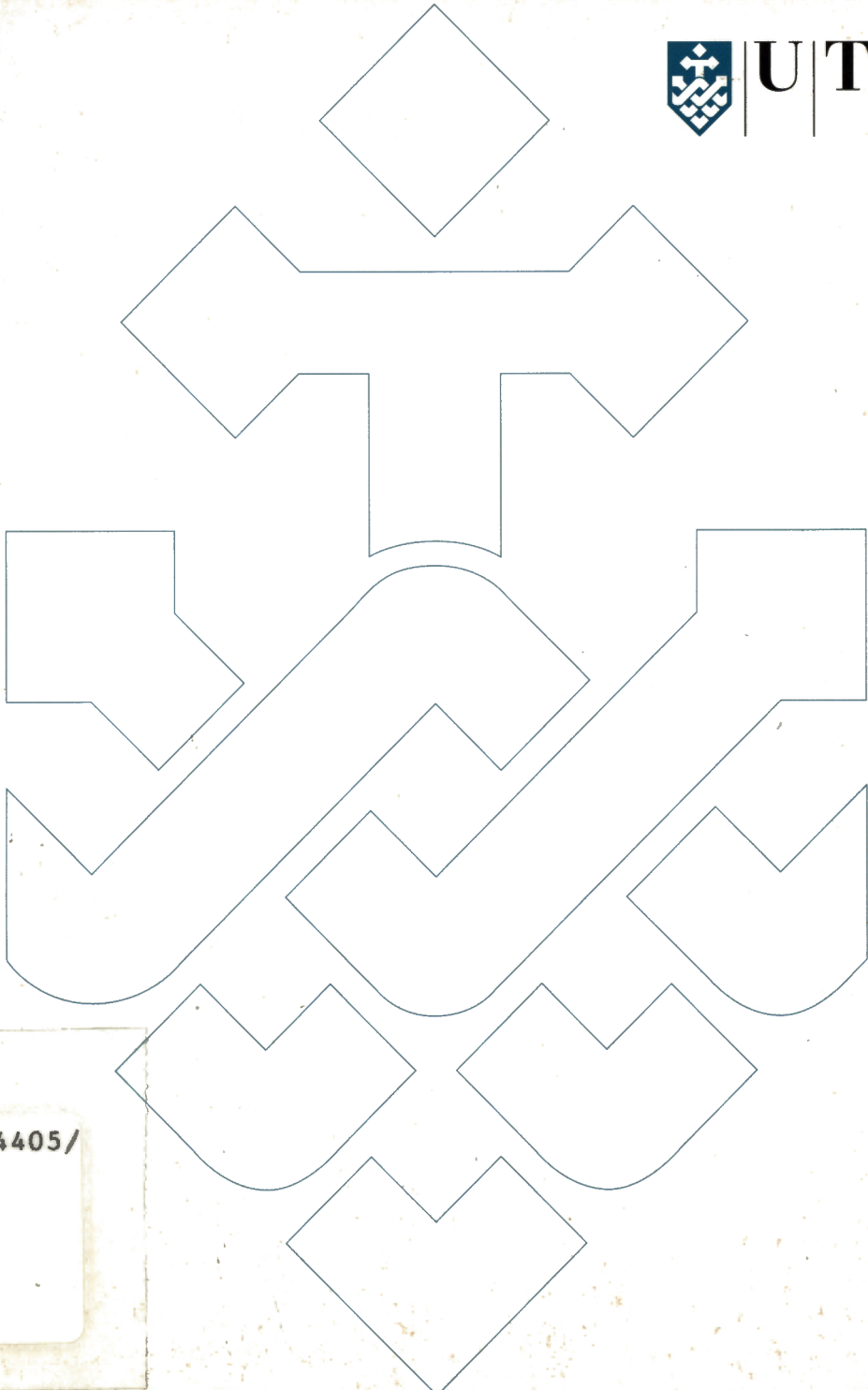


UNIVERSITY OF TECHNOLOGY, SYDNEY

Faculty of Science
HANDBOOK

2000



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UNIVERSITY OF TECHNOLOGY, SYDNEY

Faculty of Science HANDBOOK

2000

IMPORTANT YEAR 2000 NOTICE

The University of Technology, Sydney is taking all reasonable steps to identify and remedy any Year 2000 problems which might interfere with the courses and subjects it is proposing to offer during the Year 2000. Students and prospective students are advised that the University may still find it necessary in responding to any Year 2000 problem, to change the details of any course, subject, or class described in this or any other University publication. This could include not offering subjects in a particular teaching period, altering the mode of delivery for teaching, and changing assessment requirements. The University will endeavour:

- to confine such changes to the minimum necessary to address the Year 2000 problem
- to provide advance notice to students to the full extent possible, and
- where possible, to make other reasonable arrangements to minimise any disadvantage to students.

Students and prospective students should make appropriate inquiries to determine whether a course or subject has been affected by a Year 2000 problem by contacting the relevant Faculty Office.

DISCLAIMER

This publication contains information which was current at 20 August 1999. Changes in circumstances after this date may impact upon the accuracy or currency of the information. The University takes all due care to ensure that the information contained here is accurate, but reserves the right to vary any information described in this publication without notice. Readers are responsible for verifying information which pertains to them by contacting the Faculty or the UTS Information Service.

University of Technology,
Sydney. Faculty of Science
Handbook

Received on: 03-11-99

CITY CAMPUS

University of Technology,
Sydney Library

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 and Calendar

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

UTS Rules and Policies

<http://www.uts.edu.au/div/publications/policies/>

EDITORIAL AND PRODUCTION

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TABLE OF CONTENTS

GENERAL INFORMATION	5
Welcome	5
About the UTS Handbooks	5
Student inquiries	6
Applications	6
Fees and costs	6
HECS	7
Financial Help	8
UTS Library	8
Research Office	8
University Graduate School	9
Support for student learning	9
Equity and diversity	10
Other services	10
Principal dates for 2000	12
FACULTY INFORMATION	15
Message from the Dean	15
Faculty Mission Statement	15
Faculty of Science	16
Units within the Faculty	17
Centres	19
Information for Science students	21
Prizes and scholarships	27
List of courses and codes	32
International Studies electives	34
UNDERGRADUATE COURSES	35
Diploma in Scientific Practice	38
Bachelor of Science in Applied Chemistry	38
Bachelor of Science (Honours) in Applied Chemistry	41
Bachelor of Science (Honours) in Applied Chemistry – Forensic Science	41
Bachelor of Science in Materials Science	42
Bachelor of Science (Honours) in Materials Science	44
Bachelor of Science in Applied Physics	45
Bachelor of Science (Honours) in Applied Physics	47
Bachelor of Science in Applied Physics/Bachelor of Engineering in Electrical Engineering/Diploma in Engineering Practice	47
Bachelor of Health Science in Traditional Chinese Medicine	49
Bachelor of Health Science in Traditional Chinese Medicine (Honours)	50
Bachelor of Health Science in Acupuncture	50
Bachelor of Health Science in Acupuncture (Honours)	50
Bachelor of Health Science in Acupuncture/ Bachelor of Arts in International Studies	51
Bachelor of Health Science in Chinese Herbal Medicine	52

Bachelor of Medical Science	52
Bachelor of Medical Science/Bachelor of Arts in Human Movement Studies	54
Bachelor of Science (Honours)	55
Bachelor of Science in Biomedical Science	55
Bachelor of Science in Biotechnology	59
Bachelor of Science in Earth and Environmental Science	62
Bachelor of Science (Honours) in Geoscience	64
Bachelor of Science (Honours) in Environmental Science	64
Bachelor of Science in Environmental Biology	65
Bachelor of Science in Environmental and Urban Horticulture	69
Bachelor of Science/Bachelor of Laws	71
Bachelor of Medical Science/Bachelor of Laws	74
Bachelor of Science/Bachelor of Arts in International Studies	75
Bachelor of Science/Bachelor of Business	77
Bachelor of Medical Science/Bachelor of Business	78
Second majors	78
POSTGRADUATE COURSES	82
<i>Graduate Diploma</i>	82
Graduate Diploma in Hydrogeology and Groundwater Management	83
<i>Master's Degrees (by coursework)</i>	83
Master of Health Science in Traditional Chinese Medicine	84
Master of Occupational Health and Safety Management	84
Master of Occupational Health and Safety Management (Honours)	85
Master of Science in Hydrogeology and Groundwater Management	86
<i>Postgraduate Degrees by research/thesis</i>	87
SUBJECT DESCRIPTIONS	88
Subjects offered for Faculty of Nursing, Midwifery and Health students	131
Subjects offered by other faculties	132
International Studies subjects	150
ALPHABETICAL LIST OF SUBJECTS	152
BOARDS AND COMMITTEES	156
Faculty Board in Science	156
Course Advisory Committees	157
STAFF LIST	162
INDEX	169
UTS CONTACTS	175
MAPS	176

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 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 offers a range of undergraduate and 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, Midwifery and Health; 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. Courses developed and delivered by these UTS faculties reflect the University's commitment to providing a relevant education to students through flexible and work-based modes of learning and through the ongoing internationalisation of the curriculum.

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 information contained in the UTS Handbooks and Calendar is correct at the time of printing. However, UTS is continuously updating and reviewing courses and services to ensure that they meet the needs of students and industry, and as a result information contained in these publications may be subject to change.

For the latest information check with the information service, or on the website at:

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

STUDENT INQUIRIES

City campus

UTS Information Service
Foyer, Tower Building
1 Broadway

Postal address

PO Box 123
Broadway NSW 2007
telephone: (02) 9514 1222
fax: (02) 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: (02) 9514 1222
fax: (02) 9514 5032

International Programs

10 Quay Street, Sydney

Postal Address

PO Box 123
Broadway NSW 2007
telephone: (02) 9514 1531
fax: (02) 9514 1530

Email inquiries

International – intlprograms@uts.edu.au

World wide web address

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

APPLICATIONS

Undergraduate

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*, or the UAC website at: www.uac.edu.au

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 recent school leavers.

Postgraduate

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 about applying to study at UTS, contact the UTS Information Service.

International students

International students' 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 contact the International Programs Office.

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 appropriate faculty office or the UTS Information Service.

FEES AND COSTS

Service Fees

Service Fees are charged to students to contribute to the cost of a range of facilities and services which are generally available to all students during the course of their study.

Variations and exemptions

Fees and charges may vary from year to year. In certain circumstances, students may not be required to pay all or part of one or more of the different components of the Service Fees.

For full details of variations and exemptions to the fees listed below, contact the UTS Information Service.

Fee Components

Union Entrance Fee	
a once-only charge for new students	\$20
Union Fee	
a semester-based charge for currently enrolled students	\$100 per semester
Students' Association Fee	
a yearly charge for currently enrolled students	\$48 per year
Student Accommodation Levy	
a yearly charge for currently enrolled students	\$56 per year
Student Identification Card Charge	
a yearly charge for students enrolled on a tuition fee basis	\$15 per year

Course Fees

Some courses (not local undergraduate courses) at UTS attract a course fee. This is charged to students for the course itself, in addition to the Service Fees outlined above. The level of such fees is calculated by individual faculties on a course by course basis. Payment of course fees may vary depending on a student's status, and on conditions laid down by the faculty. Please contact your faculty office for full details.

Details of course fees are outlined under each course entry in this Handbook, but are subject to change. Always check with the faculty for the latest information.

Course Fees for International Students

Annual Course Fees for undergraduate international students range from A\$11,500 to A\$16,500, and for postgraduate international students from A\$12,000 to A\$16,500. For more information contact the International Programs Office.

Other costs

Students may incur other costs while they study at UTS. These may include books, photocopying, equipment hire, the purchase of computer software and hardware, and email and internet services.

The University's recommended internet service provider currently charges \$20 per month for 30 hours access or \$30 per month for \$70 hours access. These prices are subject to change.

HECS

(Higher Education Contribution Scheme)

HECS is a financial contribution paid to the Commonwealth Government by tertiary students towards the cost of their education. It is payable each teaching period and the amount paid will vary according to the number of credit points undertaken and the method of payment nominated by the student.

Most students have three choices in the way they pay HECS:

1. Paying all of the HECS up front and receiving a 25% discount
2. Deferring all payment until a student's income reaches a certain level, or
3. Paying at least \$500 of the HECS contribution up front and deferring the remainder.

Note: these options may not apply to New Zealand citizens and Permanent Residents.

Commonwealth 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 will not reduce their HECS liability.

Students who defer their HECS payments become liable to commence repayment once their taxable income reaches the repayment threshold. This does not necessarily mean at the conclusion of their studies – a student's income may reach this threshold before then.

New students, students returning from leave and students who are commencing a new or second course, must complete a Payment Options Declaration Form. This form must be lodged with the University by the census date and should show a valid Tax File Number.

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 Service.

There are a number of variations to these guidelines. It is the responsibility of each student to find out which HECS conditions apply to them. Information can be obtained from the booklet *HECS Your Questions Answered*, which is available from the HECS office on 1800 020 108 or the UTS Information Service.

FINANCIAL HELP

Austudy/Youth Allowance

Students under 25 years old, may be eligible to receive financial assistance in the form of the Youth Allowance.

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.

Commonwealth 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, in some exceptional cases, 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 (02) 9514 1177 (City)
or (02) 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 (02) 9514 1905

UTS LIBRARY

The University Library collections are housed in three campus libraries which contain over 650,000 books, journals and audiovisual materials 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 remotely. 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 (02) 9514 3388

Kuring-gai Campus Library

Eton Road, Lindfield
telephone (02) 9514 5234

Gore Hill Library

Corner Pacific Highway and Westbourne
Street, Gore Hill
telephone (02) 9514 4088

RESEARCH OFFICE

The Research Office is responsible for ensuring that the University develops its research potential. It provides a broad range of services aimed at meeting the research goals of the University and its staff.

The main objectives of the Research Office include ensuring that a deep understanding of the research priorities, interests and capacity of the University, its research teams, centres and individual academics is maintained. It is involved in formulating policy and monitoring national trends in research policy and funding to position the University so that it can react to opportunities and challenges in key fields of research.

Research Office
Level 7, Tower Building
telephone (02) 9514 1252/1264/1419
<http://www.uts.edu.au/research/ro/resoff.html>

UNIVERSITY GRADUATE SCHOOL

The University Graduate School is a pan-university organisation which enhances the quality of graduate courses and supports research degree students, providing leadership in framing policy for postgraduate development in partnership with the faculties. It provides a contact point for postgraduate students and supports them in their studies.

The University Graduate School is located in Building B2, Blackfriars, City campus.

telephone (02) 9514 1336

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

SUPPORT FOR STUDENT LEARNING

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

Student Services

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. They are also provided with valuable information about how the university and its faculties operate, and the services provided.

For more information contact Student Services Unit.

telephone (02) 9514 1177 (City)
or (02) 9514 5342 (Kuring-gai)

Careers Service

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

telephone (02) 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 (02) 9514 1471 (City campus)
or (02) 9514 5342 (Kuring-gai campus)

Health

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

telephone (02) 9514 1166 (City campus)
or (02) 9514 5342 (Kuring-gai campus)

Housing

University Housing provides assistance to students in locating private accommodation. A limited amount of UTS-owned housing is also available.

telephone (02) 9514 1509 (listings)
or (02) 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 (02) 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 (02) 9514 1177

Chemistry Learning Resources Centre

Room 211, Building 4, City campus.

