component of this subject students will study a range of computing modules designed to give them basic computing application skills and some more advanced modules appropriate to their particular discipline. The mathematics component will include studies of simultaneous linear equations and their occurrence in scientific problems; methods for solving these equations using matrices and determinants; eigenvalues and eigenvectors; vectors in two and three dimensions; products of vectors; spatial geometry and coordinate systems; functions of several variables; partial derivatives; optimisation; method of least squares. The computer algebra system *Mathematica* will be used for symbolic, graphical and numerical computations.

## 33390

### Mathematics and Scientific Software

*Offered by the Faculty of Mathmatical and Computing Sciences*
*6cp; 4hpw; prerequisite: 33290 Computing and Mathematics for Science*

Methods of Integration. Double and triple integrals and their application to scientific problems. The use of spherical and cylindrical coordinates. Linear algebra and its relationship to boundary value problems. Inner products and orthogonality. Separation of variables. Fourier series. An introduction to C and Mathematica programming in the context of problems from this subject and its prerequisite.

## 33490

### Computational Mathematics and Physics

*Offered by the Faculty of Science and the Faculty of Mathematical and Computing Sciences*
*6cp; 5hpw; prerequisites: 68201 Physics 2; 33390 Mathematics and Scientific Software*

One dimensional heat and wave equations. Solution by separation of variables. Fourier sine and cosine series. Line and surface integrals divergence and curl. Theorems of Gauss and Stokes. Functions of a complex variable. Cauchy-Riemann equations. Complex integration. Cauchy's integral theorem and integral formula. Taylor and Laurent series. Singular points and their use in contour integration.

Introduction to the study of complex physical systems by computer. Introduction to computational tools used in areas such as molecular spectroscopy, fluid flows, diffusion of pollutants, scanning tunnelling microscopy, wave propagation along optic fibres.

## 48006

### Capstone Project (6cp)

*CE, CEE, ESE, ME, SE, TE, BEBA, BEBBus*
*6cp; prerequisites: 48140 Review of Engineering Practice 2 or 48160 Professional Review, 48360 Engineering Management, at least 84cp of fields of practice subjects; corequisite: 48370 Technology Assessment*

Objectives of the capstone project are: to bring together and integrate knowledge and skills gained in the course as a whole, including engineering principles, planning and design, ethics, management, and communication, and to apply these to an initially unstructured problem formulated by each student in consultation with an adviser; to reinforce and develop competencies that have not been sufficiently emphasised in the student's choice of subjects or engineering practice to date; to define a substantial engineering study or design task, place it in context, and carry it to completion within a specified time and to a professional standard; to complete a comprehensive written and bound report that places the project in context, defines its objectives, and describes the work done and the resulting conclusions or recommendations; to provide a bridge to the student's professional future, and opportunity to demonstrate professional competencies and capabilities; to provide scope to demonstrate initiative and creativity, and take pride in achievement.

Each student is required to undertake a substantial engineering project, normally during their final year of study, and to prepare a formal report describing the work performed and the resulting conclusions and recommendations. The work is planned and carried out under the supervision of a member of academic staff. Both the work and the report must meet professional engineering standards. The project may be in any area of engineering. Students may choose a topic relating to their experience in engineering practice, or an area of interest which they wish to study in detail. Typical projects might take any of the following forms: literature review – a study of the available literature and a state-of-the-art appraisal of an area of engineering; design – the complete design of a substantial engineering artefact or system; experimental investigation – a comprehensive laboratory investigation or testing program; research and development – original research of a fundamental or applied nature, or development of a new application of a particular technology; computer-based analysis – development or use of computer software to study the behaviour of an engineering solution; project management – planning and management of a substantial engineering project, normally in a workplace, business or community context; combining technical and management skills; impact analysis, planning, system design – study and analysis of an engineering solution in its economic, social and environmental context, integrating the engineering dimension with cross-disciplinary interfaces, and optimising overall system design, normally interactive with other professions.

## 48110

### Engineering Experience 1

*CE, CEE, CSE, ESE, EE, ME, SE, TE, BEBA, BEBBus, BScBE*
*0cp; prerequisites: 48121 Engineering Practice Preview 1, either 48210 Engineering for Sustainability; or 48220 Informatics; and one of 48310 Introduction to Civil Engineering or 48510 Introduction to Electrical Engineering or 48610 Introduction to Mechanical Engineering or 48720 Introduction to Telecommunications Engineering or 48820 Introduction to Environmental Engineering*
*Engineering Practice*

Engineering educators, as well as engineering employers, have long recognised the value of integrating practical experience with academic studies. Engineering Experience 1 and 2 are zero credit point subjects that support students

while they are working in industry or the community for the purpose of gaining experience in the practice of engineering. Engineering Experience 1 provides students with the opportunity to discover engineering workplace culture and to develop their basic technical skills. It is expected that students will gain this level of experience early in their academic program. One semester prior to undertaking the experience students must enrol in the subject Engineering Practice Preview 1. Students may enrol in Engineering Experience 1 for more than one semester while they are working at a basic level and they need not take additional semesters of Engineering Practice Preview 1, however, they are encouraged to progress to higher levels of engineering practice.

Material to be taught and learnt: Each student's experience will be unique. What is learned will be a function of a number of factors affecting the experience. Employer or host organisations are not expected to provide formal training although some may choose to do so. Instead students are required to become active learners and seek opportunities to fulfil the objectives of this experience module. Students are assisted in this process through Engineering Core and Field of Practice subjects and specifically through Engineering Practice Review 1.

## 48120

### Review of Engineering Practice 1

*CE, CEE, CSE, EE, ME,TE, BEBA, BSc BE*
*6cp, (exemption process)*
*ENGINEERING PRACTICE*

This subject has been introduced for the purpose of assisting students who commenced before 1998 in the BE course and wish to transfer to the BE DipEngPrac. It replaces the two 3 cp subjects 48121 and 48122. Students who have completed 44 weeks of industrial experience under the old course can apply for an exemption in this subject as a means of simplifying the transfer to the BE DipEngPrac.

## 48130

### Engineering Experience 2

*CE, CEE, CSE, ESE, EE, ME, SE,TE, BEBA, BScBE*
*0cp, prerequisites: 48141 Engineering Practice Preview 2*
*ENGINEERING PRACTICE*

Engineering Experience 1 and 2 are zero credit point subjects that support students while they are working in industry or the community for the purpose of gaining experience in the practice of engineering. Engineering Experience 2 expects that students will be advanced in their academic studies and be working closely with engineering professionals in order to extend their understanding of the practice of professional engineering and to apply, test and further develop their technical skills. One semester prior to undertaking the experience students must enrol in the subject Engineering Practice Preview 2. Students may enrol in Engineering Experience 2 for more than one semester while they are working at this para-professional level; and they need not take additional semesters of Engineering Practice Preview 2. However, they are encouraged to progress to a professional level of engineering practice.

Material to be taught and learnt: Each student's experience will be unique. What is learned will be a function of a number of factors affecting the experience. Employer or host organisations are not expected to provide formal training although some may choose to do so. Instead students are required to become active learners and seek opportunities to fulfil the objectives of this experience module. Students are assisted in this process through Engineering Core and Field of Practice subjects and specifically through Engineering Practice Review 2.

## 48140

### Review of Engineering Practice 2

*CE, CEE, CSE, ESE, EE, ME, SE,TE, BEBA, BScBE*
*6cp, prerequisites: 48120 Review of Engineering Practice 1 plus an additional 24 weeks of engineering experience at a professional level*
*ENGINEERING PRACTICE*

This subject has been introduced for the purpose of assisting students who commenced before 1998 in the BE course and who have transfered to the BE DipEngPrac. It is used with the permission of the Director of the Engineering Practice Program where the normal process of enrolling in the 3 cp subjects 48141 and 48142 would unreasonably delay graduation.

## 48210

### Engineering for Sustainability

*CE, CEE, CSE, ESE, EE, ME, SE,TE, BEBA, BEBBus, BScBE*
*6cp*
*Core*

Upon completion of this subject, students should be able to demonstrate development in the following areas:

- orientation to university study;
- ability to read critically and write appropriately in a variety of academic contexts;
- appreciation of the social and historical contexts of engineering;
- awareness of different definitions of 'progress';
- awareness of what is 'professionalism';
- appreciation of the role of codes of ethics; and
- appreciation of the principles of sustainability.

This subject takes students on a journey into the past, present and future of engineering and its relationship to society and the environment. They will choose one of several module groups based around broad engineering-related themes.

Within these modules, students will be examining the contributions made by engineers in their respective areas, how they were received by and benefited different groups in society, and what impact they had on the environment. Current and historical case studies from our local communities as well as from other parts of the world will be used to illustrate the different ways in which technologies have evolved and have been valued.

The subject is taught by an interdisciplinary team who will present lectures, and facilitate interactive workshops. Assessment includes individual reflective writing, case study reports, and team-based poster presentation. In each of these assessment tasks, students are assessed both for their learning of key content material and academic skills such as critical reading and analysis, and academic writing and presentation.