Rosemary Ward

telephone (02) 9514 1729

email rosemary.ward@uts.edu.au

<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 (02) 9514 2325

email alex.barthel@uts.edu.au

or

Room 2-522

Kuring-gai campus

telephone (02) 9514 5160

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

Physics Learning Centre

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

Peter Logan
telephone (02) 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 (02) 9514 2268
email leigh@maths.uts.edu.au

Kuring-gai campus
Dr Jules Harnett
telephone (02) 9514 5186
email jules@maths.uts.edu.au

Computer laboratories

Computer laboratories are located throughout the University and 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 (02) 9514 2118

Computer training

In general, where computer training is necessary as part of a course that attracts HECS, it is provided.

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 range of services to assist Aboriginal and Torres Strait Islander students.

Jumbunna CAISER
Level 17, Tower Building
telephone (02) 9514 1902

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; 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.

Equity and Diversity Unit
Level 17, Tower Building
telephone (02) 9514 1084

OTHER SERVICES

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 and resource centres. Off campus the Union provides access to a ski lodge, rowing club, sailing club, athletics club and basketball stadium.

Union Office (02) 9514 1444
Haymarket (02) 9514 3369
Kuring-gai (02) 9514 5011

Union Sports Centre

The centre contains multi-purpose spaces, squash courts, weights rooms, circuit training room and climbing wall.

Lower ground floor, Building 4
telephone (02) 9514 2444

UTS Rowing Club

Dobroyd Parade, Haberfield
telephone (02) 9797 9523

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 (02) 9514 1456 (City)
or (02) 9514 2960 (Blackfriars)
or (02) 9514 5105 (Kuring-gai)

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 (02) 9212 3078
email uts@mail.coop-bookshop.com.au

Kuring-gai campus
telephone (02) 9514 5318
email kuringai@mail.coop-bookshop.com.au
<http://www.coop-bookshop.com.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.

City campus office:
Level 3 of the Tower Building
telephone (02) 9514 1155

Kuring-gai campus office:
(next to the cashier service)
telephone (02) 9514 5237

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 (02) 9514 1280
email George.Bibicos@uts.edu.au

Student Ombud

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

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

Room 402, Building 2
City campus, Broadway
telephone (02) 9514 2575
email ombuds@uts.edu.au

Radio Station 2SER (107.3 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 (02) 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.

telephone (02) 9514 1284
fax (02) 9514 1228
<http://www.utsgallery.uts.edu.au>

PRINCIPAL DATES FOR 2000

January

- 6 UTS Advisory Day
- 7 Closing date for changes of preference to the Universities Admissions Centre (UAC), by mail or in person
- 8 Closing date (midnight) for changes of preference UAC Infoline
- 10 Formal supplementary examinations for 1999 Spring semester students
- 14 Final examination timetable for Summer session
- 14 Last day to submit appeal against exclusion from Spring 1999
- 21 Main Round of offers to UAC applicants
- 21 Last day to submit 'Show Cause' appeal for Spring 1999
- 24-29 Enrolment of new main round UAC Undergraduate students at City campus
- 25 Closing date for changes of preference to Universities Admissions Centre (UAC) for final round offers
- 26 Australia Day – public holiday
- 27 Public school holidays end
- 28 Last day to submit application for Postgraduate Equity Scholarships for Autumn semester 2000
- 28 Summer session ends (commenced 29 November 1999) for subjects with formal exams
- 31 Summer session examinations commence (to 11 February)

February

- 3-16 Enrolment of new Undergraduate students at City campus (and 24-29 January)
- 1-11 Formal examinations for Summer session
- 4 Final round of offers (UAC)
- 4 Last day to lodge a Stage 2 appeal against assessment for Spring semester 1999

- 7 Closing date third round, Postgraduate courses for Autumn 2000 (except Faculty of Business – closing date 11 February)
- 14 Welcome and Registration for International Students – International Student Orientation programs commences and runs until 25 February
- 17 Official welcome and Study Success (Learning Skills) Program for all students studying on the Kuring-gai campus
- 17-18 Enrolment for International students
- 21-25 Orientation week for new students
- 21 Release of results for Summer session
- 21 Official Vice-Chancellor's welcome for all UTS students and commencement of Orientation 2000 (includes campus tours, student workshops, and the Study Success Program).
- 23 Union 'O' Day – Clubs and activities day
- 24 Late enrolment day
- 24/25 Faculty welcomes will be held on 24 or 25 February unless otherwise advised
- 28 Autumn semester classes commence

March

- 10 Last day to enrol in a course or add subjects
- 17 Last day to pay upfront HECS or Postgraduate Course fees for Autumn semester 2000
- 31 Last day to apply to graduate in Spring semester 2000
- 31 Last day to apply for leave of absence without incurring student fees/charges¹
- 31 Last day to withdraw from a subject without financial penalty¹
- 31 HECS census date

April

- 7 Last day to withdraw from a course or subject without academic penalty¹
- 17 Public School holidays commence
- 20 Provisional examination timetable available
- 21 Good Friday – public holiday
- 24-28 Vice-Chancellors' Week (non-teaching)
- 24 Easter Monday – public holiday
- 25 Anzac Day – public holiday
- 27-28 Graduation ceremonies (Kuring-gai)
- 28 Public School holidays end

May

- 1 Applications open for undergraduate courses, where applicable, and postgraduate courses for Spring semester 2000
- 15-26 Graduation ceremonies (City)
- 31 Closing date for undergraduate and first round postgraduate applications for Spring semester

June

- 2 Final examination timetable available
- 9 Last teaching day of Autumn semester
- 10-26 Formal examinations
- 12 Queen's Birthday – public holiday
- 29 Last day to submit application for Postgraduate Equity Scholarships for Spring semester 2000
- 30 Closing date second round Postgraduate applications for Spring semester

July

- 3 Public School holidays commence
- 3-7 Vice-Chancellors' Week (non-teaching)
- 3-7 Formal alternative examination period for Autumn semester students
- 4-13 Enrolments for Spring semester
- 10-14 International Students' Orientation Program
- 13 Study Success Learning Skills Program

- 13 Release of Autumn semester examination results
- 14 Public School holidays end
- 14 Formal supplementary examinations for Autumn semester students
- 17 Spring semester classes commence
- 21 Last day to withdraw from full year subjects without academic penalty
- 28 Last day to enrol in a course or add subjects
- 28 Last day to submit 'Show Cause' appeal for Autumn semester 2000

August

- 1 Applications available for undergraduate and postgraduate courses for Autumn semester 2001
- 18 Last day to pay upfront HECS or Postgraduate Course Fees for Spring semester 2000
- 31 Last day to withdraw from a course, a subject, or apply for leave of absence without academic or financial penalty¹
- 31 Last day to apply to graduate in Autumn semester 2001
- 31 HECS census date (to be confirmed)

September

- 1 Applications for Postgraduate Scholarships available
- 8 Provisional examination timetable available
- 8 Last day of teaching before AVCC week/Olympics break
- 11 AVCC week/Olympics break (to 6 October)
- 11 Public School Holidays commence (to 2 October)
- 29 Closing date for undergraduate applications via UAC (without late fee)
- 29 Closing date for inpUTS Equity Access Scheme via UAC

14 General information

October

- 2 Labour Day – public holiday
- 2 Public school holidays end
- 8 Provisional examination timetable available
- 9 Spring semester classes recommence
- 30 Graduation ceremonies (City) (to 3 November)
- 31 Closing date for undergraduate applications via UAC (with late fee)
- 31 Closing date for undergraduate applications direct to UTS (without late fee)
- 31 Closing date for most postgraduate courses for Autumn 2000 (some courses may have earlier closing dates in September)
- 31 Closing date for Australian Postgraduate Awards, the R. L. Werner and University Doctoral scholarships
- 31 Last day to submit application for Postgraduate Equity Scholarships for Summer semester 2001

November

- 1-3 Graduation ceremonies (City)
- 3 Final examination timetable available
- 17 Last teaching day of Spring semester
- 18-30 Formal examination period (and 1-4 December)
- 30 Closing date for Undergraduate applications via UAC (with late fee)

December

- 1-4 Formal examination period (and 13-30 November)
- 4 Summer session commences (ends 2 February 2001)
- 11-15 Formal alternative examination period for Spring semester students
- 20 Release of Spring semester examination results
- 20 Public School holidays commence
- 25 Christmas Day – public holiday
- 26 Boxing Day – public holiday

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 24 August 1999. The University reserves the right to vary any information described in Principal Dates for 2000 without notice.

FACULTY INFORMATION

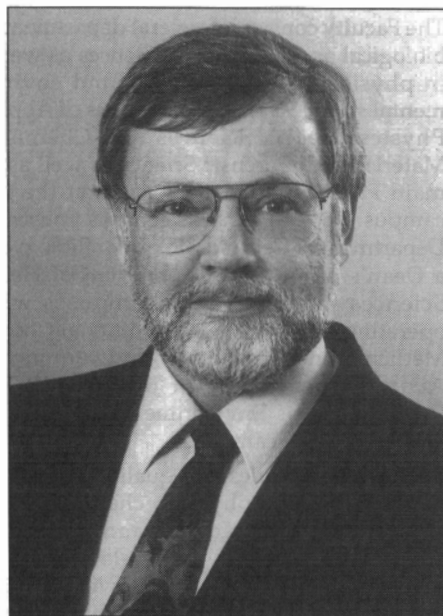
MESSAGE FROM THE DEAN

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 a wide range of undergraduate degree programs, Master's and PhD programs by research, and several post-graduate 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 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 and 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 in Building 4. 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. A Bachelor of Health Science and Honours program offered in Traditional Chinese 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, Midwifery and Health. The Faculty is also involved in offering six joint undergraduate degree programs:

- 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, 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, 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 degree Bachelor of Health Science in Traditional Chinese Medicine/ Bachelor of Arts in International Studies provides 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 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. 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. The Bachelor of Medical Science/Bachelor of Business is similar in structure to the Bachelor of Science/Bachelor of Business with the science specialisation in medical science.

In the postgraduate area, the Faculty offers PhD and Master's degrees (by thesis), Master's programs (by coursework), and a Graduate Diploma. 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 two Cooperative Research Centres, namely 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. 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 listed below.

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 post-graduate 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).

Health Psychology Unit

The Health Psychology Unit (formerly the Psycho-Oncology 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 an undergraduate course in Traditional Chinese 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 in Building 4 on Harris Street (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 Traditional Chinese Medicine are eligible to apply for places in the combined degree: Bachelor of Health Science (in Traditional Chinese 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 handbook.

All course inquiries should be directed to:

Mr Bob Hayes
UTS College of Traditional Chinese Medicine
4/645 Harris Street
Ultimo NSW 2007
telephone (02) 9514 2500

CENTRES

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. 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 commercial company, Insearch Limited.

Centre for Materials Technology

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

The main functions of the Centre are to assist staff teams to obtain government and industrial research grants; make facilities and expertise available for industry and government; establish postgraduate research scholarships and research assistantships; coordinate multidisciplinary research investigations; undertake consultancy; assist relevant professional institutes to organise conferences and 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 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 2000 *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 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). Copies will also be 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/index.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.

Re-marking 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

26 Faculty information

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 coordinator:

Mrs Rosemary Ward
telephone (02) 9514 1729
fax (02) 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 (02) 9514 2194
fax (02) 9514 2219
email peter@phys.uts.edu.au

Bridging courses

Chemistry bridging course

For first-year Chemistry subjects in 2000 it is strongly recommended 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 (02) 9514 1728
 email John.Kalman@uts.edu.au
http://www.maths.uts.edu.au/msc/bc_inf.htm

Insearch Institute of Commerce – foundation program

The Insearch Institute of Commerce, which is wholly owned by the University of Technology, Sydney, offers a Foundation Studies Certificate program in Science. The program has been designed by staff of the Faculty of Science and Faculty of Mathematical and Computing Sciences for students who are not currently qualified for direct university entry. While the University cannot guarantee admission to its degree programs, students who have completed the program may apply for admission to the first year of most degree programs offered by the Faculty. For further information contact:

The Registrar
 Insearch Institute of Commerce
 10 Quay Street
 Haymarket
 telephone (02) 9281 8188
 fax (02) 9281 9875
 email courses@insearch.edu.au

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 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 approximately \$16,000 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 and Chinese Medicine 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 Industrial Ceramics and Technical Ceramics in the year for which the award is made. The prize, established in 1979 through the generosity of the

NSW Branch of the Australian Ceramic Society, is intended as an encouragement to students studying in the field of ceramics.

The Australian Ceramic Society Award

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.

Biotechnology Prize

This prize, new in 2000, is awarded annually to the graduating student from the Biotechnology degree course who achieves the highest weighted average mark in Microbiology 1, Microbiology 2, Applied and Environmental Microbiology and Bioprocessing, provided that the weighted average mark is at distinction level or higher. The prize consists of a suitably worded certificate and a cash award of \$250.

Cathay Herbal Laboratories Prize

This prize is awarded annually to the graduating student from the Bachelor of Health Science in Acupuncture course who obtains the highest aggregate mark in the final year clinical subjects. The prize will be in the form of a suitably 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. 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 1 and Haematology 1, 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.

30 Faculty information

Hatrick-Jotun Prize

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 Composites. 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 Chemistry of Materials. The prize has a cash value of \$150.

Macquarie Pathology Services Prize in Biomedical Science

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

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 and Legislation. 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 Stages 1–3 of the course. The prize has a cash value of \$200.

Safety Institute of Australia 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.

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 Earth Resources. 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.

32 Faculty information

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 subject 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 (Honours)	P006
Bachelor of Health Science in Acupuncture/Bachelor of Arts in International Studies	NH01
Bachelor of Health Science in Traditional Chinese Medicine	NH06
Bachelor of Health Science in Traditional Chinese Medicine (Honours)	tba
Bachelor of Medical Science	NH04
Bachelor of Medical Science/Bachelor of Arts in Human Movement Studies	N009
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/Bachelor of Laws	LL04
Bachelor of Medical Science/Bachelor of Laws	LL09
Bachelor of Science/Bachelor of Arts in International Studies	N004

Course title	Code
Bachelor of Science/Bachelor of Business	N006
Bachelor of Medical Science/Bachelor of Business	N007
Diploma in Scientific Practice	N005
Graduate Diploma	
Hydrogeology and Groundwater Management	N061
Master's degrees (by coursework)	
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 Hydrogeology and Groundwater Management	N057
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.

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

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

INTERNATIONAL STUDIES ELECTIVES

The Institute for International Studies 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, French, German, Greek, Indonesian, Italian, Japanese, Malaysian, Russian, Spanish and Thai. 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, 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 *Institute for International Studies Handbook 2000*, or by contacting:

Institute for International Studies, UTS
10 Quay Street, Sydney
telephone (02) 9514 1574
fax (02) 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. 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 points¹

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.

Science Education

The Science Education program is intended to prepare students for a career in secondary school science education. In addition to a Bachelor of Science or Bachelor of Medical Science program students complete a Graduate Diploma in Education, which consists of two semesters of study.

Admission

Students enrolled in a Bachelor of Science or Bachelor of Medical Science program may apply to enter the Graduate Diploma in Education after the completion of at least 96 credit points of study. The selection process includes a formal interview. Students who seek to enter the Graduate Diploma in Education before the completion of the Bachelor program would normally be expected to have obtained a credit average in the core Science subjects.