## 48220

### Informatics

*CE, CEE, CSE, ESE, EE, ME, SE,TE, BEBA, BEBBus, BScBE*
*6cp*
*Core*

The objectives of this subject are: to develop a deep understanding of the types of engineering problems which can benefit from the use of information and computational tools; to identify these benefits, the types of tools and their appropriateness, strengths and limitations; to develop an understanding of the application of, and specific skills in applying, informatics tools to engineering problems (and in particular in the areas of utilising information, oral and written communication, teamwork, resource management, design processes); and to develop maturity with respect to critical thinking and professional ethics.

Topics include: consideration of issues related informatics tools and categories of informatics tools, types of problems which can benefit from these tools, benefits of using tools, limitation of tools, relevance of tools to different types of problems; consideration of issues related to using tools to identify, structure, conceptualise, visualise, articulate, and reason about engineering problems; consideration of issues related to how tools relate to the culture of engineering, engineering ethics, and critical thinking; specific skills in computing programming fundamentals, and a specific programming language; skills in using operating systems, written and oral communication software, spreadsheets, Internet tools, mathematical modelling tools, databases, teamwork tools, and project management tools.

## 48230

### Engineering Communication

*CE, CEE, CSE, ESE, EE, ME, SE,TE, BEBA, BEBBus, BScBE*
*6cp; prerequisite: 48220 Informatics*
*Core*

On completion of this subject students should be able to: understand basic principles and theories of human communication; research within the various discipline areas that inform the study of communication; write competently in a number of different genres; perform competently in a variety of oral communication situations; understand basic principles and practices of graphic comm-

unication; demonstrate their ability to express engineering concepts through graphical communication; demonstrate their ability to 'converse' mathematically; lead and participate in group processes; appreciate the central role of communication in engineering practice.

Topics include: principles and theories of communication; communication in practice; the processes of communication; and communication technology.

## 48240

## Uncertainties and Risks in Engineering

*CE, CEE, CSE, ESE, EE, ME, SE,TE, BEBA, BEBBus, BScBE*

*6cp; prerequisites: 48220 Informatics, 33230 Mathematical Modelling 2*

*Core*

The objectives of this subject are: to develop in students a critical understanding of ideas concerning decision-making under risk, uncertainty, ignorance and indeterminacy (and an appreciation that each person and group has knowledge, attitudes and beliefs about risk and uncertainty which, to the individual or group, are 'rational'); to explore the contexts in which experts, including professional engineers, manipulate problems involving risk and uncertainty; to develop a critical appreciation of the uncertainties and subjectivities inherent in modelling; and to equip students with the ability to select and apply appropriate statistical tools, to acquire additional statistical competencies, and to understand their strengths and limitations.

Topics include: Decision making under risk, uncertainty, ignorance or indeterminacy – history of decision making under risk, uncertainty, etc.; cultural approaches to risk and uncertainty (approaches which emphasise the plurality of rationalities); the modern dependence on or fascination with quantification; historical origins of statistics and risk analysis; new approaches to negotiating risk and uncertainty decisions: the primacy of open process, trust, and valuing contextual knowledge over quantitative risk estimates; the sociology of knowledge; case studies concerning, for example, Chernobyl, lawyers' approaches to knowledge, and probabilistic knowledge; communicating and negotiating uncertainty and risk. Formal definitions of risk, uncertainty, indeterminacy and ignorance – connections to risk management and to sustainability, especially the Precautionary Principle; connections to communication, safety, reliability, quality, investment risk, measurement, and system performance evaluation; sources of errors; limitations of models as predictive tools; risk transfer, risk modification, and risk avoidance. The role of formal methods of handling risk and uncertainty – standards, codes, and expert or professional knowledge in resolving risk or uncertainty, particularly in engineering and related professions; how models are constructed and used as the basis for codes and standards; examples and connections to the fields of practice/programs; the complexity of engineering decisions and the reductionist approach to classifying problems; ensuring predictability, quality and reliability in the face of the random perturbations and uncertainties inherent in systems. Techniques for modelling and analysing uncertainties and risks – in order to be able to examine some hypotheses about risk and uncertainty, appreciation of the process of and mastery of some of the skills for modelling and analysis will be developed, including: different classifications of mathematical models and modelling methods, e.g. stochastic, deterministic, mixed stochastic-deterministic, parameteric, black box, simulation; linear, nonlinear, lumped parameter, distributed parameter; static, dynamic; regression and correlation analysis; choice of variables and relationships to model; sources of uncertainty propagation in models, e.g. measurement uncertainties, propagation of computational errors, system noise and disturbances, unmodelled variables, non-quantifiable variables and effects; measures of certainty and uncertainty in models, e.g. robustness, confidence intervals, statistical inference based on hypothesis testing; mechanisms for minimising effects of uncertainties in models and systems, e.g. feedback, filters, and redundancy; model verification e.g. tests of goodness of fit; model validation, e.g. statistical forecasting; how decisions are made under uncertainty; different approaches to documenting and communicating the results of statistical modelling and decision making.

## 48250

### Engineering Economics and Finance

*CE, CEE, CSE, ESE, EE, ME, SE,TE, BEBA, BScBE*
*6cp*
*Core*

The objectives are for students to be able to use an understanding of engineering culture to develop an understanding of the relationship between economics and finance and engineering; to gain a working knowledge of macro and micro economic theories in the context of engineering practice, ethics and sustainability; to acquire skills in determining the appropriate use and limitations of various economic and financial models and techniques used to define/manage/analyse engineering activities; to develop competence in identifying and working through the economic and financial aspects of an engineering project/case study; to become aware of the impact of various economic and financial models and techniques on the social and technical dimensions of engineering activity; to integrate economic and financial understanding and fields of practice specialist knowledge in project-based/case study work.

Topics include: a basic understanding of macro economics, micro economics and environmental economics; awareness of the philosophies underpinning economics, and terms and methods used by economists and accountants; analysis of engineering economic models including cost-benefit analysis, multiple-objective analysis etc; skills in assessing and using accounting and financial concepts especially in context of small business but including awareness of management accounting.

## 48260

### Engineering Management

*CE, CEE, CSE, ESE, EE, ME, SE,TE, BEBA, BEBBus, BScBE*
*6cp; prerequisites: 48122 Engineering Practice Review 1 or 48120 Review of Engineering Practice; 48240 Uncertainties and Risks in Engineering*
*Core*

This subject enables students to develop the following: an appreciation that management is integral to engineering in aspects ranging from the personal to the organisational; an awareness of the roles and functions of management – general, engineering and project management; an understanding of the rationale underpinning various engineering and project management models and tools and the interaction with engineering practice. It introduces and analyses a range of engineering and project management tools, developing an appreciation of their appropriate uses, strengths and weaknesses. Building on awareness developed in earlier subjects, and through work place experiences, it introduces students to the potential impacts of engineers' decisions and management on the community and the client. Students will acquire skills in choosing and using the most appropriate engineering and project management tools for identifiable engineering activities.

Topics include: concepts of general management and engineering and project management and their relationships; systems/product life cycle model and the various contributions which engineers make, or can make, during this cycle; and the contributions of other occupations; models used to visualise the processes occurring during the cycle, and for envisaging management and decision making; the range of tools which can be applied for various purposes during the cycle e.g. to make decisions, manage people, manage resources, audit and account for management of resources, etc; historical development of this range of management, theories, tools, and models, and the arguments for and against them; engineering and project management; and the capabilities required of engineering managers.

## 48270

### Technology Assessment

*CE, CEE, CSE, ESE, EE, ME, SE,TE, BEBA, BScBE*
*6cp; prerequisite 48240 Uncertainties and Risks in Engineering*
*Core*

The objective of this subject is to provide students with an understanding of the development of impact as a concept, and to gain an appreciation of how it has been specifically constructed within the engineering culture.

Students will consider the concept of impact within the frameworks of technology assessment techniques; acquire an appreciation of and sensitivity to different interpretations of the impact of technologies; examine how different understandings of the concept of impact affect the relationships between technological professions and society; compare and critique methodologies and strategies for dealing with the impacts of engineering activity; develop skills in

determining the appropriate use of various techniques used by decision makers to manage/determine the impact of engineering activity; develop skills in involving community in decision making regarding the impact of engineering activity; gain an appreciation of the diversity of engineering practice and its interdependence with other professions; experience and reflect on the interdisciplinary nature of engineering activity.

## 48430

### Software Development

*CSE, EE, SE,TE, BEBA, BEBBus, BScBE*
*6cp, prerequisite: 48220 Informatics*
*Fields of practice: Computer Systems Engineering Program*

The objectives of this subject are to: develop in students a critical understanding of issues related to the development of software systems, including understanding of the concepts of software life cycles, processes and software paradigms; software methodologies; software analysis, design, implementation, and testing; and algorithm design and problem solving. It also aims to develop in students the skill to apply analysis and design techniques and programming skills to the development of software systems; and equip them with the ability to acquire new software development skills as required by specific development projects.

Topics include: introduction to the software development life cycle and development processes and models (such as the waterfall model, incremental and iterative development, and the spiral model); introduction to software paradigms and detailed consideration of the purpose and underlying principles of the structured and Object Oriented paradigms; introduction to concepts of development methodologies and detailed coverage of one specific methodology (including analysis, design and implementation aspects of this methodology); principles and procedures for software testing, verification, validation and debugging; approaches to algorithm design and problem solving; software coding – introduction and detailed coverage of a programming language in order to develop specific skills related to above elements.

Students would have developed fundamental programming skills in the prerequisite subject 48220 Informatics. In order to further develop their programming skills, and to understand the relationships between different programming paradigms, they will be required to develop a deeper understanding of the Java programming language. The object-oriented paradigm will be implemented using the Unified Modelling Language (UML) methodology.

## 48441

### Introductory Digital Systems

*CSE, EE, SE,TE, BEBA, BEBBus, BScBE*
*6cp; prerequisites: 48520 Electronics, 48430 Software Development*
*Fields of practice: Computer Systems Engineering Program*

The objectives of this subject are to enable students to: master the fundamentals of digital and programmable electronic circuits and their engineering applications; master the hardware architecture of a typical small computer system; understand the principles of low level programming and gain an ability to write simple assembly code. Students will be introduced to the basics of concurrent and real time application programming. The subject will develop a simple register-based computer incorporating I/O and interrupts.

Topics include: digital sequential circuits; state diagram and its application in the design of digital circuits; basic hardware architectures of the digital computer in terms of its building blocks; how hardware integrates with software at the machine level; low level language programming; internal architecture and design of a typical register-based central processing unit and a main memory subsystem, and their interdependence; concepts of computer system busses, as well as different types of input and output devices; interrupts and DMA (direct memory access) input and output; micro-controller theory; hardware interfacing design techniques. Aspects of real time programming, concurrency and multiple processing, the design of a basic multi-tasking operating system and the solution of a concurrent application. Optional modules toward the end of the subject cover an in-depth study of a selected micro-controller, advanced topics in embedded real time applications, printed circuit board design among others.

## 48451

### Advanced Digital Systems

*CSE, BEBA, BEBBus*
*6cp; prerequisite: 48441 Introductory Digital Systems*
*FIELDS OF PRACTICE: COMPUTER SYSTEMS ENGINEERING PROGRAM*

The objectives of this subject are that students should be able to: analyse, design and implement a programmable digital system based on a user requirement specification, investigate advanced computing architectures. The subject has two major components (1) analysis/design and (2) implementation, of an advanced computing node. The components are integrated, and are each worth 50 per cent of the course mark.

The subject provides an in depth understanding of the analysis/design and implementation of advanced digital hardware at medium scale computer system building block level. It builds on the basics of Introductory Digital Systems introduced in the earlier 'field of practice' subjects. This subject is common to the Electrical, CSE and Telecommunication degree courses.

Topics include Quantitative Analysis, The Design Process, Functional Design, Implementation Technologies, Computer Architectures, Memory and I/O Systems. It emphasises Computer Aided Design, including the use of the VHDL specification, simulation and integrated VLSI implementation technologies.

## 48530

### Circuit Analysis

*CSE, EE,TE, BEBA, BEBBus, BScBE*
*6cp; prerequisite: 48520 Electronics*
*FIELDS OF PRACTICE: ELECTRICAL ENGINEERING PROGRAM*

In previous subjects students have been introduced to the analysis and application of electrical devices and systems. In this subject these skills will be developed to the point of virtuosity, as students acquire proficiency in the rigorous analysis of real-world models. By a process of 1) theoretical investigation, 2) experiment design, 3) experimental testing, and 4) reflection, students will develop a clear conceptual and experiential understanding of the difference between real-world phenomena and the models that are used to represent them. While electrical circuits are a prime focus, the application of analysis techniques to other disciplines and types of system models will be concomitant. The subject will also provide a perspective on the historical development of this area and on present and future trends.

In most weeks students will partake in a 3 hour small group teaching session with up to an additional 3 hours laboratory or in-field activities. Assessment will consist of individual and group work tasks with weekly quizzes and a final exam.

The following topics are covered:

Signals and Systems - Introduction to spectral analysis, Laplace transforms; ideal and real voltage and current sources and loads; Resistors., capacitors, inductors and coupled coils; Kirchoff's voltage and current laws, Thevenin's and Norton's theorems, mesh and nodal analysis, symmetry, circuit transformation, superposition, solution of ODEs using Laplace; Power in AC circuits, electrical distribution networks and devices, multiphase systems; One and two ports systems, transfer and immittance functions, two port parameters and behaviour; Poles and zeros, s-plane analysis, Bode plots; First Order Systems – Response to periodic and non-periodic inputs, time domain solution, frequency domain solution; Arbitrary Systems Analysis – Linear versus Non-linear, response to an arbitrary input using convolution, dominant pole approximation, practical system identification techniques.

## 48540

### Signals and Systems

*CSE, EE,TE, BEBA, BE BBus, BScBE*
*6cp; prerequisites: 48220 Informatics, 33230 Mathematical Modelling 2*
*FIELDS OF PRACTICE: ELECTRICAL ENGINEERING PROGRAM*

This subject presents the theoretical basis for system analysis and gives students skills in using the techniques to design components of real control/communication systems. The derivation of models from real world devices through measurement, and the comparison of model predictions with experimental results is emphasised in the laboratory component of the course. A group project that requires the design and implementation of part of a control/communication system allows students to apply their knowledge to a real-life problem.

Topics include: signal types and signal representation in the time and frequency domains; system modeling; signal operations in the time and frequency domains; discrete signals and systems; the effects of feedback;

time and frequency domain performance and correlation; system stability.

Through learning activities students will also gain study skills including academic literacy skills, and an appreciation of the different fields of practice of engineering and the interdisciplinary nature of engineering.

Class time will be used for lecture-type resource sessions, tutorials, laboratories and project work. There will be a number of formal laboratory sessions that apply system theory to different engineering disciplines, which also familiarise students with the laboratory equipment. Several simple control systems will then be used as case studies in signals and system behaviour. The laboratory component culminates in a substantial group project that will require a formal written and oral presentation.

## 48550

## Power Systems

*EE, BEBA, BEBBus, BScBE*
*6cp; prerequisites: 48531 Electromechanical Systems, 48530 Circuit Analysis, 68038 Advanced Mathematics and Physics*
*FIELDS OF PRACTICE: ELECTRICAL ENGINEERING PROGRAM*

The objective of this subject is to reinforce and extend knowledge of electromechanical systems and circuit analysis into the components and philosophy of typical power systems (generators, transformers, transmission lines, induction and synchronous motors, protection) by a deeper study of 3-phase systems, ac machines, and power system design principles.

Technical and theoretical content is expected to be acquired by students to the levels of 'know' (essential), 'familiar' (can solve problems if required) and 'aware' (have read/seen), and the laboratory skills to be acquired, are shown below. The topics are linked by application to a small power system, on which assignments and laboratory work are based.

**Know:**

- 3-phase circuit theory – balanced network, star/delta, p.u. system.
- Component non-ideal models and performance – transmission line, 1-phase and 3-phase transformer, dc and ac machines (dc, induction, synchronous as motor and generator).
- System control and design principles – energy storage, cogeneration, renewable generation, remote and grid-connected systems, and pollution control.

**Familiar:**

- 3-phase circuit theory – symmetrical components, unbalanced network, fault calculations, motor starting, generator short circuit.
- Component models and performance – CT, VT, circuit breaker, cables.
- System control and design principles – voltage selection, ac vs dc, system losses and efficiency.

**Aware (exposure technologies):**

- Component models and performance – d,q transformation.
- System control and design principles – P,Q, tie lines, state estimation, tap setting, economic load despatch, load flow, FACTS, SVC, harmonics.
- Principles of protection – overcurrent, unit, distance, earth.
- Power system applications – electric train, rolling mill, power station, air conditioning fan, sewerage or water pump, wind generator, sub-station, switchyard, hv and lv reticulation.

**Laboratory skills**

- 1-phase transformer tests and performance.
- 3-phase transformer tests and performance.
- dc machine performance.
- Induction machine parameters and performance.
- 3-phase dc generator parameters and performance.
- Power system performance.

## 48560

### Analogue and Digital Control

*EE, BEBA, BEBBus, BScBE*
*6cp; prerequisite: 48540 Signals and Systems*
*Fields of practice: Electrical Engineering Program*

The objective of this subject is to enable students to model with validation control systems, to analyse, design, and implement both analogue and digital controllers so that the controlled systems conform with given specifications. Emphasis is placed on laboratory work, the theoretical content of the subject being only that required to produce successful designs. Students are required to work on reduced scale models of actual industrial processes. The equipment is based upon experience gained with authentic control applications and is suitably modified for student use. Students follow the usual sequence adopted in industry, i.e. they start with the calibration of transducers and actuators leading on to dynamic response testing, physical modelling, model verification and finally to controller design, implementation, and testing.

Topics include: linear and nonlinear modelling of control systems using Newton's rules, analogous networks or Lagragian techniques; linearisation and development of linear, time-invariant transfer functions; development of lead-lad compensators or PID controllers using classical control design techniques such as root locus, Bode gain and phase diagrams, Nyquist plots and Nichols chart; development of state-variable equations from differential equations; development of state-variable feedback controllers and state observers.; open-loop pulse transfer functions and discrete-time state models; discretisation using backward difference, bilinear, step-invariance or pole-zero mapping; development of digital PID controllers, deadbeat controllers, and discrete-time state-variable feedback controllers; describing functions and limit cycles for nonlinear control systems; and the development of linear controllers for nonlinear systems using describing function techniques.