Course program

Students complete two semesters of studies in Education, not necessarily in the same year. The Graduate Diploma will not be awarded until the completion of the Bachelor of Science or Bachelor of Medical Science program.

For further information please contact:

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

Since 1999 all Honours courses except the Bachelor of Science (Honours) in Applied Chemistry – Forensic Science and the Bachelor of Health Science (Honours) courses are one-year full time or equivalent part-time courses. They are 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.

Diploma in Scientific Practice

- ◆ *Course code:* N005
- ◆ *Testamur title:* *Diploma in Scientific Practice*
- ◆ *Abbreviation:* *DipScPrac*
- ◆ *Course Director:*
Associate Professor R T Buckney
- ◆ *Course fee:* HECS

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.

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 (02) 9514 4044
fax (02) 9514 4095

Bachelor of Science in Applied Chemistry

- ◆ *Course code:* NC05
- ◆ *Testamur title:* *Bachelor of Science in Applied Chemistry*
- ◆ *Abbreviation:* *BSc*
- ◆ *Course Director:* *Dr J R Kalman*
- ◆ *Course fee:* HECS

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 them-

selves 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 the list of electives at the end of this entry. They may also 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 post-graduate 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 (02) 9514 1728
fax (02) 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
	<i>either</i>	
68101	Physics 1C ¹	6cp
	<i>or one of</i>	
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
	<i>or</i>	
68041	Physics 1A ²	6cp
	<i>plus</i>	
	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

40 Undergraduate courses

Stage 4

Spring semester

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

Stage 5

Autumn semester

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

Stage 6

Spring semester

65606	Analytical Chemistry 3	6cp
65607	Physical Chemistry 2 Electives/second major	6cp 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 or	6cp
68041	Physics 1A ²	6cp

Stage 2

Autumn semester

65201	Chemistry 2C either	6cp
68201	Physics 2 or one of	6cp
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 Elective/second major	6cp 6cp
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Stage 4

Autumn semester

65307	Physical Chemistry 1 Elective/second major	6cp 6cp
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Spring semester

65409	Analytical Chemistry 2 Elective/second major	6cp 6cp
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Stage 5

Autumn semester

65508	Organic Chemistry 2 Elective/second major	6cp 6cp
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Spring semester

65606	Analytical Chemistry 3 Elective/second major	6cp 6cp
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Stage 6

Autumn semester

65509	Inorganic Chemistry 2 Elective/second major	6cp 6cp
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Spring semester

65607	Physical Chemistry 2 Elective/second major	6cp 6cp
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¹ Strongly recommended.

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

Note: See the list of second majors on page 78.

Electives offered by the Department of Chemistry, Materials and Forensic Science

65521	Applied Organic Chemistry	6cp
67606	Corrosion and Degradation of Materials	6cp
65621	Environmental Chemistry	6cp
65062	Extractive Metallurgy	6cp
67306	Industrial Ceramics	6cp
67508	Surface Chemistry of Materials	6cp
67305	Polymer Science	6cp

Bachelor of Science (Honours) in Applied Chemistry

- ◆ *Course code: NCO6*
- ◆ *Testamur title: Bachelor of Science (Honours) in Applied Chemistry*
- ◆ *Abbreviation: BSc(Hons)*
- ◆ *Course Director: Dr J R Kalman*
- ◆ *Course fee: HECS*

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 2000 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
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Stage 2

65854	Honours (Chemistry) (2 sem)	24cp
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Bachelor of Science (Honours) in Applied Chemistry – Forensic Science

- ◆ *Course code: NCO4*
- ◆ *Testamur title: Bachelor of Science (Honours) in Applied Chemistry – Forensic Science*
- ◆ *Abbreviation: BSc(Hons)*
- ◆ *Course Director: Dr C Roux*
- ◆ *Course fee: HECS*

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.

Attendance

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

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, ie a credit average or better in Stage 3 and 4 subjects), 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 (02) 9514 1718
 fax (02) 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
	<i>either</i>	
91311	Biology 1	6cp
	<i>or</i>	
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
	<i>one of</i>	
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
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Bachelor of Science in Materials Science

- ◆ *Course code: NM05*
- ◆ *Testamur title: Bachelor of Science in Materials Science*
- ◆ *Abbreviation: BSc*
- ◆ *Course Director: Dr G L Heness*
- ◆ *Course fee: HECS*

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 Greg Heness
Department of Chemistry, Materials and Forensic Science
telephone (02) 9514 1782
fax (02) 9514 1628
email Greg.Heness@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 1C	6cp

44 Undergraduate courses

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 Elective/second major	6cp 6cp
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Spring semester

67506	Technical Ceramics Elective/second major	6cp 6cp
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Stage 5

Autumn semester

67407	Physical Properties of Materials Elective/second major	6cp 6cp
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Spring semester

65062	Extractive Metallurgy Elective/second major	6cp 6cp
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Stage 6

Autumn semester

67608	Composites Elective/second major	6cp 6cp
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Spring semester

67606	Corrosion and Degradation of Materials Elective/second major	6cp 6cp
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Note: See the list of second majors on page 78.

Electives offered by the Department of Chemistry, Materials and Forensic Science

65621	Environmental Chemistry	6cp
65307	Physical Chemistry 1	6cp
65306	Analytical Chemistry 1	6cp
65202	Organic Chemistry 1	6cp
65411	Inorganic Chemistry 1	6cp
65410	Chemical Safety and Legislation	6cp
65409	Analytical Chemistry 2	6cp
65508	Organic Chemistry 2	6cp
65607	Physical Chemistry 2	6cp

Bachelor of Science (Honours) in Materials Science

- ◆ *Course code: NMO6*
 - ◆ *Testamur title: Bachelor of Science (Honours) in Materials Science*
 - ◆ *Abbreviation: BSc(Hons)*
 - ◆ *Course fee: HECS*
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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 2000 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
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Stage 2

67854	Honours (Materials Science) (2 sem)	24cp
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Bachelor of Science in Applied Physics

- ◆ *Course code: NP05*
- ◆ *Testamur title: Bachelor of Science in Applied Physics*
- ◆ *Abbreviation: BSc*
- ◆ *Applied Physics Student Coordinator: Dr G R Anstis*
- ◆ *Course fee: HECS*

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 Geoff Anstis
Department of Applied Physics
telephone (02) 9514 2193
fax (02) 9514 2219
email Geoff.Anstis@uts.edu.au

Full-time program

Stage 1

Autumn semester

33190	Mathematical Modelling for Science	6cp
65101	Chemistry 1C	6cp
68101	Physics 1C	6cp
	<i>one of</i>	
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

46 Undergraduate courses

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
	Electives/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
	<i>one of</i>	
66101	Earth Science 1	6cp
91311	Biology 1	6cp
91701	Medical Science 1	6cp
48210	Engineering for Sustainability	6cp

Spring semester

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

Stage 2

Autumn semester

65201	Chemistry 2C	6cp
68201	Physics 2	6cp

Spring semester

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

Stage 3¹

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, Geoff Anstis or Head of the Applied Physics Department, Suzanne Hogg.

Bachelor of Science (Honours) in Applied Physics

- ◆ *Course code: NPO6*
 - ◆ *Testamur title: Bachelor of Science (Honours) in Applied Physics*
 - ◆ *Abbreviation: BSc(Hons)*
 - ◆ *Course fee: HECS*
-

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 2000 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
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Stage 2

68854	Honours (Physics) (2 sem)	24cp
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Bachelor of Science in Applied Physics/Bachelor of Engineering in Electrical Engineering/Diploma in Engineering Practice

- ◆ *Course code: NPO4*
 - ◆ *Testamur title:*
Bachelor of Science in Applied Physics
Bachelor of Engineering in Electrical Engineering
Diploma in Engineering Practice
 - ◆ *Abbreviation: BSc BE DipEngPrac*
 - ◆ *Applied Physics Student Coordinator:*
Dr G R Anstis
 - ◆ *Course fee: HECS*
-

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 multi-disciplinary 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

48 Undergraduate courses

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 Geoff Anstis
Department of Applied Physics
telephone (02) 9514 2193
fax (02) 9514 2219
email Geoff.Anstis@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 Traditional Chinese Medicine¹

- ◆ *Course code:* NH06
- ◆ *Testamur title:* Bachelor of Health Science in Traditional Chinese Medicine
- ◆ *Abbreviation:* BHLthSc
- ◆ *Course Director:* Mr C Zaslowski
- ◆ *Course fee:* HECS

This course has been recently introduced and is pending accreditation and therefore may be subject to change. For further details contact the College of Traditional Chinese Medicine on telephone (02) 9514 2500.

The Bachelor of Health Science in Traditional Chinese Medicine provides the graduate with a professional entry level for the practice of acupuncture and Chinese patent herbal medicine. Traditional Chinese Medicine is made up of two major branches: acupuncture and Chinese herbal medicine.

During the four 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, Chinese materia medica and clinical herbal prescriptions, 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 Traditional Chinese Medicine (pending accreditation) may have the opportunity to enter the Honours program or the combined degree: Bachelor of Health Science in Traditional Chinese Medicine/ Bachelor of Arts in International Studies (Chinese major).

All Academic inquiries should be directed to:
Course Director
Mr Chris Zaslowski
College of Traditional Chinese Medicine
Faculty of Science
Telephone (02) 9514 7856 or (02) 9514 2500
Fax (02) 9514 7866
email Chris.Zaslowski@uts.edu.au

Course program

Stage 1

Autumn semester

99560	Introduction to TCM	6cp
99502	Foundations of TCM	6cp
99563	Health Sciences 1	6cp
99616	Clinical Theory & Clinic Level 1 (over 2 semesters)	8cp

Stage 2

Spring semester

99564	The Physiology of Qi	4cp
99617	Point Location 1	8cp
99570	Health Sciences 2	6cp
92167	Foundations of Helping and Caring	4cp

Stage 3

Autumn semester

99618	Chinese Diagnostic System 1	6cp
99567	Introduction to Chinese Herbal Medicine	6cp
99539	Pathophysiology A	6cp
99619	Clinic – Level 2 and Point Location 2 (over 2 semesters)	8cp

Stage 4

Spring semester

99620	History and Philosophy of TCM	4cp
99621	Chinese Diagnostic System 2	6cp
99622	Pharmacology of Traditional Chinese Medicine	6cp
99579	Chinese Massage (<i>Tuina</i>)	6cp

Stage 5

Autumn semester

99623	Chinese Herbal Formulae	8cp
99584	Clinical Features of Disease	6cp
99624	Clinical Theory and Clinic – Level 3 (over 2 semesters)	12cp

Stage 6

Spring semester

99625	Research Methods	6cp
99626	Microsystems and Advanced Treatment Techniques	8cp
99627	Clinical Practicum (therapy and diagnosis)	8cp

Stage 7

Autumn semester

99628	Disease States	8cp
99629	Chinese Medical Classics	4cp
99630	Clinical Practice 1	12cp

¹ Subject to approval

Stage 8

Spring semester

99591	Practice Management	4cp
99590	Special Topics in TCM (Intermodal and Professional)	8cp
99631	Clinical Practice 2 (Chinese University hospital option)	12cp

Bachelor of Health Science in Traditional Chinese Medicine (Honours)¹

- ◆ *Course code:* tba
- ◆ *Testamur title:* Bachelor of Health Science in Traditional Chinese Medicine (Honours)
- ◆ *Abbreviation:* BHLthSc(Hons)
- ◆ *Course fee:* HECS

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 eight 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 program

Stages 1–8

As for Pass degree.

Stage 9

99593	Honours Project (2 sem)	24cp
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Stage 10

99593	Honours Project (2 sem)	24cp
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¹ Subject to approval

Bachelor of Health Science in Acupuncture

- ◆ *Course code:* P005
- ◆ *Testamur title:* Bachelor of Health Science in Acupuncture
- ◆ *Abbreviation:* BHLthSci
- ◆ *Course Director:* Mr C Zaslowski
- ◆ *Course fee:* HECS

This course has now been integrated into the Bachelor of Health Science in Traditional Chinese Medicine. 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. Students who commenced in 1998 should consult the 1999 Faculty of Science Handbook for the course structure and subject descriptions. The 1999 handbook can be found on the UTS website:

<http://www.uts.edu.au/div/publications/sci/index.html>

For further details contact the College of Traditional Chinese Medicine on telephone (02) 9514 2500.

Bachelor of Health Science in Acupuncture (Honours)

- ◆ *Course code:* P006
- ◆ *Testamur title:* Bachelor of Health Science in Acupuncture (Honours)
- ◆ *Abbreviation:* BHLthSci
- ◆ *Course Director:* Mr C Zaslowski
- ◆ *Course fee:* HECS

For inquiries contact the College of Traditional Chinese Medicine on telephone (02) 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 program

Stages 1–7

As for Pass degree.

Stage 8

99593 Honours Project (2 sem) 24cp

Stage 9

99593 Honours Project (2 sem) 24cp

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

- ◆ *Course code: NH01*
- ◆ *Testamur title:*
Bachelor of Health Science in Acupuncture
Bachelor of Arts in International Studies
- ◆ *Abbreviation: BHlthSc BA*
- ◆ *Course Director: Mr C Zaslowski*
- ◆ *Course fee: HECS*

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 Zaslowski

College of Traditional Chinese Medicine

Faculty of Science

telephone (02) 9514 7856 or (02) 9514 2500

fax (02) 9514 7866

email Chris.Zaslowski@uts.edu.au

Course program

Year 1

Stage 1

99560	Introduction to TCM	6cp
99502	Foundations of TCM	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
99617	Point Location 1	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 Workshops	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 in TCM (Intermodal and Professional)	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	6cp

Year 5

Stage 9

977111	In-country Study 1: China	24cp
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Stage 10

978111	In-country Study 2: China	24cp
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Year 6

Stage 11

50140	Comparative Social Change	8cp
99579	Chinese Massage (<i>Tiuna</i>)	6cp
99591	Practice Management	4cp
99607	Clinical Internship (A&M/INT.ST) B	6cp
	Total	264cp

Note: For descriptions of International Studies subjects please consult the *Institute for International Studies Handbook 2000*.

Bachelor of Health Science in Chinese Herbal Medicine

- ◆ *Course code:* NH02
- ◆ *Testamur title:* Bachelor of Health Science in Chinese Herbal Medicine
- ◆ *Abbreviation:* BHLthSc
- ◆ *Course Director:* Mr W Cochran
- ◆ *Course fee:* HECS

Students who commenced this course in 1998 should consult the 1999 Faculty of Science Handbook for the course structure and subject descriptions. The 1999 Handbook can be found on the UTS website:

<http://www.uts.edu.au/div/publications/sci/index.html>

Bachelor of Medical Science

- ◆ *Course code:* NH04
- ◆ *Testamur title:* Bachelor of Medical Science
- ◆ *Abbreviation:* BMedSc
- ◆ *Course Director:* Dr G Nicholson
- ◆ *Course fee:* HECS

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 bio-medical industries; biotechnology companies; medical research in research institutes, hospitals, industry and universities; and other health-related professions at both State and

Commonwealth 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, Midwifery and Health; Business; Law, or the Institute for International Studies. Examples of recommended electives are given in the Elective Options Table for the 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 (02) 9514 2230 or (02) 9514 2234
fax (02) 9514 2228
email Graham.Nicholson@uts.edu.au

Course program

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
	<i>one of</i>	
68201	Physics 2	6cp
91312	Biology 2	6cp
	<i>or</i>	
	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 Medical Science/Bachelor of Arts in Human Movement Studies¹

- ◆ *Course code: N009*
- ◆ *Testamur title: Bachelor of Medical Science Bachelor of Arts in Human Movement Studies*
- ◆ *Abbreviation: BMedSc BA*
- ◆ *Course Director: Dr G Nicholson*
- ◆ *Course fee: HECS*

This course seeks to provide students with the knowledge, competencies and understandings necessary to assume leading roles in human movement services and medical science, particularly in therapeutic and human performance settings.