## 48561

### Power Electronics

*EE, BEBA BEBBus*
*6cp; prerequisite: 48530 Circuit Analysis*
*Fields of practice: Electrical Engineering Program*

The objectives of this subject are to enable students to: acquire reasonable proficiency in power electronics and its applications; gain confidence and expertise in the use of power semiconductor devices; have some understanding of rigorous analysis using computer simulation of real power electronic systems; be aware of the electromagnetic interference problems associated with power electronic systems and how these problems can be overcome; be aware of the inter-disciplinary nature of power electronics; be aware of the enormous potential this area has for development and exploitation; learn how to evaluate whether one has the skills to undertake a specific design or analysis task and, if not, how to build up the required skill level; be aware of good and bad practice in problem solving and learn the art of improving on practice whenever a weakness is revealed; develop validation strategies that enable one to have sufficient confidence to analyse one's own readiness to accept professional responsibility for conclusions reached; be aware of the importance of continually seeking improved analytical methods and computational tools that will give results more expeditiously and with reduced chance of errors; have a clear conceptual understanding of the difference between real practical systems and the models that are used to represent them.

Topics include: external characteristics, operation and gate drive circuit design of modern power semiconductor devices; protection circuits and thermal design for power devices; power conversion circuits including rectifiers, choppers, inverters, and cycloconverters; pulse-width modulation techniques; harmonic and voltage control of inverters; applications such as switch-mode power supplies, dc drives, ac drives, UPS systems, HVDC; recent advances in device technology; using microcontroller for power electronic applications; EMC and electromagnetic interference in power electronics; use of linear electronics for control of power electronic systems.

## 48570

### Data Acquisition and Distribution

*CSE, EE, BE (CSE, EE), BA*
*6cp; prerequisites: 48540 Signals and Systems (EE); 48441 Introductory Digital Systems (CSE)*
*FIELDS OF PRACTICE: ELECTRICAL ENGINEERING PROGRAM*

#### *Objectives*

By the end of this subject students should be able to:

- Analyse, design, build and test:
- Data Acquisition and Distribution Systems (DADS)
- Measurement Systems
- Intelligent Instrumentation Systems
- Characterise, specify and select to satisfy the requirements of a DADS:
- Sensors/transducers and associated circuits
- Transducer analog interfacing and signal conditioning circuits
- Data conversion devices and systems
- Interface DADS to computers, plant and installations
- Write, test and embed Control and Programming Software for DADS interfacing

Material to be taught and learnt:

- Applications, requirement specifications and typical architectures of DADS;
- General performance characteristics of DADS components and subsystems;
- Physical principles and design fundamentals of sensors and transducers;
- Mechanical, temperature, pressure, flow-rate, level transducers and applications;
- Optoelectronic transducers and applications;
- Transducer analogue interfacing;
- Precision Amplifiers and Low-level signal conditioning;
- Noise, Guarding and Shielding in Instrumentation Systems;
- Data conversion devices and systems;
- DADS design; Time and error budget of DADS.
- Computer structures for DADS;
- DADS interfacing to computers and control software;
- Intelligent Instrumentation Systems; Data integrity.

## 50140

### Modernisation and Social Change

*Offered by the Faculty of Humanities and Social Sciences*
*8cp; 4hpw*

The aim of this subject is to provide students with an understanding of the processes of modernisation and social change in a comparative context using case studies in countries of Western Europe, Latin America, East and South-East Asia. The lectures will highlight a number of key issues, for example whether the processes of social change are universal or specific; the consequences of modernisation in and for the economy, politics, society, culture and ideology of non-Western societies; and whether the established Eurocentric analytical models are still useful in understanding the modern world. It will be emphasised that differing interpretations of modernisation flow from various relations of power which lead to a multiplicity of views on its meanings and significance.

There are no prerequisites for this subject.

## 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.

## 70105

### Legal Research

*4cp*

This subject aims to familiarise students with the basic tools available to engage in legal research. It includes an introduction to various paper-based resources (citations, digests etc.).

Students are also introduced to the use of computerised systems as an aid to legal research. The emphasis is on Internet-based systems such as AustLII, Scale Plus and Butterworths Online. CD-ROM products are also briefly covered.

**Text**

Watt R J, *Concise Legal Research*, Federation Press

## 70113

### Legal Process and History

*10cp*

This subject aims to introduce students to, and to provide students with, a sound working knowledge of the Australian legal and constitutional environment. The subject also aims to equip students with certain legal skills – in particular, the skills of case analysis, statutory interpretation, legal problem solving and critical analysis – which are essential to the study and practice of the law. Students will be asked to consider what is law, who makes law, and how and why the law has developed in the way that it has. They will also examine the institutions that make up our legal system – the legislature, the Crown and the executive, the courts and the 'legal players' (the judge, the jury and the legal practitioner) – and explore the principles and doctrines that underpin our legal system. Further, they will be asked to consider why our legal system is so different from that of some of our regional neighbours, and to evaluate the strengths and weaknesses of the common law legal system. Valuable insight into the way our legal system operates may be gained through using a historical approach, and this means delving back into English, as well as Australian, legal and constitutional history. Such an approach also facilitates refinement of critical analysis skills. At the end of the subject, students should have a fully developed understanding of the Western legal tradition, the place of common law in that system, and the ramifications of living under a Westminster Parliamentary system as well as a federal system.

**Texts and references**

Derham D, Maher K F, Waller L, *An Introduction to Law*, Law Book Company, 1991

Morris G et al, *Laying Down the Law*

Parkinson P, *Tradition and Change in Australian Law*

## 70211

### Law of Contract

*8cp; prerequisite: 70113 Legal Process and History; corequisites: 70217 Criminal Law; 70105 Legal Research*

This subject deals with the legal principles related to when promises are binding, the difficulties arising out of their interpretation, how they may become defeasible, issues relating to their performance, and how they may be discharged. Topics covered include the formation of contracts (agreement, consideration, terms); vitiating factors (capacity, mistake, misrepresentation, illegality, duress, undue influence, unconscionability); discharge by performance and non-performance of contractual obligations (breach and frustration); and contractual remedies.

**Texts and references**

Carter J W &Harland D J, *Cases and Materials on Contract Law in Australia*, 3rd edn, Butterworths, 1998

Carter J W &Harland D J, *Contract Law in Australia*, 4th edn, Butterworths, 1997

Cheshire & Fifoot, *Law of Contract*, 7th Aust. edn, 1997

Greig D & Davis J, *The Law of Contract*, 1987, and Fifth Supplement, Law Book Company, 1993

Monahan, *Essential Contract Law*, Carslaw Publishing, 1997

## 70217

### Criminal Law

*6cp; corequisites: 70113 Legal Process and History; 70105 Legal Research*

The subject deals with the substantive criminal law, the doctrines and rules that define the conditions of criminal liability and some aspects of the procedural law. Australian common law doctrine and the *Crimes Act 1900* (NSW) are considered. Topics include the nature of crime; the doctrine of *mens rea* and *actus reus*; presumption of innocence; offences against the person; property offences; strict

liability; complicity; criminal defences; criminal investigation and procedure; and drug law.

**Texts and references**

*Crimes Act 1900* (NSW)

Fisse B (ed.), *Howard's Criminal Law*, 5th edn, Law Book Company, 1990

Gillies P, *Criminal Law*, 3rd edn, Law Book Company, 1993

Helipern D & Yeo S, *Cases on Criminal Law*, Law Book Company, 1995

Waller L & Williams C R, *Criminal Law: Text and Cases*, 8th edn, Butterworths

Brown D, Farrier D & et al, *Criminal Law*, 2nd edn, Federation Press, 1996

## 70311

### Law of Tort

*8cp; prerequisite: 70113 Legal Process and History; corequisites: 70105 Legal Research; 70217 Criminal Law*

This subject discusses the functions and aims of the tort. It then examines the nature of tortious liability in the light of a selection of specific torts, namely, trespass to the person, goods and land; the action on the case for wilful injuries; conversion; negligence; nuisance; and defamation. Reference is also made to defences, vicarious liability and contribution between tortfeasors.

Attention is drawn to the relevance of the type of conduct complained of (intentional, reckless, careless); the nature of the various interests protected (personal security, chattels, land, reputation, economic interests, domestic relations); the adaptability of tort law to changing needs and values of society (thus the introduction, dominance and current perceived limitations of the fault concept); and the element of policy expressed or implied in judicial decisions.

**Texts and references**

Balkin R P & Davis J L R, *Law of Torts*, Butterworths, 1996

Fleming J G, *The Law of Torts*, 8th edn, Law Book Company

Trindade F & Cane P, *The Law of Torts in Australia*, 2nd edn, Oxford University Press

Gardiner D, *Outline of Torts*, Butterworths

Luntz H & Hambly A D, *Torts: Cases and Commentary*, 3rd edn, Butterworths, 1995

Morison W L & Sappideen C, *Torts, Commentary and Materials*, 8th edn, Law Book Company

## 70317

### Real Property

*8cp; prerequisite: 70211 Law of Contract; corequisite: 70311 Law of Tort*

Topics covered include agreements for sale of land; time for completion; Torrens title and priorities; old system, possessory, qualified and limited title; fixtures; trespass to land; co-ownership; easements; covenants; mortgages; and leases.