Employment opportunities

Graduates may enter a wide range of settings including community and corporate health and fitness; government agencies associated with sport, physical activity and health; national, State and regional academies of sport; commercial organisations involved in product development and promotion; professional sporting teams; rehabilitation clinics and hospitals, private business in personal training and rehabilitation; teaching and research in universities and colleges.

Course structure

The course consists of four years full-time study in which students complete the requirements of the Bachelor of Medical Science (core subjects in basic science and medical and pre-clinical science) and the Bachelor of Arts in Human Movement Studies (foundation, core sub-discipline and advanced studies).

¹ Subject to approval

Course program

Year 1 – Stage 1

Autumn semester

27183	LifeSpan Human Development (formerly Introduction to Human Movement Studies)	6cp
65012	Chemistry 1C	6cp
68041	Physics 1A	6cp
91701	Medical Science 1	6cp
		24cp

Year 1 – Stage 2

Spring semester

27152	Measurement and Development of Physical Capacity	6cp
65021	Chemistry 2C	6cp
91702	Medical Science 2	6cp
	<i>one of</i>	
91312	Biology 2	6cp
68201	Physics 2	6cp
	<i>or</i>	
	Other approved study	6cp
		24cp

Year 2 – Stage 3

Autumn semester

91313	Biochemistry 1	6cp
91703	Physiological Systems	6cp
27155	Research Design and Statistics for Human Movement	6cp
27223	Mechanics of Human Motion	6cp
		24cp

Year 2 – Stage 4

Spring semester

91704	Behavioural Sciences	6cp
91705	Medical Devices and Diagnostics	6cp
27171	Applied Kinesiology	6cp
27175	Energetics of Human Movement	6cp
		24cp

Year 3 – Stage 5

Autumn semester

91707	Pharmacology 1	8cp
xxxxx	Science elective	4cp
27160	Sport and Exercise Behaviour	6cp
27xxx	Motor Control ¹	6cp
		24cp

¹ This subject is under development

Year 3 – Stage 6

Spring semester

91708	Psychophysiology	8cp
91709	Pharmacology 2	8cp
xxxxx	Science elective	4cp
xxxxx	Science elective	4cp
		24cp

Year 4 – Stage 7

Autumn semester

27331	Motor Learning and Control	6cp
27190	Workplace Learning for Human Movement	6cp
27307	Sport Management	6cp
27173	Efficiency of Human Movement 1	6cp
		24cp

Year 4 – Stage 8

Spring semester

27222	Exercise Prescription	6cp
27105	Nutrition for Physical Activity	6cp
27172	Applied Sport Psychology	6cp
27174	Efficiency of Human Movement 2	6cp
		24cp

Bachelor of Science (Honours)

- ◆ *Course code:* KB04
- ◆ *Testamur title:* Bachelor of Science (Honours)
- ◆ *Abbreviation:* BSc(Hons)
- ◆ *Course fee:* HECS

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 program

Full-time program

Year 1 – Stages 1 and 2

Autumn and Spring semesters

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

Year 1 – Stages 1 and 2

Autumn and Spring semesters

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

Autumn and Spring semesters

91305	Honours (Biological and Biomedical Sciences) (2yrs)	24cp
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Bachelor of Science in Biomedical Science

- ◆ *Course code:* KB02
- ◆ *Testamur title:* Bachelor of Science in Biomedical Science
- ◆ *Abbreviation:* BSc
- ◆ *Course Director:* Dr J Swann
- ◆ *Course fee:* HECS

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 the 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
	<i>one of</i>	
68201	Physics 2	6cp
91312	Biology 2	6cp
	<i>or</i>	
	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
	Electives/second major	8cp

Stage 6

Spring semester

Biomedical Science Electives ¹	8cp
Electives/second major	16cp

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
<i>one of</i>	
68201 Physics 2	6cp
91312 Biology 2	6cp
<i>or</i>	
Other approved science subject	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

Stages 3 and 4 – in 2001 and odd years

Autumn semester

91314 Microbiology 1	6cp
91354 Anatomical Pathology	6cp

Spring semester

91330 Microbiology 2	6cp
Elective/second major	6cp

Stage 5

Autumn semester

Biomedical Science Electives ¹	16cp
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Spring semester

Biomedical Science Electives ¹	8cp
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Stage 6

Autumn semester

Electives/second major	8cp
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Spring semester

Electives/second major	16cp
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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.

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
<i>plus</i>	
Additional electives	8cp

Stage 6

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

Microbiology strand

Stage 5

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

Stage 6

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

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

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	Microbiology 2	6	S	C	4
91354	Anatomical Pathology	6	A	C	3
91355	Haematology 1	3	S	4	4
91704	Behavioural Sciences	6	S	4	C
91705	Medical Devices and Diagnostics	6	S	4	C
91331	Microbiology 3	8	A	5 e ¹	5
91332	Molecular Biology 1	8	A	5 o ¹	5
91344	Clinical Biochemistry 1	8	A	5 e ¹	5
91358	Haematology 2	8	A	5 o ¹	5
91707	Pharmacology 1	8	A	5	C
91335	Molecular Biology 2	8	S	6 o ¹	6
91338	Clinical Bacteriology	8	S	6 e ¹	6
91340	Transfusion Science	8	S	6 o ¹	6
91345	Clinical Biochemistry 2	8	S	6 e ¹	6
91352	Eukaryotic Microbiology	8	S	6 o ¹	6
91359	Immunology 2	8	S	6 e ¹	6
91708	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.

Pathology strand**Stage 5**

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

Stage 6

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

Immunology strand**Stage 5**

91332	Molecular Biology 1 <i>plus</i> Additional electives	8cp 16cp
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Stage 6

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

Bachelor of Science in Biotechnology

- ◆ *Course code: KB06*
- ◆ *Testamur title: Bachelor of Science in Biotechnology*
- ◆ *Abbreviation: BSc*
- ◆ *Course Director: Associate Professor K Broady*
- ◆ *Course fee: HECS*

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

60 Undergraduate courses

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: Course Director

Associate Professor K Broady
Department of Cell and Molecular Biology
telephone (02) 9514 4101
fax (02) 9514 4026
email Kevin.Broady@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
	<i>one of</i>	
68201	Physics 2	6cp
91312	Biology 2	6cp
	<i>or</i>	
	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

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
	<i>one of</i>	
68201	Physics 2	6cp
91312	Biology 2	6cp
	<i>or</i>	
	Other approved science subject	6cp

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

Stages 3 and 4 – in 2001 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

Stage 5

Autumn semester

91332	Molecular Biology 1	8cp
	Electives ¹ /second major	8cp

Spring semester

91335	Molecular Biology 2	8cp
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Stage 6

Autumn semester

91369	Applied and Environmental Microbiology	8cp
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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 the 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 the Biotechnology course (Biological, Biomedical and Environmental Science subjects)

Subject number	Subject name	Credit points	Sem A/S	Recommended stage for subject ¹
91315	Biomonitoring	3	A	3
91320	Biochemistry 2	6	S	4
91331	Microbiology 3	8	A	5 e ¹
91122	Environmental Management	6	S	6
91338	Clinical Bacteriology	8	S	6 e ¹
91114	Toxicity Assessment	6	S	6
91352	Eukaryotic Microbiology	8	S	6 o ¹
91359	Immunology 2	8	S	6 e ¹
91398	Special Reading Assignment LS ²	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 Earth and Environmental Science

- ◆ *Course code:* NG05
- ◆ *Testamur title:* Bachelor of Science in Earth and Environmental Science
- ◆ *Abbreviation:* BSc
- ◆ *Course Director:*
Associate Professor C G Skilbeck
- ◆ *Course fee:* HECS

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.

All students are encouraged to consult the departmental web site at:

<http://www.science.uts.edu.au/depts/des/desees.html>

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
Earth and Environmental Science
Associate Professor Greg Skilbeck
Department of Environmental Sciences
telephone (02) 9514 1760
fax (02) 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 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 ¹	6cp
91395	Biocomputing	3cp

Stage 3

Autumn semester

66304	Earth Materials	6cp
66305	Fold Belts and Cratons	6cp
68041	Physics 1A	6cp
91110	Experimental Design and Sampling ¹	6cp

Stage 4

Spring semester

66408	Earth Resources	6cp
66409	Surficial Processes and Products	6cp
66510	Geophysics	6cp
	either	
91112	Ecological Principles and Modelling	6cp
	or	
91309	Australian Biota ¹	6cp

Stage 5

Autumn semester

91120	Mapping and Remote Sensing	6cp
66508	Crustal and Mantle Processes	6cp
66509	Tectonics and Surface Dynamics	6cp
	either	
91119	Terrestrial Ecosystems	6cp
	or	
91121	Aquatic Ecology ¹	6cp

Stage 6

Spring semester

66609	Environmental and Quaternary Geology	6cp
66611	Engineering and Groundwater Geology	6cp
91122	Environmental Management	6cp
	Elective ²	6cp

Part-time program

Stage 1

Autumn semester

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

Spring semester

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

Stage 2

Autumn semester

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

Spring semester

33106	Statistical Design and Analysis (2 sem)	3cp
91312	Biology 2 ¹	6cp
91395	Biocomputing	3cp

Stage 3

Autumn semester

66304	Earth Materials	6cp
68041	Physics 1A	6cp

Spring semester

66408	Earth Resources	6cp
	either	
91112	Ecological Principles and Modelling	6cp
	or	
91309	Australian Biota	6cp

Stage 4

Autumn semester

66305	Fold Belts and Cratons	6cp
91110	Experimental Design and Sampling	6cp

Spring semester

66409	Surficial Processes and Products	6cp
66510	Geophysics	6cp

Stage 5

Autumn semester

91120	Mapping and Remote Sensing	6cp
66508	Crustal and Mantle Processes	6cp

Spring semester

66609	Environmental and Quaternary Geology	6cp
	Elective ²	6cp

Stage 6

Autumn semester

66509	Tectonics and Surface Dynamics	6cp
	either	
91119	Terrestrial Ecosystems	6cp
	or	
91121	Aquatic Ecology	6cp

Spring semester

66611	Engineering and Groundwater Geology	6cp
91122	Environmental Management	6cp

¹ These are second major subjects.² Students may choose any subject from within the Department, Faculty or University provided they meet the pre- or co-requisite requirements. Students in Earth and Environmental Sciences are strongly recommended to enrol in 66612 Geological Mapping.

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	Applied 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
- ◆ *Testamur title:* Bachelor of Science (Honours) in Geoscience
- ◆ *Abbreviation:* BSc(Hons)
- ◆ *Course fee:* HECS

Bachelor of Science (Honours) in Environmental Science

- ◆ *Course code:* NG07
- ◆ *Testamur title:* Bachelor of Science (Honours) in Environmental Science
- ◆ *Abbreviation:* BSc(Hons)
- ◆ *Course fee:* HECS

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 2000 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
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Stage 2

66854	Honours (Geoscience) (2 sem)	24cp
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Full-time program

Bachelor of Science (Honours) in Environmental Science

Stage 1

66855	Honours (Environmental Science) (2 sem)	24cp
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Stage 2

66855	Honours (Environmental Science) (2 sem)	24cp
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Bachelor of Science in Environmental Biology

- ◆ *Course code: KB05*
- ◆ *Testamur title: Bachelor of Science in Environmental Biology*
- ◆ *Abbreviation: BSc*
- ◆ *Course Director: Dr R Lim*
- ◆ *Course fee: HECS*

From 2000 onwards all subjects in this degree will be worth 6 credit points with the exception of Mathematics 1 and Biocomputing. Students who commenced their studies before 1999 should carefully read the Subject Descriptions (this handbook) and must consult with the Course Director before choosing a final program. The names and numbers of some subjects have changed and students need to be aware of these. All students are encouraged to consult the departmental web site at:

<http://www.science.uts.edu.au/depts/des/deseb.html>

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 microorganisms, and in freshwater, marine and terrestrial ecosystems. From 2000 onwards, several specialised second majors will be available (see Course Structure section).

During their studies students will have the opportunity to take part in field trips to many parts of the eastern part of Australia, for example, north and south coast areas, Snowy Mountains, Murrumbidgee Irrigation Area, the far west, Jervis Bay and Heron Island. Students should note, however, that excursions for field study elective subjects may be held in the weeks prior to semester and in other non-teaching weeks of the year, including weekends. The major field trips are elective subjects listed separately below. The timetable for field trips scheduled to run in 2000 will be available prior to enrolment in late 1999.

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 of full-time or six years of part-time attendance (see below) 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 award of a Diploma in Scientific Practice.

From 2000 onwards the Environmental Biology degree will be divided into a major area of study, consisting of core environmental biology (72 credit points) and core support (mathematics, statistics, computing, chemistry) (30 credit points) subjects, and a second major or other elective area of study (comprising 42 credit points). Four specialist second majors are available to students studying a major in environmental biology: Pollution Ecology, Wildlife Ecology, Freshwater Ecology or Coastal and Marine Sciences. The subject program for each of these is indicated below. Students should be aware that second majors in other science degree programs (listed later in this

66 Undergraduate courses

handbook), or any combination of subjects from within the University, can alternatively be studied to complete the 42 credit points outside the major area. Elective subjects can be chosen from any program elsewhere within the Department, Faculty or University, provided students can satisfy the prerequisites.

Students are strongly advised to consult with the Course Director, Environmental Biology, for advice on subject and second major selection.

All academic inquiries should be directed to:

Course Director, Environmental Biology

Dr Richard Lim

Department of Environmental Sciences

telephone (02) 9514 4037

fax (02) 9514 4079

email Richard.Lim@uts.edu.au

Note: Dr Lim will be on study leave in Spring 1999; intending students are advised to consult the Head of Department during that period.

Full-time major 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
	Elective/second major	6cp

Stage 2

Spring semester

33106	Statistical Design and Analysis (2 sem)	3cp
65022	Chemistry 2A	6cp
91312	Biology 2	6cp
91395	Biocomputing	3cp
	Elective/second major	6cp

Stage 3

Autumn semester

91110	Experimental Design and Sampling	6cp
91111	Pollution Assessment	6cp
91270	Plant Physiology	6cp
	Elective/second major	6cp

Stage 4

Spring semester

91112	Ecological Principles and Modelling	6cp
91309	Australian Biota	6cp
91363	Animal Ecophysiology	6cp
	Elective/second major	6cp

Stage 5

Autumn semester

91119	Terrestrial Ecosystems	6cp
91120	Mapping and Remote Sensing	6cp
91121	Aquatic Ecology	6cp
	Elective/second major	6cp

Stage 6

Spring semester

91122	Environmental Management	6cp
79004	Environmental Law and Science	6cp
	Elective/second major	6cp
	Elective/second major	6cp

Part-time major 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
	Elective/second major	6cp

Spring semester

33106	Statistical Design and Analysis (2 sem)	3cp
91395	Biocomputing	3cp
	Elective/second major	6cp

Stage 3

Autumn semester

91110	Experimental Design and Sampling	6cp
91270	Plant Physiology	6cp

Spring semester

91112	Ecological Principles and Modelling	6cp
91309	Australian Biota	6cp

Stage 4

Autumn semester

91111	Pollution Assessment	6cp
	Elective/second major	6cp

Spring semester

91363	Animal Ecophysiology	6cp
	Elective/second major	6cp

Stage 5

Autumn semester

91119	Terrestrial Ecosystems	6cp
91120	Mapping and Remote Sensing	6cp

Spring semester

79004	Environmental Law and Science	6cp
91122	Environmental Management	6cp

Stage 6

Autumn semester

91121	Aquatic Ecology	6cp
	Elective/second major	6cp

Spring semester

	Electives/second major	12cp
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Full-time electives/second major in Pollution Ecology

Stage 1

Autumn semester

	<i>either</i>	
66101	Earth Science 1	6cp
	<i>or</i>	
68041	Physics 1 A	6cp
	<i>or</i>	
91246	Plant Structure, Function and Culture	6cp

Stage 2

Spring semester

	<i>either</i>	
66204	Field Studies 1	6cp
	<i>or</i>	
68041	Physics 1A	6cp
	<i>or</i>	
68201	Physics 2	6cp

Stage 3

Autumn semester

91313	Biochemistry 1	6cp
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Stage 4

Spring semester

91114	Toxicity Assessment	6cp
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Stage 5

Autumn semester

	Elective ¹	6cp
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Stage 6

Spring semester

91113	Pollution Ecology	6cp
	Elective ¹	6cp

Full-time electives/second major in Wildlife Ecology

Stage 1

Autumn semester

	<i>either</i>	
66101	Earth Science 1	6cp
	<i>or</i>	
68041	Physics 1 A	6cp
	<i>or</i>	
91246	Plant Structure, Function and Culture	6cp

Stage 2

Spring semester

	<i>either</i>	
66204	Field Studies 1	6cp
	<i>or</i>	
68041	Physics 1A	6cp
	<i>or</i>	
68201	Physics 2	6cp

Stage 3

Autumn semester

	Elective ¹	6cp
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Stage 4

Spring semester

91245	Open Space Management	6cp
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Stage 5

Autumn semester

91116	Wildlife Ecology	6cp
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Stage 6

Spring semester

91113	Pollution Ecology	6cp
	<i>or</i>	
91117	Freshwater Ecology	6cp
	Elective ¹	6cp

¹ Students may choose any subject from within the Department, Faculty or University provided they meet the pre- or corequisite requirements.

Full-time electives/second major in Freshwater Ecology**Stage 1****Autumn semester**

<i>either</i>		
66101	Earth Science 1	6cp
<i>or</i>		
68041	Physics 1 A	6cp
<i>or</i>		
91246	Plant Structure, Function and Culture	6cp

Stage 2**Spring semester**

<i>either</i>		
66204	Field Studies 1	6cp
<i>or</i>		
68041	Physics 1A	6cp
<i>or</i>		
68201	Physics 2	6cp

Stage 3**Autumn semester**

91314	Microbiology 1	6cp
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Stage 4**Spring semester**

91114	Toxicity Assessment	6cp
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Stage 5**Autumn semester**

91118	Fisheries Resources	6cp
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Stage 6**Spring semester**

91117	Freshwater Ecology	6cp
	Elective ¹	6cp

¹ Students may choose any subject from within the Department, Faculty or University provided they meet the pre- or corequisite requirements.

Full-time electives/second major in Coastal and Marine Sciences**Stage 1****Autumn semester**

66101	Earth Science 1	6cp
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Stage 2**Spring semester**

66204	Field Studies 1	6cp
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Stage 3**Autumn semester**

	Elective ¹	6cp
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Stage 4**Spring semester**

98711	Coastal Resource Policy	6cp
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Stage 5**Autumn semester**

91118	Fisheries Resources	6cp
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Stage 6**Spring semester**

98708	Environmental Risk Assessment	6cp
	Elective ¹	6cp

¹ Students may choose any subject from within the Department, Faculty or University provided they meet the pre- or corequisite requirements. However, students undertaking the electives/second major in Coastal and Marine Science are strongly recommended to enrol in 91124 Coastal and Marine Ecology and 91126 Coral Reef Ecosystems.

Elective field subjects in the Department of Environmental Sciences

66612	Geological Mapping	6cp
91124	Coastal and Marine Ecology	6cp
91126	Coral Reef Ecosystems	6cp
91370	Semi-Arid Ecology	6cp
91371	Mountain Ecology	6cp

Bachelor of Science in Environmental and Urban Horticulture

- ◆ *Course code: KB03*
- ◆ *Testamur title: Bachelor of Science in Environmental and Urban Horticulture*
- ◆ *Abbreviation: BSc*
- ◆ *Course Director: Dr Lou DeFilippis*
- ◆ *Course fee: HECS*

From 2000 onwards all subjects in this degree will be worth 6 credit points with the exception of Mathematics 1 and Biocomputing. Students who commenced their studies before 1999 should carefully read the Subject Descriptions (this handbook) and must consult with the Course Director before choosing a final program. The names and numbers of some subjects have changed and students need to be aware of these. All students are encouraged to consult the departmental web site at:

<http://www.science.uts.edu.au/depts/des/deseuh.html>

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 sciences 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 plant production systems and open space areas.

Excursions will be undertaken in the Sydney metropolitan area and in other parts of the state. 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 of the year, including weekends. The timetable for field trips scheduled to run in 2000 will be available prior to enrolment in late 1999.

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 of full-time or six years of part-time attendance (see below) 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 award of a Diploma in Scientific Practice.

From 2000 onwards the Environmental and Urban Horticulture degree will be divided into a major area of study, consisting of core horticulture (72 credit points) and core support (mathematics, statistics, computing, chemistry) (30 credit points) subjects, and a second major or other elective area of study (comprising 42 credit points). The recommended electives/second major for Environmental and Urban Horticulture students is in Environmental Biology and this is the program shown below. Students should be aware, however, that electives/second majors in other science degree programs (listed later in this handbook), or any combination of subjects from within the University, can alternatively be studied to complete the 42 credit points outside the major area. An Electives/Second major in either molecular biology or microbiology (see Electives/Second Majors section of this handbook) would be a suitable alternative to the Environmental Biology option. Elective subjects can be chosen from anywhere in the Department, Faculty or University, provided students can satisfy the prerequisites.

Students are strongly advised to consult with the Course Director, Environmental and Urban Horticulture, for advice on subject and electives/second major selection.

70 Undergraduate courses

All academic enquiries should be directed to:

Course Director
Environmental and Urban Horticulture
Dr Lou DeFilippis
Department of Environmental Sciences
telephone (02) 9514 4152
fax (02) 9514 4079
email Lou.DeFilippis@uts.edu.au

Full-time program

(Second major subjects are in italics.)

Stage 1

Autumn semester

33101	Mathematics 1 (LS)	3cp
33106	Statistical Design and Analysis (2 sem)	3cp
65012	Chemistry 1A	6cp
91246	Plant Structure, Function and Culture	6cp
91311	Biology 1	6cp

Stage 2

Spring semester

33106	Statistical Design and Analysis (2 sem)	3cp
65022	Chemistry 2A	6cp
91247	Landscape Design and Plant Culture	6cp
91312	Biology 2	6cp
91395	Biocomputing	3cp

Stage 3

Autumn semester

91110	Experimental Design and Sampling	6cp
91111	<i>Pollution Assessment</i>	6cp
91233	Plant Production and Growth Media	6cp
91270	Plant Physiology	6cp

Stage 4

Spring semester

91112	<i>Ecological Principles and Modelling</i>	6cp
91234	Uses of Australian Plants	6cp
91237	Plant Pathology	6cp
91309	<i>Australian Biota</i>	6cp

Stage 5

Autumn semester

91120	Mapping and Remote Sensing	6cp
91121	<i>Aquatic Ecology</i>	6cp
91250	Plants in the Landscape	6cp
	<i>Elective¹</i>	6cp

Stage 6

Spring semester

91245	Open Space Management	6cp
91248	Plant Production Systems	6cp
91249	Plant Genetics and Breeding	6cp
	<i>either</i>	
91122	Environmental Management	6cp
	<i>or</i>	
79004	<i>Environmental Law</i>	6cp

Part-time program

(Second major subjects are in italics.)

Stage 1

Autumn semester

91246	Plant Structure, Function and Culture	6cp
91311	Biology 1	6cp

Spring semester

91247	Landscape Design and Plant Culture	6cp
91312	Biology 2	6cp

Stage 2

Autumn semester

33101	Mathematics 1 (LS)	3cp
33106	Statistical Design and Analysis (2 sem)	3cp
65012	Chemistry 1A	6cp

Spring semester

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

Stage 3

Autumn semester

91233	Plant Production and Growth Media	6cp
91270	Plant Physiology	6cp

Spring semester

91112	Ecological Principles and Modelling	6cp
91237	Plant Pathology	6cp

Stage 4

Autumn semester

91111	Pollution Assessment	6cp
91110	<i>Experimental Design and Sampling</i>	6cp

Spring semester

91234	Uses of Australian Plants	6cp
91309	<i>Australian Biota</i>	6cp

Stage 5

Autumn semester

91120	<i>Mapping and Remote Sensing</i>	6cp
91250	Plants in the Landscape	6cp

Spring semester

91245	Open Space Management	6cp
91249	Plant Genetics and Breeding	6cp

Stage 6

Autumn semester

91121	Aquatic Ecology	6cp
	<i>Elective¹</i>	6cp

Spring semester

91248	Plant Production Systems	6cp
	<i>either</i>	
91122	Environmental Management	6cp
	<i>or</i>	
79004	Environmental Law and Science	6cp

¹ Students may choose any subject from within the Department, Faculty or University provided they meet the pre- or corequisite requirements.

Bachelor of Science/ Bachelor of Laws

- ◆ *Course code: LL04*
- ◆ *Testamur title: Bachelor of Science Bachelor of Laws*
- ◆ *Abbreviation: BSc LLB*
- ◆ *Course Director (Science): Associate Professor R T Buckney*
- ◆ *Course fee: HECS*

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

72 Undergraduate courses

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 (02) 9514 4044
fax (02) 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 *2000 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 (Transition Metal Chemistry)	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 (Structure Elucidation and Synthesis)	6cp
65509	Inorganic Chemistry 2 (New Inorganic Materials)	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 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
91120	Mapping and Remote Sensing	6cp
66408	Earth Resources	6cp
66305	Fold Belts and Cratons	6cp
66611	Engineering and Groundwater Geology	6cp
66409	Surficial Processes and Products	6cp
66508	Crustal and Mantle Processes	6cp
66510	Geophysics	6cp
66609	Environmental and Quaternary Geology	6cp
66509	Tectonics and Surface Dynamics Science electives	6cp 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 Biomedical Science electives Science electives	6cp 24cp 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 Science electives	8cp 10cp

Environmental Biology (96 credit points)

91311	Biology 1	6cp
65101	Chemistry 1C	6cp
91312	Biology 2	6cp
65201	Chemistry 2C	6cp
91110	Experimental Design and Sampling	6cp
33106	Statistical Design and Analysis (2 sem)	6cp
91111	Pollution Assessment	6cp
91395	Biocomputing	3cp
91270	Plant Physiology	6cp
91112	Ecological Principles and Modelling	6cp
91309	Australian Biota	6cp
91363	Animal Ecophysiology	6cp
91119	Terrestrial Ecosystems	6cp
91120	Mapping and Remote Sensing	6cp
91121	Aquatic Ecology	6cp
91122	Environmental Management Elective	6cp 3cp

Environmental and Urban Horticulture (96 credit points)

91246	Plant Structure, Function and Culture	6cp
91311	Biology 1	6cp
91247	Landscape Design and Plant Culture	6cp
91110	Experimental Design and Sampling	6cp
91312	Biology 2	6cp
91233	Plant Production and Growth Media	6cp
91234	Uses of Australian Plants	6cp
91120	Mapping and Remote Sensing	6cp
91395	Biocomputing	3cp
91270	Plant Physiology	6cp
91248	Plant Production Systems	6cp
91237	Plant Pathology	6cp
91250	Plants in the Landscape	6cp
91245	Open Space Management	6cp
91249	Plant Genetics and Breeding	6cp
	Science electives	9cp

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*
- ◆ *Testamur title: Bachelor of Medical Science Bachelor of Laws*
- ◆ *Abbreviation: BMedSc LLB*
- ◆ *Course Director: Dr G Nicholson*
- ◆ *Course fee: HECS*

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 (02) 9514 2230/(02) 9514 2234
fax (02) 9514 2228
email Graham.Nicholson@uts.edu.au

Course program¹

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
<i>or</i>	
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 2000 *Faculty of Law Handbook* for elective Law subjects.

Bachelor of Science/ Bachelor of Arts in International Studies

- ◆ *Course code:* N004
- ◆ *Testamur title:* Bachelor of Science
Bachelor of Arts in International Studies
- ◆ *Abbreviation:* BSc BA
- ◆ *Course Director:*
Associate Professor R T Buckney
- ◆ *Course fee:* HECS

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, France, Germany, Greece, Indonesia, Italy, Japan, Malaysia, Mexico, Russia, South China, Spain, Taiwan, Thailand and Vietnam. In general, the International Studies program has no prior language requirement, except for entry to the Vietnam major 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 program¹

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:

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 *Institute for International Studies Handbook 2000*.

Bachelor of Science/ Bachelor of Business

- ◆ *Course code: N006*
- ◆ *Testamur title: Bachelor of Science
Bachelor of Business*
- ◆ *Abbreviation: BSc BBus*
- ◆ *Course Director:
Associate Professor R T Buckney*
- ◆ *Course fee: HECS*

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

Students must complete 96 credit points from each degree program, with subjects normally taken concurrently from both degrees. (See 'Recommended Science strands' on page 72.) 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.

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 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 time-tabling 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, though 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 and major subjects	12cp
Business core subjects	12cp

Stage 4

Spring semester

Science foundation and major 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 2000 *Faculty of Business Handbook*.

Recommended Science major subjects are detailed in the Bachelor of Science/Bachelor of Laws course description.

Bachelor of Medical Science/Bachelor of Business

- ◆ *Course code: N007*
- ◆ *Testamur title: Bachelor of Medical Science Bachelor of Business*
- ◆ *Abbreviation: BMedSc BBus*
- ◆ *Course Director: Associate Professor R T Buckney*
- ◆ *Course fee: HECS*

This course is similar to the Bachelor of Science/Bachelor of Business course N006. Recommended science subjects are given in the description of the Medical Science/Law program.