**Texts and references**

Butt, *Land Law*, 3rd edn, Law Book Company

*Conveyancing Act 1919* (NSW)

Land & Skapinker, *Sale of Land*, 3rd edn, Longmans

*Real Property Act 1900* (NSW)

Sappideen C & ors, *Cases and Materials on Real Property*, 3rd edn, Law Book Company

## 70318

### Personal Property

*4cp; prerequisite: 70211 Law of Contract; corequisite: 70311 Law of Tort*

Topics covered include classifications of personal property, choses in action and choses in possession; acquisition of title to goods; law of bailment; insurance; securities interests in chattels; and law of negotiable instruments, with particular reference to cheques.

**Texts**

Helmore B A, *Commercial Law and Personal Property in NSW*, 10th edn, by Carter J W et al, Law Book Company, 1992

## 70417

### Corporate Law

*8cp; corequisite: 70317 Real Property*

The response of the law to the activities of business entities is dealt with in this subject. Although the emphasis is on corporations, there will be a brief discussion of the manner in which non-corporate entities including partnerships are regulated. The study of corporations law will include an overview of the historical developments, the current method of regulation and the proposals for reform.

**Texts and references**

Ford H A J, Austin R P and Ramsay I M, *Principles of Corporations Law*, Butterworths, 1997

Redmond P, Corporations Law – *Cases and Materials*, Law Book Company, 1992

Tomasic R & Bottomley S, *Corporations Law in Australia*, Federation Press, 1995

## 70516

### Equity and Trusts

*8cp; prerequisite: 70317 Real Property; corequisite: 70417 Corporate Law*

Equity is a body of rules or principles which form an appendage to the general rules of the common law. The doctrines of equity developed as a response to defects in the English common law system which had resulted in rigidity and inflexibility. A knowledge of the principles of equity is therefore crucial to a complete understanding of the law in those areas of private law, particularly property and contract, where equity intervened to modify the operation of the rules of the common law. In that sense the doctrines of equity form part of the law of contract or property. Equity also developed remedies, such as the injunction, which were unknown to the common law and which have a continuing influence in public law as well as private law.

**Texts and references**

Chalmers D, *Introduction to Trusts*, Law Book Company, 1988

Evans M B, *Outline of Equity and Trusts*, Butterworths, 1988

Ford H A J & Lee W A, *Principles of the Law of Trusts*, 2nd edn, Law Book Company, 1990

Heydon J D, Gummow W M C & Austin R P, *Cases and Materials on Equity and Trusts*, 3rd edn, Butterworths, 1989

Meagher R P & Gummow W M, *Jacobs' Law of Trusts in Australia*, 5th edn, Butterworths, 1986

Meagher R P, Gummow W M C & Lehane J R F, *Equity: Doctrines and Remedies*, 3rd edn, Butterworths, 1992

## 70616

### Federal Constitutional Law

*8cp; prerequisites: 70113 Legal Process and History; 70105 Legal Research; corequisite: 70211 Law of Contract*

This subject examines the effect of the Australian Constitution on the legal and fiscal relationship of the Commonwealth and States. In order that students develop an understanding of the techniques of judicial review in the constitutional context, a range of powers given to the Commonwealth is examined. These include trade and commerce, corporations, taxation, and external affairs. Other areas examined are explicit and implicit restrictions of power, the questions of inconsistency and intergovernmental relations. The general role of the High Court in Australian constitutional law is considered along with the Separation of Powers Doctrine as it relates to the independence of the Judiciary.

**Texts and references**

Booker K, Glass A & Watt R, *An Introduction to Australian Federal Constitutional Law*, Butterworths, 1994

Blackshield T, Williams G & Fitzgerald B, *Australian Constitutional Law Theory: Commentary and Materials*, Federation Press, 1996

## 70617

### Administrative Law

*8cp; prerequisite: 70616 Federal Constitutional Law*

This subject deals with the supervision of the executive arm of government by the courts and by other statutory mechanisms. Topics include the grounds of review of administrative decisions, in particular natural justice; *ultra vires*; jurisdictional error and error of law; remedies available at common law upon judicial review, including the prerogative writs and equitable remedies; judicial review under the *Administrative Decision (Judicial Review) Act 1976* (Cwlth); a review of Commonwealth decisions under the *Administrative Appeals Tribunal Act 1976* (Cwlth); and the role and function of the Ombudsman. If time permits, freedom of information and privacy legislation will also be touched upon, and the role of the Independent Commission Against Corruption (ICAC).

**Texts and references**

Sykes E L, Lanham D J, Tracey R R S, Esser K W, *General Principles of Administrative Law*, 4th edn, Butterworths, 1997

Allars M, *Australian Administrative Law: Cases and Materials*, Butterworths, 1997

Douglas R, Jones M, *Administrative Law: Commentary and Materials*, 2nd edn, Federation Press, 1996

Ellis-Jones I, *Essential Administrative Law*, Cavendish, 1997

## 71005

## Practice and Procedure

*4cp; corequisite: 70516 Equity and Trusts*

Practice and Procedure is a core subject that develops the students' understanding of the process of litigation from the commencement of proceedings through to the final hearings. Topics include statements of claim in contracts and torts; defence, cross claims and replies; equitable proceedings; particulars; discovery, inspection and interrogatories; notice of motion; drafting affidavits; subpoenas; and advocacy skills.

## 71116

## Remedies

*6cp; corequisite: 70516 Equity and Trusts*

This subject deals with the range of court-ordered remedies available to a plaintiff in civil proceedings. The more common remedies are those administered at either common law or in equity: damages; equitable remedies (declarations, specific performance, injunctions, Anton Pillar orders, account, equitable damages); and statutory and common law remedies for deceptive conduct. Bankruptcy and insolvency will also be considered.

**Texts and references**

Covell W & Lupton K, *Principles of Remedies*, Butterworths, 1995

Tilbury M J, *Civil Remedies*, Vols I & II, Butterworths, 1990 and 1993

Noone M & Kercher B, *Remedies: Commentary and Materials*, 2nd edn, Law Book Company, 1993

## 71216

## Law of Evidence

*6cp; prerequisite: 70516 Equity and Trusts*

This subject deals with adjectival law and the determination of how information may be presented to the court in litigation, when such information will be admissible in evidence, and how the rules of proof are applied. The inclusionary rule of relevance, the various exclusionary rules (such as hearsay, opinion, tendency, coincidence, credibility, character, privilege), and the judicial discretion to exclude will be studied, as well as the incidence of the burden of proof.

**Texts and references**

Aronson M et al, *Litigation: Evidence and Procedure*, 6th edn, Butterworths, 1998

Australian Law Reform Commission, *Evidence*, ALRC Reports Nos 26 (Interim, two vols, 1985) and 38 (1987)

Brown R, *Documentary Evidence in Australia*, 2nd edn, Law Book Company, 1996

Buzzard J H, May R, Howard M N, *Phipson on Evidence*, 14th edn, Sweet & Maxwell, 1990

Byrne D & Heydon J D, *Cross on Evidence*, 5th Aust. edn, Butterworths, 1996

Byrne D & Heydon J D, *Cross on Evidence*, loose-leaf, Butterworths

Campbell E & Waller L, *Well and Truly Tried: Essays on Evidence*, Law Book Company, 1982

Forbes J R S, *Similar Facts*, Law Book Company, 1987

Gillies P, *Law of Evidence in Australia*, 2nd edn, Legal Books, 1991

Glass H H (ed.), *Seminars on Evidence*, Law Book Company, 1975

Heydon J D, *A Guide to the Evidence Act 1995* (Cwlth) and (NSW), 2nd edn, Butterworths, 1997

Ligertwood A, *Australian Evidence*, 2nd edn, Butterworths, 1993

Ligertwood A, *Australian Evidence: Cases and Materials*, Butterworths, 1995

McNicol R, *Law of Privilege*, Law Book Company, 1992

Odgers S, *Uniform Evidence Law*, 2nd edn, Federation Press, 1997

Waight P K & Williams C R, *Evidence: Commentary and Materials*, 5th edn, Law Book Company, 1998

Wellman F, *The Art of Cross-Examination*, 4th edn, Collier Books, 1936

Wells W A N, *Evidence and Advocacy*, Butterworths, 1988

Wigmore J H, *Evidence in Trials at Common Law*, Boston, 1961

Zariski A (ed.), *Evidence and Procedure in a Federation*, Law Book Company, 1993

### 79991

### Complex Forensic Cases (Law)

*Offered by the Faculty of Law*
*6cp; 6hpw; corequisite: 65743 Complex Forensic Cases (Chemistry)*

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.