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
91110	Experimental Design and Sampling	6cp
91112	Ecological Principles and Modelling	6cp

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
66611	Engineering and Groundwater Geology	6cp
66609	Environmental and Quaternary Geology	6cp
66408	Earth Resources	6cp
91120	Mapping and Remote Sensing Geochemistry / organic geochemistry elective for SUCOGG	6cp

Applied Chemistry

65306	Analytical Chemistry 1	6cp
65409	Analytical Chemistry 2	6cp
65202	Organic Chemistry 1	6cp
65508	Organic Chemistry 2 (Structure Elucidation and Synthesis)	6cp

Medical Science

91701	Medical Science 1	6cp
91702	Medical Science 2	6cp
	<i>plus at least two of</i>	
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
	<i>plus any 2 of</i>	
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
	<i>plus three or more of the following</i>	
68311	Physics 3	6cp
68312	Applied Physics 1	6cp
68412	Applied Physics 2	6cp
68512	Applied Physics 3	6cp

Pathophysiology¹

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

Neurophysiology¹

(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.

33401	Introductory Mathematical Methods	6cp
35252	Statistics 2	6cp
<i>together with any two of</i>		
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
35101	Mathematics 1	6cp
35102	Mathematics 2	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

<i>at least 24 credit points from the following</i>		
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
<i>plus one of the following</i>		
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
	<i>plus one of the following</i>	
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

50226	Communication and Information Environments	8cp
50227	Media, Information and Society	8cp
50124	Information Needs and Uses	8cp
50125	Communication and Audience	8cp
50126	Information and the Organisation	8cp
50127	International Communication	8cp
50128	Media, Information and the Law	8cp
50129	News and Current Affairs	8cp
50130	Organisation Change and Communication	8cp
50179	Virtual Communities	8cp

Information

at least three of the following

50232	Information in Society	8cp
50223	Information Resources	8cp
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

50238	Public Communication Processes	8cp
50239	Public Communication Challenges	8cp
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:

- Communication and English Language Studies
- Cultural Studies
- Journalism
- Social Inquiry
- Social, Political and Historical Studies
- Writing

Please consult the *2000 Faculty of Humanities and Social Sciences Handbook* for further information or online at:

<http://www.uts.edu.au/div/publications/hss/index.html>

or telephone (02) 9514 2300 for further details.

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 consult the *2000 Faculty of Education Handbook* or online at:

<http://www.uts.edu.au/div/publications/edu/index.html>

POSTGRADUATE COURSES

General information

The Faculty offers both PhD and Master's programs by research and thesis. There are also several Master's by coursework and a Graduate Diploma. 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. 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 Education, Training and Youth Affairs (DETYA) 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 DIPLOMA

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 Calendar* or online at: <http://www.uts.edu.au/div/publications/policies/rules/contents.html>

Graduate Diploma in Hydrogeology and Groundwater Management

- ◆ *Course code: N061*
- ◆ *Testamur title: Graduate Diploma in Hydrogeology and Groundwater Management*
- ◆ *Abbreviation: GradDipHGM*
- ◆ *Course fee: HECS*

Autumn semester

- 66014 Hydrogeology
- 49550 Computing for Groundwater Specialists¹
- 49555 Groundwater Modelling
- 66015 Hydrogeochemistry
- 49551 Surface Hydrology and Groundwater Elective 1
- Elective 2

¹ This is a non-credit subject available to students whose computing background requires strengthening.

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

For further information contact:

Course Director, Hydrogeology and Groundwater Management
Professor M J Knight
telephone (02) 9514 1984
fax (02) 9514 1985
email groundwater.management@uts.edu.au

MASTER'S DEGREES (BY COURSEWORK)

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

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 Health Science in Traditional Chinese Medicine

- ◆ *Course code:* NH61
- ◆ *Testamur title:* Master of Health Science in Traditional Chinese Medicine
- ◆ *Abbreviation:* MHLthSc
- ◆ *Course Director:* Mr Yang Cong Xing
- ◆ *Course fee:* \$7,500 (\$3,750 per year)

This course is designed for students who wish to gain the knowledge and skills to prescribe Chinese Herbal Medicines.

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.

Stage 1

Autumn semester

99599	Principles of Chinese Herbal Medicine	8cp
99600	Graduate Clinic Level 1 (CHM) (2 semesters)	4cp

Spring semester

99612	Principles of Chinese Herbal Prescriptions	6cp
99613	Principles of Pharmacology in Chinese Medicine	6cp

Stage 2

Autumn semester

99614	Classics of Chinese Herbal Medicine	4cp
99615	Graduate Clinic Level 2 (CHM) (2 semesters)	3cp
99594	Chinese Herbal Practice 1	6cp

Spring semester

99596	Chinese Herbal Practice 2	6cp
99597	Graduate Clinical Internship (CHM)	5cp

For further information and details about subject syllabuses contact:

Course Director
Traditional Chinese Medicine
Mr Yang Cong Xing
telephone (02) 9514 7854
fax (02) 9281 2267
email Congxing.yang@uts.edu.au

Master of Occupational Health and Safety Management

- ◆ *Course code:* P055
- ◆ *Testamur title:* Master of Occupational Health and Safety Management
- ◆ *Abbreviation:* MOHSM
- ◆ *Course Director:* Dr D Cobbin
- ◆ *Course fee:* \$6,500 (\$3,250 per year)

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/liase 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 program

The course has been reviewed in 1999 and, subject to final approval, several subjects have been restructured.

The following subjects will be offered in 2000:

Autumn semester

69312	Occupational Hazard Analysis	6cp
69325	Data Analysis in Occupational Health and Safety	3cp
69323	Human Factors/Ergonomic Design	3cp
69341	Risk Management	6cp
69344	Occupational Health and Safety Management (replaces 69313 and 69343)	6cp

Spring semester

69336	Evaluating OHS (Construction Industry)	6cp
69342	Legal Aspects of Occupational Health and Safety	3cp
69311	Occupational Health and Safety in Society	3cp
69338	Biological Hazards and Toxicology (replaces 69324 and 69334)	6cp
69332	Chemical Safety Management	3cp
69335	People and the Physical Environment	3cp

For further information contact:

Course Director, Occupational Health and Safety Management

Dr D Cobbin

telephone (02) 9514 2231 or (02) 9514 2227

fax (02) 9514 2228

email Deirdre.Cobbin@uts.edu.au

Master of Occupational Health and Safety Management (Honours)

- ◆ *Course code: P057*
- ◆ *Testamur title: Master of Occupational Health and Safety Management (Honours)*
- ◆ *Abbreviation: MOHSM(Hons)*
- ◆ *Course Director: Dr D Cobbin*
- ◆ *Course fee: \$3,250*

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 (02) 9514 2231 or (02) 9514 2227

fax (02) 9514 2228

email Deirdre.Cobbin@uts.edu.au

Master of Science in Hydrogeology and Groundwater Management

- ◆ *Course code: N057*
- ◆ *Testamur title: Master of Science in Hydrogeology and Groundwater Management*
- ◆ *Abbreviation: MSc*
- ◆ *Course Director: Professor M J Knight*
- ◆ *Course fee: HECS*

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 program

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 Specialists¹
 - 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 (02) 9514 1984

fax (02) 9514 1985

email groundwater.management@uts.edu.au

POSTGRADUATE DEGREES BY RESEARCH/THESIS

The Master's and PhD programs are designed for graduates who wish to develop a career in the biological, biomedical, environmental, earth, chemical or 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 (02) 9514 2490
 fax (02) 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 strongly recommended that students will have passed NSW HSC 2-unit Chemistry or equivalent, or at least attended the UTS Chemistry Bridging Course

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

90 Subject descriptions

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, 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 (02) 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.

92 Subject descriptions

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.

65521

Applied Organic Chemistry

6cp; 6hpw; prerequisites: all Stage 4 subjects; subject coordinator: Dr J Kalman

This subject looks at selected advanced topics in organic chemistry, focusing on organic reaction mechanisms, photochemistry and spectroscopic elucidation of organic structures.

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), 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: Chemistry 1, 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, 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; prerequisites: 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.

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 1***6cp*

This is an entry level subject to the study of Earth Science concepts that introduces students to the basics necessary for geoscientific and environmental studies. The dynamic Earth and its materials; the structure and evolution of the crust, continents, oceans and the atmosphere. Geological history – what the rock sequences are telling us; time sequencing of major events which shaped our planet; the development of life forms and geological controls on these; structural geology. Introduction to landscape development – fluvial and arid, the coastal zone; geological hazards; groundwater; engineering geology; resources and mining; environmental geology. Weekly practical classes cover a wide range of skills in map reading, examination and description of sediments, minerals, rocks and fossils; geological interpretation. These are complimented by two full-day field excursions and other self-paced fieldwork.

66204**Field Studies 1**

6cp; approximately 3-4 hpw for 10 weeks, six-day field excursion in NSW, and up to 4 local half-day excursions; prerequisites: 66101 Earth Science 1, 91311 Biology 1

An introduction to field techniques in the earth and environmental sciences. Introduction to air photographs and satellite imagery; use of these and topographic and other maps in the field. Concepts of land tenure, ethics and safety in the field. Methods of systematic study – gridding, transects, maps and plans on the local scale. Basic geological mapping, stratigraphic principles, examination of landscape changes with time. As appropriate, use and development of thematic and soils maps. Much of the subject will be taught during one major field camp and supported by one or more afternoons of local fieldwork.

66304**Earth Materials**

6cp; prerequisites: 33101 Mathematics 1 (LS) (or equivalent), 65012 Chemistry 1A, 66101 Earth Science 1

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; prerequisites: 66101 Earth Science 1

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.

66408

Earth Resources

6cp; 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 petroliferous sediments. Concepts of exploration and resource estimation. Alternate energy sources and their viability.

66409

Surficial Processes and Products

6cp; prerequisites: 66204 Field Studies 1, 66304 Earth Materials, 65012 Chemistry 1A, 91311 Biology

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

6cp; prerequisites: 66304 Earth Materials, 66305 Fold Belts and Cratons

Mantle-crust interactions as expressed by igneous activity at ocean ridges, intraplate settings and subduction zones. High pressure metamorphic processes and products at convergent margins. Crustal processes responsible for the formation of metamorphic rocks. 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 the use of analytical equipment.

66509

Tectonics and Surface Dynamics

6cp; 4 hpw lectures/tutorials, 2 hpw flexible; prerequisite: 66101 Earth Sciences 1

Development of ideas leading to the present understanding of dynamic systems controlling evolution of the lithosphere. Modern tectonic elements and their distribution in relation to present-day plate boundaries. Identification of plate boundary assemblages and other tectonic elements in ancient fold belts. Terrane analysis. Supercontinents and their dispersion. Island arcs, cordilleran orogens and intracontinental mountain belts. Tectonic development of Australia and its surrounding oceans. Interactions between tectonics and climate, ocean dynamics, plant and animal biogeography and erosion.

66510

Geophysics

6cp; prerequisites: 68041 Physics 1A or equivalent, 66101 Earth Science 1, 66408 Earth Resources

Review of solid earth geophysics including seismicity, magnetism, gravity and heat flow. 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. Two-day field excursion.

66609**Environmental and Quaternary Geology**

6cp; prerequisite: 66409 Surficial Processes and Products

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. Geological hazards and their recognition, management and alleviation. Pollution and anthropogenic interference with Earth systems and the problems that arise. Recognition of the environmental problems and methods for their control and alleviation.

66611**Engineering and Groundwater Geology**

6cp; includes several full and half-day excursions and field project work in the Sydney Basin; prerequisites: 66101 Earth Science 1, 33101 Mathematics 1 (LS), 65012 Chemistry 1A or equivalent; co- or prerequisite: 66409 Surficial Processes and Products

Chemical weathering and clay mineralogy. Rheological properties of rocks and soils, properties of fills and aggregates; unified soil classification system. Engineering rock mass concepts and classification. Engineering site investigations, aspects of testing rocks and soils. Soil and rock slope stability; concepts of urban development, special purpose investigations e.g. dams and tunnels. Basic concepts of hydrogeology; effective porosity, hydraulic conductivity of geologic materials, occurrence and flow of water in aquifers and soils, Darcy's Law, regional groundwater systems. The unsaturated zone. Elements of aqueous geochemistry and groundwater sampling. Water wells, construction of piezometers.

This subject replaces 66501 Engineering and Environmental Geology, 66061 Environmental Geology, 66034 Groundwater Geology and 66610 Engineering Geology. Students who have completed these should not enrol in Engineering and Groundwater Geology.

66612**Geological Mapping**

6cp; 10-day field excursion; prerequisite: 66204 Field Studies 1

Regional and detailed geological mapping in a range of settings using topographic, air photo and plan bases. Recording field observations. Field techniques in stratigraphy and structural geology. Traversing. Location determination by visual, compass, altimeter and GPS methods. Use of information from remote sensing and geophysical aerial surveys. Report preparation and data compilation. Presentation of geological maps and sections. Land tenure and interaction with landowners and other interested parties. Safety in the field.

66651**Convergent Margin Tectonics**

3cp; flexible including a 4-day field excursion; prerequisite: 66509 Tectonics and Surface Dynamics

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
other staff involved P G Lennox (UNSW)
K Klepeis (Sydney University)

66653**Applied Clastic Basin Analysis**

SUCOGG Elective 3cp; flexible

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 G Skilbeck
email Greg.Skilbeck@uts.edu.au

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

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 R Mawson
email rmawson@laurel.ocs.mq.edu.au
other staff involved Professor J Talent
Associate Professor B Webby Dr G Brock
(Macquarie University)

66942

Palaeobiology Part I

SUCOGG Elective 3cp; flexible

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 R Mawson
email rmawson@laurel.ocs.mq.edu.au
other staff involved Professor J Talent

66943

Coastal Environmental Assessments

SUCOGG Elective 3cp; flexible

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

other staff involved

Dr P C Rickwood (UNSW)

Dr E Frankel (UTS)

66944

Coal Exploration and Mining Geology

SUCOGG Elective 3cp; flexible

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 C Ward (UNSW)

email C.Ward@unsw.edu.au

other staff involved Mr G H McNally

Mr D Palmer (UNSW)

66947

Carbonates in Petroleum Exploration

SUCOGG Elective 3cp; flexible

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

other staff involved

Professor P Davies (Sydney University)

66949

Palaeobiology Part II

SUCOGG Elective 3cp; flexible

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 R Mawson

email rmawson@laurel.ocs.mq.edu.au

other staff involved Professor J Talent

66950

Geochemical Analysis Techniques and Applications

SUCOGG Elective 3cp; flexible

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
other staff involved Professor S Y O'Reilly
Professor T H Green (Macquarie University)
Professor W L Griffin (CSIRO)

66952

An Introduction to Phase Diagrams and Thermobarometry

SUCOGG Elective 3cp; flexible

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 G Clarke (Sydney University)
email geoffc@mail.usyd.edu.au
other staff involved
Associate Professor B Hensen

66953

Interpretation of 2D and 3D Seismic Reflection Data

SUCOGG Elective 3cp; flexible

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 D Palmer (UNSW)

email d.palmer@unsw.edu.au
other staff involved
Associate Professor C G Skilbeck (UTS)

66954

Processing of Seismic Reflection and Ground Penetrating Radar Data

SUCOGG Elective 3cp; flexible

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 D Palmer (UNSW)
 email d.palmer@unsw.edu.au
 other staff involved
 Professor I Mason (Sydney University)
 Dr K Gohl (Macquarie University)

66955

Geological and Structural Interpretation of Potential Field Data

SUCOGG Elective 3cp; flexible

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
 other staff involved Dr P G Lennox (UNSW)
 Mr D Palmer (UNSW)

66956

Deformation Processes

SUCOGG Elective 3cp; flexible

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 inter-crystalline (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 neocrystallisation 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

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 (Sydney University)
 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; prerequisites: 33222 Engineering Mathematics 2B, 42631 Mechanics 3

An introduction to the behaviour of mechanical vibrations. The content includes free and forced response of spring/mass/damper systems, two- and multidegree of freedom systems, torsional vibrations and transverse vibration of beams. Laplace transformation, mechanical impedance and matrix methods are used, and both analytical and computer-based numerical solutions are presented.