# INTERNATIONAL STUDIES SUBJECTS

Students enrolled in the combined **Bachelor of Science/Bachelor of Arts in International Studies (N004)** will study a major – a country or region of specialisation – as part of their degree. In 1999, the following majors are offered through the Institute for International Studies: Argentina, Australia and the Asia–Pacific Region, Chile, China, Croatia, France, Germany, Greece, Indonesia, Italy, Japan, Latin America, Malaysia, Mexico, Poland, Russia, Slovenia, South China, South-East Asia, Spain, Taiwan, Thailand and Ukraine. These majors will be taken in conjunction with one of the following Contemporary Society subjects: Contemporary China, Contemporary Europe, Contemporary Japan, Contemporary Latin America, or Contemporary South-East Asia. As part of the combined degree students will also enrol in In-country Study 1 and In-country Study 2 for the duration of their study at an institution of higher education in the country or region of their major.

For more information about International Studies subjects, please refer to the *1999 Institute for International Studies Handbook.*

Students enrolled in Bachelor of Health Science in Acupuncture/Bachelor of Arts in International Studies (NH01) will study the following International Studies subjects.

### 971111, 972111, 973111, 974111

### Chinese Language and Culture

*Offered by the Institute for International Studies*
*8cp per subject*

This program is open to students who are either complete beginners, who first learnt Chinese at secondary school level in Australia or who already have a working knowledge of Chinese characters and communicative competence in a Chinese language other than Modern Standard Chinese. There are three points of entry into this program: Chinese 1 for complete beginners, Chinese 3 for students who have successfully completed HSC 2/3-unit Chinese and Chinese 7 for students who have a working knowledge of Chinese characters as well as communicative competence in a Chinese language other than Modern Standard Chinese. Students take four consecutive units in the program, usually either units 1–4, 3–6 or 7–10, determined by their point of entry. Other programs may be negotiated according to the student's level of proficiency.

The Chinese language program is designed to provide students with the communicative skills necessary to undertake In-country Study in China. A communicative approach is adopted for classroom instruction and students are expected to participate fully in class activities in the process of acquiring practical language skills. The teaching incorporates an introduction to Chinese culture and helps students to appreciate the wider cultural ramifications of Chinese in various contexts. The program will lay a solid foundation for further cultural studies in Chinese.

In exceptional circumstances, students with advanced skills in Chinese will be excluded from the Chinese Language and Culture program and will be required to substitute other appropriate subjects from the List of Approved Substitute Subjects. These subjects may be other subjects on offer in the International Studies program, including those relating to the study of Contemporary Society or those focusing on another Language and Culture. For details of substitute subjects, see the List of Approved Substitute Subjects section of the*1999 Institute for International Studies Handbook*. Students interested in studying classical Chinese or Chinese at a level not currently offered at UTS should inquire at the Institute about the possibility of undertaking Chinese subjects offered at other institutions. Students will need to obtain the approval of the Board of Studies of the Institute before they can vary any of their subjects of study in the International Studies program.

Further descriptions of each subject can be found in the Language Studies section of *1999 Institute for International Studies Handbook.*

## 976111

### Contemporary China

*Offered by the Institute for International Studies 8cp; 4hpw*

This subject examines the contours and dynamics of social, political and economic changes in the People's Republic of China since the death of Mao Zedong and the start of the reform era. A central theme is the emerging relationship between state and society in a state socialist system in the process of change and reform. It is an introductory subject that requires no prior knowledge of the People's Republic of China or of any Chinese language.

## 977111

### In-country Study 1: China

*Offered by the Institute for International Studies 24cp; prerequisite: completion of 4 semesters of study in the International Studies program*

## 978111

### In-country Study 2: China

*Offered by the Institute for International Studies 24cp; prerequisite: 977111 (above)*

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Open Space Management 91225
Organic Chemistry 1 65202
Organic Chemistry 2 (Structure Elucidation and Synthesis) 65508
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Palaeobiology Part I 66942
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Pathophysiology 1 91520
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People and the Physical Environment 69335
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Pharmacognosy 99580
Pharmacology 1 91707
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Philosophy, Religion and Culture 99530
Physical Chemistry 1 65307
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Physical Evidence 1 65541
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Physical Metallurgy 67304
Physical Modelling 68036
Physical Optics 68602
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Physiological Foundations of Health 1 91518
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Physiology of *Qi*, The 99564
Plant Genetics and Breeding 91271
Plant Pathology 91237
Plant Physiology 91270
Plant Production and Growth Media 91233
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Pollution Assessment 98718
Polymer Science 67305
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Power Electronics 48561
Power Systems 48550
Practice and Procedure 71005
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Principles and Practice of Biotechnology 91325
Principles of Botany 99601
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Principles of Pharmacognosy 99602
Processing of Seismic Reflection and Ground Penetrating Radar Data 66954
Professional Experience (Biol/Biom) F/T 91997
Professional Experience (Biol/Biom) P/T 91999
Professional Scientific Practice A 60811
Professional Scientific Practice B 60812
Professional Writing and Communication 51389
Project (Honours) 68858
Project Workshops 99542
Psychology of Secondary Students 023001
Psychophysiology 91708
Public Administration and Management 98703
*Qi Gong:* Its Use in Acupuncture 99543
Quantum and Solid State Physics 68511
Quantum Physics 1 68401
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Special Reading Assignment P/G – Life Sciences 91498
Special Reading Assignment – Life Sciences 91398
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Special Topics in TCM (Intermodal and Professional) 99590
Statistical Design and Analysis 33106
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| Technology and Innovation Forum | 68515 |
| Technology Assessment | 48270 |
| Technology, Society and Change | 95556 |
| Tectonics and Surface Dynamics | 66509 |
| Terrestrial Ecosystems | 91306 |
| Therapeutic Techniques and *Tuina* (Chinese Massage) | 99555 |
| Thermodynamics and Energy | 68403 |
| Topics in Coastal Management | 98707 |
| Tourism, Recreation and Natural Resource Management | 98204 |
| Toxic Materials in the Environment | 91347 |
| Transfusion Science | 91340 |
| Uncertainties and Risks in Engineering | 48240 |
| Undergraduate Research Project | 91283 |
| Urban Stormwater Management | 98709 |
| Uses of Australian Plants | 91234 |
| Vacuum and Thin Film Physics | 68405 |

# Boards and committees

## FACULTY BOARD IN SCIENCE

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Professor A R Moon (Chair)

Associate Dean (Coursework Programs)
Associate Professor R T Buckney

Associate Dean (Research)
Professor E C Leitch

Alternate Dean
Dr A Piper

Faculty Administrator
Ms H M Juillerat

Faculty Technical Manager
Mr D Edwards

Head, Department of Applied Physics
Ms S W Hogg

Head, Department of Cell and Molecular Biology
Associate Professor K Broady

Head, Department of Chemistry, Materials and Forensic Science
Professor M A Wilson

Head, Department of Environmental Sciences
Associate Professor C G Skilbeck

Head, Department of Health Sciences
Associate Professor P Miller

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Professor A M Johnson
Professor R L Raison
Professor G B Smith

### Nominated members

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Faculty of Engineering

Dr T Langtry
Faculty of Mathematical and Computing Sciences

Ms J Forbes
Faculty of Nursing

Associate Professor E Hazel
Centre for Learning and Teaching

Ms S Scholfield
University Library

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Dr D M Cobbin
Dr K Cordatos
Ms L A Evans
Dr E Frankel
Dr A George
Dr D C Green
Dr G L Heness
Dr K A Johnson
Associate Professor P F Logan
Dr D Morrison
Dr U Munro
Ms A Pulkownik
Dr P Ralph
Associate Professor C Rogers
Dr A Simpson
Dr R J Sleet
Dr I M Stevenson
Dr J C Swann
Dr J Tarran
Dr W Y Yeung

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Mr A J Buttenshaw
Mrs G Goldsack
Mr R I Hayes
Mr J Phillips
Mr M Rosenbaum
Mr A Rubel
Ms M A Stevens

### Student members

Mr B Goeldi
Mr S A King
Mr S Whitfield
Ms K Gill

### 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 forwarded 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 profession(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

Professor A R Moon
Dean, Faculty of Science

Associate Professor R T Buckney
Associate Dean (Coursework Programs)

Professor M A Wilson
Head, Department of Chemistry, Materials and Forensic Science

Dr C Roux
Course Coordinator – Forensic Science
Department of Chemistry, Materials and Forensic Science

### External members

Mr A E Hodda
Deputy Director, Division of Analytical Laboratories, The Institute of Clinical Pathology & Medical Research (ICPMR)

Dr C J Lennard
Director, Scientific Unit, Forensic Services, Australian Federal Police

Dr M A Raymond
Director, Forensic Services Group, New South Wales Police Services

Dr J Robertson
Assistant Secretary, Forensic Sciences Division, Australian Federal Police

Dr A Ross
Director, National Institute of Forensic Science

Mr Z Skopec
Director, Australian Forensic Drug Laboratory (AFDL)

## Course Advisory Committee in Cell and Molecular Biology

### Internal members

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Dean, Faculty of Science

Associate Professor R T Buckney
Associate Dean (Coursework Programs)

Associate Professor K Broady
Head of Department

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Principal Research Scientist, Biotech Australia

Mr L Chia
Regional Customer Support Manager, Abbott Diagnostics Division

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Dr A Fletcher
Head, Department of Cell Biology, Red Cross Blood Transfusion Service

Dr K Hopper
Director, Aoris Nova Pty Ltd

Dr J Isbister
Head, Department of Haematology, Royal North Shore Hospital

Dr M Meerkin
Chief Executive Officer and Managing Pathologist, Sugerman's Pathology Pty Ltd

Dr P Molloy
Research Scientist, CSIRO Division of Biomolecular Engineering

Associate Professor D Naidoo
Director of Clinical Chemistry, The Prince of Wales Hospital

Dr R Pritchard
Head, Department of Microbiology, Royal North Shore Hospital

## Course Advisory Committee in Chemistry

### Internal members

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Associate Professor R T Buckney
Associate Dean (Coursework Programs)

Professor M A Wilson
Head of Department

Associate Professor A T Baker
Associate Professor G P Norton
Associate Professors in Chemistry

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Dr G Batley
Chief Research Scientist, Centre for Advanced Analytical Chemistry, CSIRO Division of Coal and Energy Technology

Dr J Crass
Laboratory Technology and Food Processing, Bankstown College of TAFE

Mr G Livanos
QA Manager, Stafford Miller

Dr F Mitchell
Asset Management, TransGrid

Mr R Mooney
AMDEL Laboratories Ltd

Mr G Paul
Hardman Australia

Mr D Waters
Manager, SPECT Production, National Medical Cyclotron, ANSTO

## Course Advisory Committee in Environmental Biology and Horticulture

### Internal members

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Associate Professor C G Skilbeck
Head of Department

Associate Professor K Brown
Associate Professor in Environmental Biology

Dr U Munro
Lecturer

Mr J Renwick
Lecturer

Dr K A Johnson
Lecturer

Ms A Pulkownik
Lecturer

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School of Biology, University of New South Wales

Ms L Brodie
Bushland Management Officer, National Trust of Australia (NSW)

Dr C Grant
Executive Director, Environment, Planning and Estate Management, Olympic Coordination Authority

Mr R Grimwade
Director, Centennial Park and Moore Park Trust

## Course Advisory Committee in Earth and Environmental Science

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Associate Professor R T Buckney
Associate Dean (Coursework Programs)

Associate Professor C G Skilbeck
Head of Department

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CSIRO, Division of Petroleum Resources

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Consultant

Mr J N Cramsie
Director, Geological Survey NSW, Department of Mineral Resources

Dr J Hunt
Senior Project Manager, Environment, Major Projects Group, ADI Limited

Mr R N Lees
Managing Director, Michelago Resources N L

Mr M Smith
General Manager, Exploration, Austpac Gold N L

Mr P Southwell
Chief Geoscientist, Exploration Department, Cultus Petroleum

## Course Advisory Committee in Health Sciences

### Internal members

Professor A R Moon
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Associate Professor R T Buckney
Associate Dean (Coursework Programs)

Associate Professor P Miller
Head of Department

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Associate Professor J Duke
Faculty of Nursing, Royal Melbourne Institute of Technology

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Clinical Nurse Consultant, HIV/Infection Control, Department of Microbiology, Royal North Shore Hospital

Dr L Oliver
Chief Physicist, Department of Clinical Oncology, Royal North Shore Hospital

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Senior Lecturer, Acupuncture Course Coordinator, Victoria University of Technology

## Course Advisory Committee in Materials Science

### Internal members

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Dean, Faculty of Science

Associate Professor R T Buckney
Associate Dean (Coursework Programs)

Professor M A Wilson
Head of Department

Dr A Ray

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Thomson Marconi Sonar Pty Ltd

Mr J Byrnes
Consultant

Dr R Grant (Chair)
Development Chemist, Dow Corning Australia Pty Ltd

Mr I Johnson
Marketing Development Manager, ICI

Ms J Liston
Principal Packaging Technologist, Unifoods

Dr D Taylor
Managing Director, Taylor Ceramic Engineering

## Course Advisory Committee in Occupational Health and Safety

### Internal members

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Associate Professor R T Buckney
Associate Dean (Coursework Programs)

Associate Professor P Miller
Head of Department

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Senior Lecturer

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Member Federal Safety Education Committee, Safety Institute of Australia

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Senior Occupational Health Nurse Adviser, Workcover Authority of NSW

Ms S Kidziak
Principal Consultant Occupational Health, Safety and Environment, Chamber of Manufacturers of NSW

Ms D Nalty
Rehabilitation Coordinator, Catholic Schools Office

## Course Advisory Committee in Physics

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Professor G B Smith
Professor of Applied Physics

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Dr J Warner
Fund Manager, First State Managed Investments

## Advisory Board of the Coastal Resource Management Unit

### Internal members

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Associate Dean (Coursework Programs), Faculty of Science

Professor R Robertson
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Mr S Wearing
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Cr R Bell
Gosford City Council Representative

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Environment Projects Manager, AWT

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Director of Planning and Development, NSW Tourism Commission

Mr P Mahoney
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Mr J Parsons
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Ms B Richardson
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Ms J Wall
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# Staff list

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*Scientific Officer*
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## City campus

***Broadway***

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

***Haymarket***

- Building 5
  Cnr Quay Street and Ultimo Rd, Ultimo

***Blackfriars***

- Cnr Blackfriars and Buckland Streets,
  Chippendale
- Blackfriars Childrens Centre
  Buckland Street, Chippendale

***Small Street***

- 3 Small Street, Ultimo

***Quay Street***

- 10 Quay Street, Sydney
- Prince Centre
- Cnr Quay and Thomas Streets

***Wembley House***

- 839–847 George Street, Sydney

***Harris Street***

- 645 Harris Street, Ultimo

***Student housing***

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

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  Eveleigh, NSW, 1430
  Telephone: 9209 4350
  Fax: 9209 4351

## Kuring-gai campus

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

## St Leonards campus

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

## Yarrawood conference and research centre

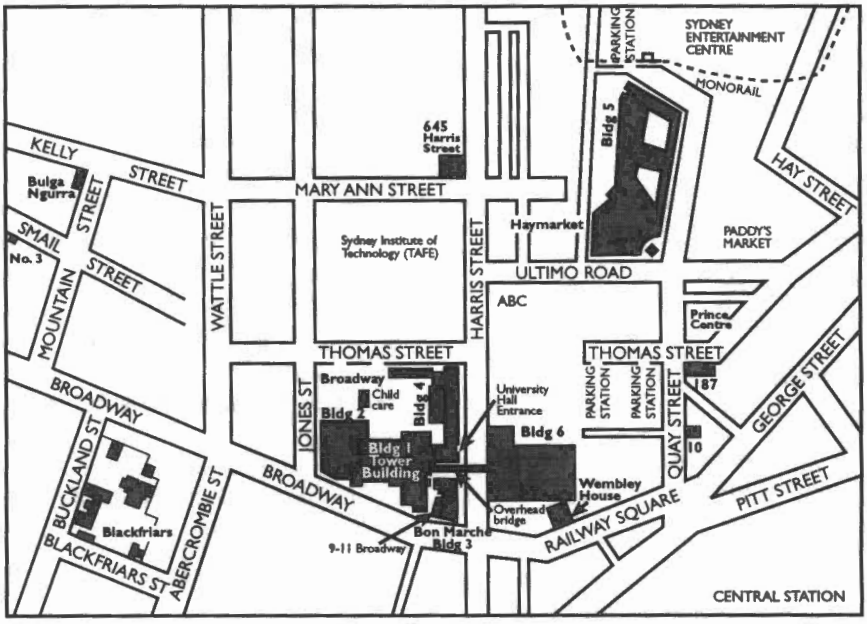
- 689 Springwood Road
  Yarramundi, NSW, 2753

## Stroud Field Station

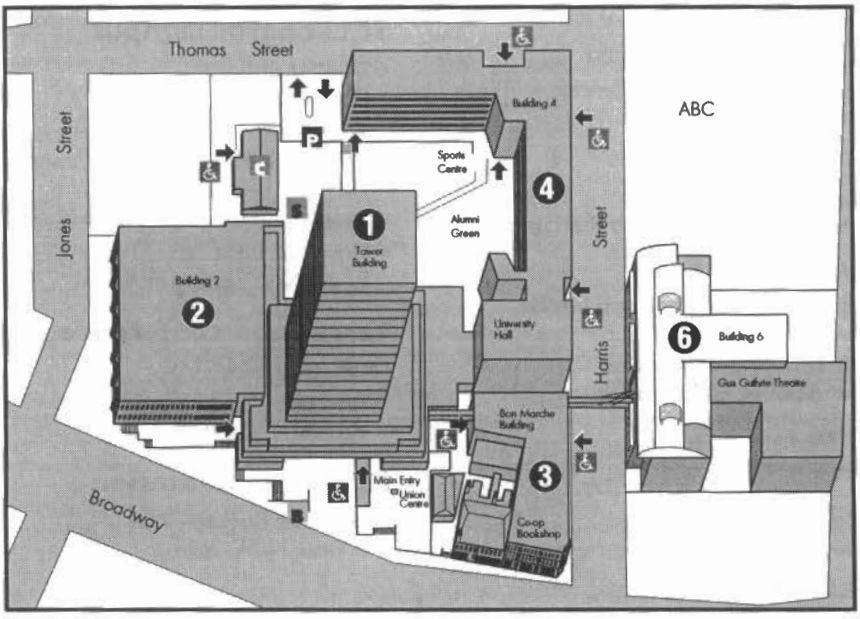
- 2605 The Bucketts Way
  Booral, NSW, 2425