67101

Introduction to Materials

6cp; corequisite: 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; prerequisites: 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 fracture 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 the 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 course

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

104 Subject descriptions

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; prerequisite: 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: 33130 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 – electrostatics, 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 kinematics 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;, 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: 68311 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. Orthonormality, 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, 3290 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

6cp; 5hpw; prerequisites: 68201 Physics 2 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 68312 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 , 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; prerequisite: 8314 Electronics or 48520 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: ne 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: 68311 Physics 3, 68302 Applied Optics, 33330 Physical Mathematics

Image formation in an electron microscope. Diffraction theories. Contrast mechanisms. The transmission and scanning electron microscope. Microprobe and nanoprobe analysis.

68601**Quantum Physics 2**

3cp; 3hpw; prerequisite: 68401 Quantum Physics 1; corequisite: 33330 Physical Mathematics

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; prerequisites: 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

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.

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.

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.

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; prerequisite: 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).

69338**Biological Hazards and Toxicology***6cp; 4hpw*

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.

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 legislating, its interpretation, and the implications for the organisation and management of the occupational health and safety function.

69344

Occupational Health and Safety Management

6cp; 4hpw

This subject will bring together the management aspects of occupational health and safety through group exercises and case studies. It includes examination of the behaviour of people in organisations, and the dynamics of interpersonal and intergroup behaviour. It then deals 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.

91110

Experimental Design and Sampling

6cp; prerequisites: 91312 Biology 2; 91395 Biocomputing; 33106 Statistical Design and Analysis or equivalent

The principles and practice of scientific experimentation, with particular emphasis on biology. The essential steps in experimental design and analysis, and their roles. The source of experimental variability and the ways of effectively dealing with them. Environmental sampling procedures and designs. The logic of experimental and statistical hypothesis testing. The practical uses and limitations of these statistical tests in biology: multifactoral analysis of variance, correlation, multiple regression, chi-square. Techniques for analysing multivariate data, with emphasis on the pattern-analysis methods of ordination and clustering.

This subject replaces 91303 Experimental Design in Ecology and 91329 Ecological Sampling (or the equivalent subject 91376 Environmental Measurement). Students who have completed these subjects should not enrol in this subject.

91111

Pollution Assessment

6cp; prerequisites: 91312 Biology 2, 65012 Chemistry 1A or equivalent

This subject presents an overview of the sources and classes of major pollutants in aquatic and terrestrial ecosystems, their fates in the environment and the means of assessing their impact on the biota. It will introduce the concepts of bioaccumulation, biotransformations, acute and chronic toxicity as well as the applicability of field and laboratory methods in the biomonitoring process.

91112

Ecological Principles and Modelling

6cp; 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 field excursion which could be conducted before commencement of semester.

91113

Pollution Ecology

6cp; prerequisites: 91111 Pollution Assessment, 91112 Ecological Principles and Modelling

This subject addresses some of the current issues in pollution ecology and will include examination of relevant case studies. Natural and stress variability in ecosystems, snapshot vs long-term studies. Future development of toxicity assessment in ecotoxicology; microcosms, mesocosm, field studies. Early warning biomarkers of environmental degradation; impact of pollution of genetic diversity. Rehabilitation of contaminated sites, including bioremediation; alternatives to pesticides; endocrine disruptors and lifestyle effects of pollutants; toxicity modelling (QSARS and others); nexus between ecology of organisms

and their apparent responses to contaminants; the science underlying environmental quality guidelines.

91114

Toxicity Assessment

6cp; prerequisites: 91312 Biology 2, 65012 Chemistry 1A or equivalent

Physiological and cellular responses of organisms to toxic chemicals and the variety of assessment methods to compare their relative toxicities. Biological responses to toxic materials, conditions affecting their uptake and transformation, stress physiology; chronic and acute toxicity testing, bioassays and test protocols for terrestrial and aquatic systems (pesticides, herbicides); multispecies test. Biological and chemical principles of pest control; the safe use of pesticides. Criteria for selection of organisms; interpretation of test results; endpoints and biomarkers.

91116

Wildlife Ecology

6cp; prerequisite: 91309 Australian Biota

This subject covers a range of aspects including wildlife ecology and management in Australia and worldwide; behavioural ecology of vertebrate wildlife; the ecology of threatened and endangered species; anthropogenic impacts on Australian wildlife; captive breeding programs and the role of national parks in conservation; the ecology of native and introduced pest animals; conservation through sustainable use of wildlife.

91117

Freshwater Ecology

6cp; includes a number of compulsory field trips

Energy sources in freshwater lentic and lotic systems. Nutrient dynamics. Primary and secondary productivity. Trophic relationships; microbial processes; herbivory; predation; and competitive interactions. Limnological phenomena. River–floodplain interactions. Special features of Australian lentic and lotic systems and their biota. Ecological consequences of river regulation and introduced species. Human impacts on and management of freshwater ecosystems. Restoration of freshwater ecosystems. Professional practices in freshwater ecology.

112 Subject descriptions

91118

Fisheries Resources

6cp; prerequisites: 91112 Ecological Principles and Modelling

Freshwater, estuarine and marine biological resources and their exploitation will be examined. Problems of productivity against a background of regulations will be explored, and the major management requirements for ESD of coastal and freshwater fisheries resources addressed. NSW and Australian practices shall be examined in relation to best practices elsewhere. Some classes taught in excursion mode.

91119

Terrestrial Ecosystems

4cp; 3hpw; prerequisites: 93109 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.

91120

Mapping and Remote Sensing

6cp; prerequisites: 91395 Biocomputing, 91110 Experimental Design and Sampling (Earth and Environmental Science students should have completed 66305 Fold Belts and Cratons)

This senior subject caters to Earth and Environmental Science, Environmental Biology, and Environmental and Urban Horticulture students. It covers the properties of EM radiation and its interaction with the Earth's atmosphere. Qualitative and quantitative analysis and interpretation of aerial photographs and satellite imagery including Landsat TM and SPOT data, and microwave and thermal imaging are included. Students are introduced to the techniques of Geographical Information Systems (GIS) and digital image enhancement using specialist computing software, and image processing,

GIS design and analysis skills are provided. GIS will be used to address issues associated with resources management, while remote sensing techniques will be applied to the assessment of resources, such as forestry, coastal habitats and geological features.

91121

Aquatic Ecology

6cp; includes a compulsory field trip to Stroud, normally held in February; prerequisites: 91270 Plant Physiology, 91363 Animal Ecophysiology

Australian water resources. The hydrological cycle and catchment-water relationships. Structural components and functional processes of aquatic ecosystems; physical, chemical and biological features; nutrient cycles and energy flows. Distinctive features of lakes, wetlands, rivers and streams, estuaries, coastal lagoons and the sea. Ecology of algae, macrophytes, zooplankton, benthic macroinvertebrates, and vertebrates in aquatic systems. Food webs in aquatic ecosystems.

91122

Environmental Management

6cp; prerequisite: completion of Stages 1-5

Environmental Management is examined from different perspectives including the socio-economic and community aspects. Global issues as well as Australian environmental issues are considered. Integrated environmental management is offered as a means of limiting effects of problems. This is considered in the light of environmental ethics and legislation. Other aspects include risk environmental impact assessment and consequences including the evaluation process. Tools used for capacity building are developed. Several major case studies are explored. Agenda 21 issues and sustainable use of environmental resources are emphasised.

91124

Coastal and Marine Ecology

6cp; includes a 5-day field excursion to Jervis Bay, normally held in February; prerequisites: satisfactory completion of Stages 1 and 2, including 66204 Field Studies 1

The subject provides an introduction to marine ecology. It examines a wide range of temperate marine habitats and communities including: seagrasses, fishes, sandy shores, mangroves and intertidal invertebrates, as well as coastal geological processes. The subject includes 10 hours of formal lectures, 40 hours of practical

work on site, a written exam and a report on one of the detailed investigations performed during the field trip.

Enrolment in this subject is restricted by the accommodation at the University of Canberra Field Station. Preference will be given firstly to Environmental Biology students who are enrolled in the Coastal and Marine Sciences sub-major, and thereafter will be based on academic performance over Stages 1 and 2. This subject was previously called Field Studies: Introductory Marine Sciences. Do not enrol in Coastal and Marine Ecology if you have completed Field Studies: Introductory Marine Sciences.

91125

Undergraduate Research Project

6cp; prerequisite: completion of Stages 1-5, normally at distinction level

This subject is an elective which is intended to be undertaken in the final semester of study in the Environmental Biology, Environmental and Urban Horticulture, or Earth and Environmental Science degrees, by students clearly intending to pursue a career in scientific research. It involves the planning, execution, analysis and reporting of a research project, under the supervision of a member of the academic staff. The project can be based on field and/or laboratory study. An additional requirement is that students attend all departmental research seminars. Entrance is normally restricted to students who have a distinction WAM in Stages 3–5, prior approval of the Head of Department, a prearranged research project and agreement of the intended supervisor.

91126

Coral Reef Ecosystems

6cp; includes a 9-day field excursion to Heron Island, normally held in July; prerequisite: 91124 Coastal and Marine Ecology

During this senior level elective field subject, students will examine in detail the ecology and geology of a coral reef environment. As part of the study, students carry out a group research project on an area of special interest with the reef environment. The subject requires a literature survey prior to attendance on the excursion and preparation of a field report following completion of the field work. The subject covers a range of aspects of the marine environment, including chemical, biological,

physical and geological oceanography, in addition to the biology of fishes, benthic fauna, plants and sediments.

Enrolment in the subject is restricted by the availability of space at the Heron Island Research Station and preference will be given firstly to Environmental Biology students who are enrolled in the Coastal and Marine Sciences sub-major, and thereafter will be based on academic performance over Stages 3–5. The subject was formerly called Field Studies: Advanced Marine Sciences.

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 Szytynda on telephone (02) 9514 4157 before enrolling in this subject.

91150

Biology and Ecology for Engineers

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.

91233

Plant Production and Growth Media

6cp; prerequisites: 65012 Chemistry 1A, 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 nutrient, 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; 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

91237

Plant Pathology

6cp; 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.

91245

Open Space Management

6cp; prerequisite: 91270 Plant Physiology

This subject is 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. The subject considers landscape management principles, including the organisation of landscape management and the role of planning. Integral to this subject are contributions from industry experts in diverse areas of open space management. Several case studies in open space management are examined and the importance of obtaining accurate information for decision making is highlighted.

91246

Plant Structure, Function and Culture

6cp

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 enhancement of the urban surroundings. The subject also introduced 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.

This subject replaces 91231 Horticulture 1. Students who have completed this subject should not enrol in Plant Structure, Function and Culture.

91247

Landscape Design and Plant Culture

6cp; prerequisites: 91246 Plant Structure, Function and Culture

This subject introduces students to landscape studies by considering 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. The subject also introduces students to a wide variety of plant materials used to enhance urban surroundings, including annual, perennial, herbaceous, woody, exotic and native

plant species. Also studied are techniques of plant propagation. The subject provides an introduction to irrigation systems used in nurseries and open space areas, including computerised systems, and methods of greenhouse environmental control.

This subject replaces 91230 Landscape Design and 91232 Horticulture 2. Students who have completed these subjects should not enrol in this subject.

91248

Plant Production Systems

6cp; prerequisites: 91246 Plant Structure, Function and Culture

This subject consists of two equal parts; plant tissue culture and horticultural production management. In plant tissue culture students are introduced to plant cell and tissue culture, and the application of these techniques to cloning, somatic embryogenesis, somaclonal variation, anther and pollen culture, totipotent suspension as means of multiplication, phenotypic and genetic stability of tissue cultured plants. The program also includes media preparation, and nutrient requirements. Use of robotics and biofermentors in micropropagation. Pathogen detection and elimination, production of virus free plants, pathogen indexing, certification of horticultural crops. Plant quarantine and international shipment of tissue cultures plants. Germplasm preservation; cryopreservation, long-term storage. Biosecondary metabolites. Physiological status of micropropagated plants, transplanting, hardening off stages. Practices and problems in micropropagation such as vitrification, phenolic exudates, vessel environment. Laboratory design and large-scale production. Students are introduced to experiments involving plant tissue culture technology. Special emphasis is given to Australian indigenous and rare flora.

Horticultural production management will develop student 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 the 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.

91249

Plant Genetics and Breeding

6cp; 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.

91250

Plants in the Landscape

6cp; prerequisite: 91270 Plant Physiology

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.

91270

Plant Physiology

6cp; prerequisite 66312 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.

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.

91309

Australian Biota

6cp; 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

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; prerequisites: 91311 Biology 1

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

Central place of biochemistry in life sciences. Structures and properties of monosaccharides, polysaccharides, fatty acids, lipids, amino acids, peptides, proteins, nucleosides, nucleotides, nucleic acids. Catabolism, anabolism, energy flow. Enzymes as controlling elements in metabolic pathways. Overview of main carbohydrate flow pathways in metabolism. Glycolysis, Krebs cycle, links to oxidative phosphorylation. Derivation of amino acids from intermediates of carbohydrate metabolism. Gluconeogenesis. Photosynthesis Lipids in membranes. Overview of fatty acid metabolism. Structure and folding of proteins. Fibrous proteins; functional proteins – haemoglobin, catalytic proteins. DNA and its replication RNA and translation. Transcription, protein synthesis.

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 microorganisms.

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 microorganisms' biota. Sampling procedures; estimates of biomass and productivity; methods of data analysis. This subject includes field excursions.

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.

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 acids and proteins. Cryoscopic osmometry. Electrochemical methods; potentiometry and ion electrodes, polarography. Introduction to radiochemistry. Immunoassay methods.

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.

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 microorganisms: 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, pseudo monads 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.

91351**Immunology 1**

3cp; 3hpw; prerequisites: 91354 Anatomical Pathology, 91314 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; prerequisite: 91312 Biology 2; corequisite: 91363 Animal Ecophysiology

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.

91368

Bioprocessing

8cp; 6hpw; prerequisite: 91330 Microbiology 2

Fermentation technology; processes of formation and extraction of useful products of microbial, animal and plant cells; the microbiological, physiological and biochemical bases of industrially useful fermentations in the food, beverage, pharmaceutical and other relevant industries; unit operations and processing procedures in industrial fermentations. Computer interfacing and control procedures for fermentation systems. Economic and other factors impinging on the operation of fermentation industries. Industrial visits and a literature project are undertaken in this subject.

91369

Applied and Environmental Microbiology

8cp; 6hpw; prerequisite: 91330 Microbiology 2

Foods and waters as microbial ecosystems. Factors affecting their contamination by microorganisms of spoilage and public health significance. Indicator organisms and the microbiological monitoring of foods and waters. Quality control in food production and water management. Waste treatment processes for industrial and domestic wastes. Bioremediation of contaminated aquatic and terrestrial ecosystems.

Industrial visits are an important component of this subject.