# Maps

## City campus




## Broadway



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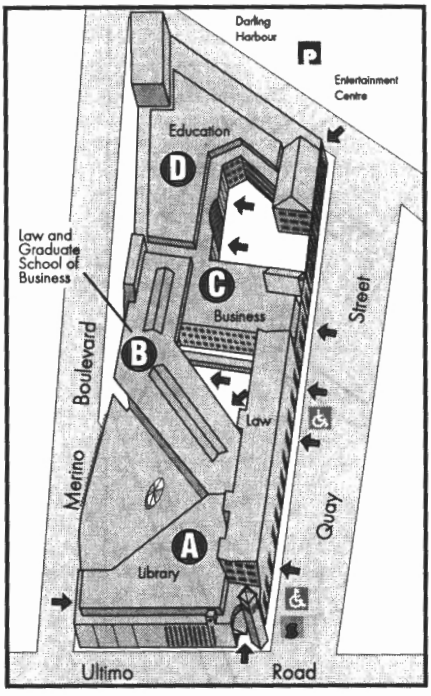
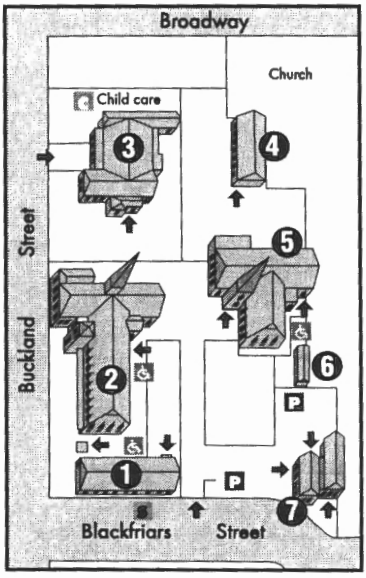


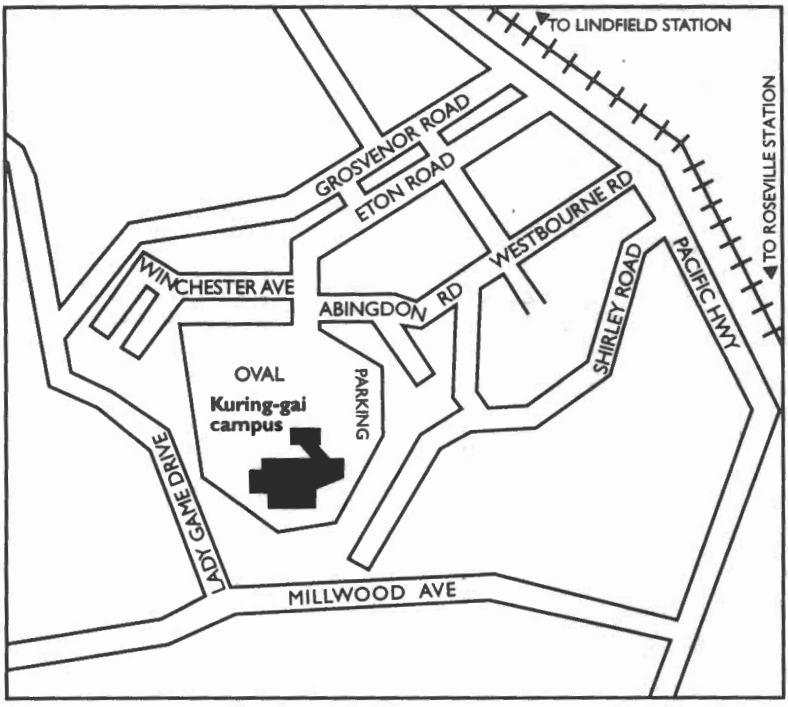

**KEY**

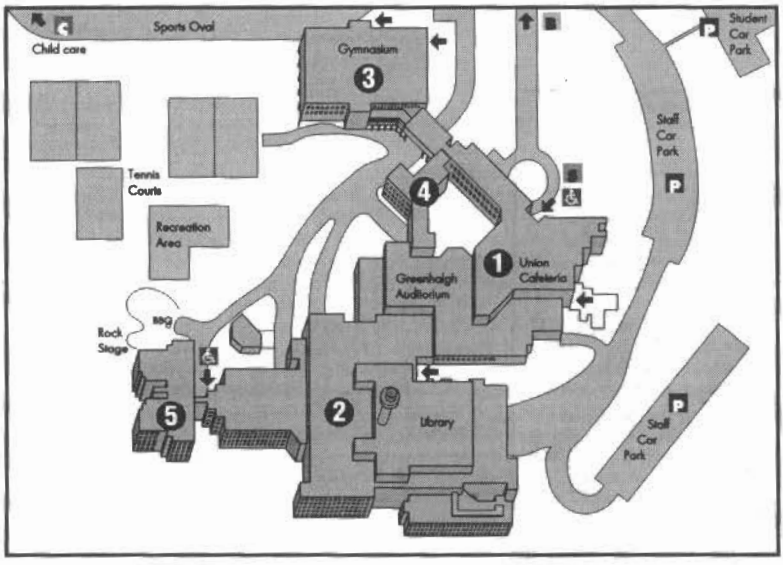
- Entry/Exit
- Disabled access
- Main bus stop
- UTS shuttle bus
- Parking
- Building numbers
- Child care

## Blackfriars

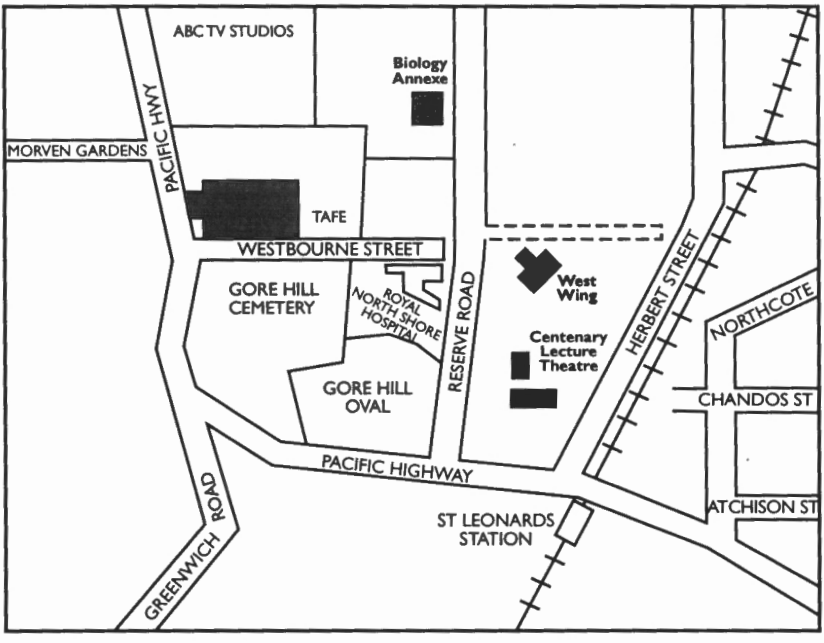


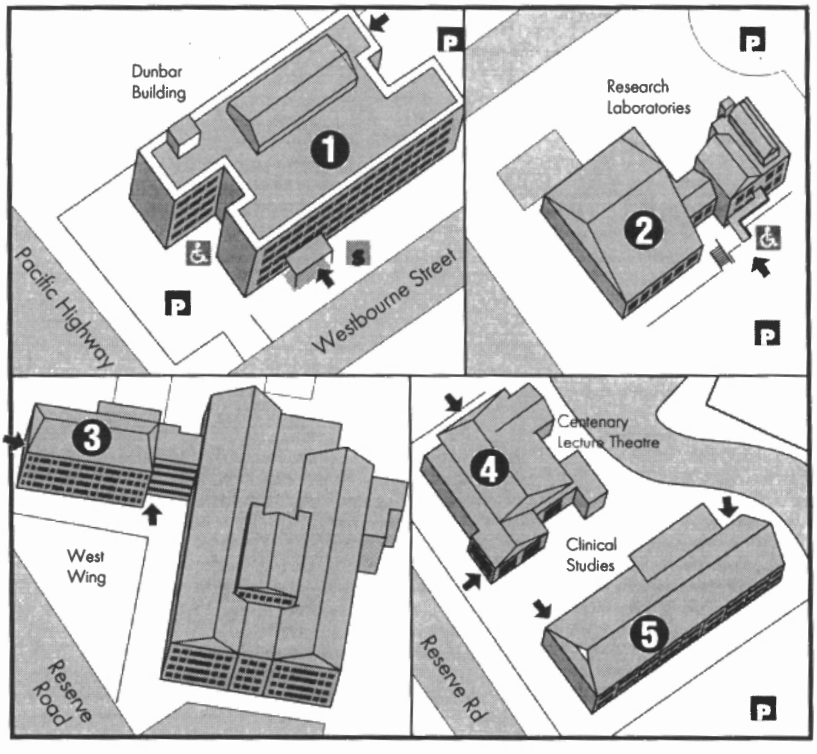
## Kuring-gai campus



## St Leonards campus



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