91370

Semi-Arid Ecology

6cp; 10–14 day field excursion to far western NSW in July every third year, alternating with 91371; prerequisite: 66204 Field Studies 1

This and other extended field electives are normally taken in the senior stages of the degree course. It is assumed that students will have a thorough knowledge of basic ecology. The aim is to broaden student's 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 park management of dry areas will be included, along with ecological studies of factors determining the structure and composition 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.

Enrolment in the subject is restricted by the availability of space in vehicles. Preference will be given firstly to Environmental Biology students who are enrolled in any of the named Electives/Second majors, and thereafter will be based on academic performance over Stages 2–4.

91371

Mountain Ecology

6cp; 10–14 day field excursion to southern NSW in December every third year, alternating with 91370; prerequisite: 66204 Field Studies 1

This and other extended field electives are normally taken in the senior stages of the degree course. It is assumed that students will have a thorough knowledge of basic ecology. The aim is to broaden student's understanding of environmental biology and its management applications by demonstration and experimentation outside the Sydney Basin. The ecology of tall forests and mountain areas, and 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.

Enrolment in the subject is restricted by the availability of space in vehicles. Preference will be given firstly to Environmental Biology students who are enrolled in any of the named second majors, and then will be based on academic performance over Stages 2–4.

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.

91395

Biocomputing

3cp; prerequisite: 1st semester of 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).

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 microorganisms and the significance of microbial activities for engineering or processes involving environmental impacts. The subject provides an overview of the growth characteristics of microorganisms and the environmental factors which influence their growth. Microorganisms are dealt with in the context of decomposition processes, transformations of chemicals in biogeochemical cycles, as potential pathogens in water and groundwaters, in wastewater treatment, corrosion processes and public health. Their potential use 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: 9170 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 com-

partmental 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, oximetry, temperature. Principles of active stimulation of various organs such as heart, muscle and cochlear are also taught. Medical overview of the regulatory framework imaging modalities explored is also given.

91706

Neuroscience

8cp; 6hpw; prerequisite: 91703 Physiological Systems

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.

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.

98711**Coastal Resource Policy***6cp*

An intermediate level undergraduate subject which provides an overview of coastal policy and resources management, integrated coastal [and ocean] development and management, including selected regions will be surveyed and assessed. Policies of national, state and local governments will be critically examined and contrasted as appropriate with policies of overseas coastal nations. Constituency building is introduced with the associated tools necessary for coastal managers. The interdisciplinary nature of coastal resources, problems, conflicts and issues will be highlighted. (This subject was previously part of the Master of Science in Coastal Resource Management – the content has been modified to fit the undergraduate program.)

99502**Foundations of TCM***6cp; a flexible teaching and learning subject*

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.

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.

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, of equivalent qualification, before undertaking an internship in a clinic of the UTS College of Traditional Chinese Medicine as a 'student-practitioner'.

99539**Pathophysiology A***6cp; 6hpw; prerequisite: 99570 Health Sciences 2*

The immune system and its role in resistance to disease. The main groups of microorganisms which affect humans – their biology, concept of normal flora, opportunistic pathogens and compromised host. Epidemiology. Methods of limiting spread of microorganisms 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

126 Subject descriptions

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.

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.

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; a flexible teaching and learning subject; 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.

99567

Introduction to Chinese Herbal Medicine

6cp; 6 hpw; prerequisites: 99560 Introduction to TCM, 99502 Foundations of TCM; corequisite: 99539 Pathophysiology A

This subject provides introductory information on 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.

99570

Health Sciences 2

6cp; 6hpw; prerequisite: 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.

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 6x13hrs (over two semesters); prerequisites: all subjects of Stage 4 of the TCM course; corequisite: nil

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.

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.

99584

Clinical Features of Disease

6cp; 4hpw; prerequisite: 99540 Pathophysiology B; corequisite: nil

This subject builds on the theoretical material offered in Anatomy and Physiology subjects. 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.

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.

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. The subject also encourages students to broaden their understanding of issues and techniques related to practice, to individually pursue areas of

128 Subject descriptions

personal interest and research, and to see themselves as part of the wider health care community.

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.

99593

Honours Project

48cp; 2 semesters; prerequisites: completion at credit level of the four-year degree in TCM or equivalent

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 gastrointestinal conditions.

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.

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.

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.

99616**Clinical Theory and Clinic Level 1**

8cp; workshop and clinical observation sessions: 2hpw in Autumn semester. Clinical Assistant Level 1: 40 hours over two semesters; corequisites: 99560 Introduction to TCM, 99502 Foundations of TCM, 99563 Health Sciences 1

Approximately 30 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 in the UTS teaching clinics.

99617**Point Location 1**

8cp; 6hpw; prerequisites: all units of Stage 1 of the TCM course; corequisite: 99564 The Physiology of Qi

This subject deals with the location, depth, action, special precautions and contra-indications of the major points used in clinical practice. This module of point location complements the knowledge of point function provided in 99560 Introduction to TCM and 99564 The Physiology of Qi. The module in anatomy provides a basis for the accurate location of points, and the module that introduces acupressure and basic treatment techniques provides practical experience.

99618**Chinese Diagnostic System 1**

6cp; 5hpw; prerequisites: 99560 Introduction to TCM, 99502 Foundations of TCM

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 compliment the theoretical work being offered in 99509 Special Points and Systems.

99619**Clinic – Level 2 and Point Location 2**

8cp; Clinical Assistant Level: 60 hours; practicums: 13x2 hours; prerequisites: all subjects of Stage 2 of the TCM course; corequisites: 99539 Pathophysiology A (TCM), 99618 Chinese Diagnostic System 1

Clinical training is continued in the College of Traditional Chinese Medicine clinics. Knowledge of point location is revised and expanded.

99620**History and Philosophy of TCM**

4cp; 4hpw; prerequisite: 99502 Foundations of TCM

This subject studies the development of TCM in the West as well as the theoretical structure of Traditional Chinese Medicine and its influence upon the holistic approach to healing and preventative therapy. It focuses on some of the more complex theories arising from classical literature and the ethics, both ancient and modern, that are imbedded in the practice of TCM.

99621**Chinese Diagnostic System 2**

6cp; 6hpw; prerequisite: 99618 Chinese Diagnostic System 1; corequisite: 99620 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.

99623**Chinese Herbal Formulae**

8cp; 6hpw; prerequisites: all TCM subjects of Stage 2 of the TCM course; 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.

99624**Clinical Theory and Clinic – Level 3**

2cp; Workshops, tutorials and planning sessions: 2hpw; Clinical Assistant Level 3: 70 hours; prerequisites: all units of Stage 4 of the TCM course; corequisites: 99584 Clinical Features of Disease, 99623 Chinese Herbal Formulae

This module builds on the first three years of theoretical, practical and clinical training and acquaints the student with skills and duties required by a 'student-practitioner' working in the University's outpatient clinic. Clinical training is continued through the clinical program of the College of TCM.

99625

Research Methods

6cp; 6hpw

This subject is an introduction to the scientific method and its importance to the TCM profession. It deals with basic research issues: theories and models; independent; dependent and confounding variables; and the influence of the placebo effects. It also examines the philosophical basis of positivist, empiricist and analytical approaches to scientific endeavours.

99626

Microsystems

8cp; 8hpw; prerequisites: all TCM subjects of Stage 6

The theoretical information provided by the subject is applied and practised in the subject's workshops on advanced treatment techniques. Much of the information contained in these units is applicable to the treatment of sports injuries, pain control and paralysis.

99627

Clinical Practicum

8cp; 6hpw prerequisites: all TCM subjects of Stage 5; corequisites: all TCM 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.

99628

Disease States

8cp; 8hpw; prerequisites: all TCM and Biomedical subjects

The subject moves its emphasis from the 'learning' of TCM to the clinical practice of TCM. After determining that TCM 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.

99629

Chinese Medical Classics

4cp; 3hpw; prerequisites: 99620 History and Philosophy of TCM

Traditional Chinese Medicine is firmly based on a 2000-year-old body of classical medical writing. This subject examines some of the major landmark texts of TCM that are still relevant to today's practitioners. The interpretation of such ancient writings is the study of a lifetime but this subject introduces the student to the original writings on many aspects of TCM theory with which they are already familiar.

99630

Clinical Practice 1

12cp: 250 hours of supervised clinical practice and clinical case presentation; prerequisites: satisfactory completion of all Stage 1-6 subjects in the TCM course

The student experiences the full range of practitioner responsibilities under the supervision of a clinical manager. This area of training is accomplished in the outpatient clinics of the College of TCM which provide low-cost TCM services to the public.

99631

Clinical Practice 2

12cp: 250 hours of supervised clinical practice and oral presentation of a case history; 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 out-patient clinics of the College of TCM which provide low cost TCM services to the public. The student also has the option of spending two months in China to undertake a hospital internship in Guangzhou University of TCM.

SUBJECTS OFFERED FOR FACULTY OF NURSING, MIDWIFERY AND HEALTH STUDENTS

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 microorganisms which affect humans – their biology, concept of normal flora, opportunistic pathogens and compromised host; methods of limiting the spread of microorganisms 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.

91523

Fundamentals of Pathophysiology 1

This subject has been designed to develop knowledge of the levels of organisation and homeostasis in the human body and to develop an understanding of the anatomy, physiology, microbiology and pathophysiology of the cardiovascular and respiratory systems. Students will also study the basic principles of pharmacology with specific emphasis on drugs used in the treatment of the systems studied. The principles of infection control will be discussed. The musculoskeletal system will be introduced.

91524

Fundamentals of Pathophysiology 2

This subject has been designed to develop an understanding of the anatomy, physiology, microbiology and pathophysiology of the renal, reproductive, gastrointestinal and musculoskeletal systems. Students will also study the drugs used in the treatment of the systems studied.

92167

Foundations of Helping and Caring

4cp; 4hpw; Part 1: Interpersonal and Counselling Skills. Part 2: Psychosocial Foundations of Health, Illness and Disability

This subject facilitates the development of essential interpersonal and helping skills required for the practice of TCM. The subject introduces students to approaches to understanding people and models of health and health care from the western perspectives. Particular focus is given to the psychosocial factors that contribute to and maintain illness and disability and to therapeutic approaches and strategies to restore and facilitate well-being and coping. The meeting places between western and eastern philosophies, understandings, practices and influences are explored.

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

12cp; 4hpw plus practical experience

This subject introduces students to professional practice in the secondary school by drawing together the theory and practice necessary for an effective educational practitioner. It enables students to address skills, understandings, procedures and policy issues that are essential to effective professional practice by all teachers in present-day secondary schools and assists them to combine the knowledge and insights which are provided by all the other subjects which they undertake in the program.

023192

Secondary Practicum 2

Offered by the Faculty of Education

12cp; 3hpw plus practical experience

This subject prepares students for implementing current developments in learning and teaching by addressing a range of policy issues and their implications for professional practice in the school. An emphasis is also placed on the development of professional commitment and its implications for lifelong learning. Further integration of theory and practice occurs as students engage in and reflect upon their school-based practice.

028001

Learning in Science 1

Offered by the Faculty of Education

7cp; 8hpw

This subject aims to develop the craft of teaching science while blending professional skill with suitable academic insights. The students will develop a range of approaches and strategies to use in the classroom and laboratory which reflect research findings in science education. They will develop a philosophy of teaching science consistent with current syllabuses and policies and demonstrate understanding of the professional insights and demands of the practising science teacher.

028002**Learning in Science 2**

*Offered by the Faculty of Education
7cp; 8hpw*

This subject aims to prepare proficient beginning teachers in science. It is intended as a foundation for continuing professional development. On completion of this subject students will competently apply their educational studies to the teaching of science; be able to design, organise and evaluate methods and materials for science teaching; and have a theoretical framework on which to base their future careers in science teaching.

27105**Nutrition for Physical Activity**

*Undergraduate
6cp; prerequisite: 27173 Efficiency of Human Movement 1*

Examines the role of nutrition in maintaining a healthy lifestyle and in exercise and sports performance. Focuses on dietary guidelines for exercise prescription and sports performance and on the relationships between physical activity and eating disorders such as anorexia, bulimia and obesity.

27152**Measurement and Development of Physical Capacity**

*Undergraduate
6cp; prerequisite: 27175 Energetics of Human Movement*

Examines the interrelationships between physical activity and the physiological and anatomical development of the individual, with emphasis on the measurement and development of physical capacity (strength, flexibility and endurance) and basic training methodology. Provides students with proficiency in the skills required to measure fundamental human-movement-related capacities.

27155**Research Design and Statistics for Human Movement**

*Undergraduate
4cp*

Introduces students to the concepts and skills necessary to understand and conduct research in the human movement context. Provides an essential understanding of research procedures

and statistical concepts and techniques applicable to professional practice and academic inquiry in human movement.

27160**Sport and Exercise Behaviour**

*Undergraduate
6cp; prerequisite: 27106 Social Psychology of Leisure*

Examines sport performance in relation to cognitive and social psychological constructs. Emphasises the utilisation of sports psychology for performance enhancement in sport. Examines the psychological responses involved in exercise with an emphasis on how these responses influence future exercise behaviour. Employs a contextual learning strategy where students are required to both examine and apply psychological theories in the exercise and sport environment. Focuses on developing a strong theoretical understanding as well as developing proficiency in the skills required for measurement and assessment in exercise and sports psychology.

27171**Applied Kinesiology**

*Undergraduate
4cp; prerequisite: 27180 Functional Kinesiology*

Develops an understanding of how human movement is affected by the body's structure. Detailed study of musculoskeletal and neuromuscular anatomy is applied to the human movement context.

27172**Applied Sport Psychology**

*Undergraduate
6cp; prerequisite: 27160 Sport and Exercise Behaviour*

Examines the field of applied sport psychology. Focuses primarily on performance enhancement through the understanding and implementation of psychological principles in sport situations.

27173**Efficiency of Human Movement 1**

*Undergraduate
6cp; prerequisite: 27175 Energetics of Human Movement*

Examines human physiological responses and adaptations to exercise with emphasis on metabolism, ventilation, cardiorespiratory function, muscle metabolism, and exercise

134 Subject descriptions

training methodology. Focuses on developing a strong theoretical understanding as well as developing proficiency in the skills required for fundamental assessment in exercise physiology.

27174

Efficiency of Human Movement 2

Undergraduate

6cp; prerequisite: 27223 Mechanics of Human Motion

Examines techniques for quantifying aspects of human motion and explores applications of biomechanical principles and methodologies in ergonomics, orthopaedics, sport, exercise and rehabilitation.

27175

Energetics of Human Movement

Undergraduate

4cp; prerequisites: 91429 Physiological Bases of Human Movement; 65014 Chemistry (Human Movement)

Examines the interactions between the bioenergetic, metabolic, neurological and hormonal aspects of human movement, muscular control, and cardiorespiratory function and performance.

27183

Introduction to Human Movement Studies

Undergraduate

6cp

Introduces students to the study of human movement through a conceptual approach. Presents basic research techniques as well as an exploration of professional opportunities in various areas of human movement.

27190

Workplace Learning 2

Undergraduate

6cp; prerequisite: 27189 Workplace Learning 1

Provides practical opportunities through which students can further develop professional and personal skills in the leisure and human movement field. Through a 180-hour placement, students will be able to apply and test the various theories and concepts learnt during their course of study in a practical setting. Project management, report writing and presentations are the major assessment components. Career planning and job application skills are an additional element of this subject.

27222

Exercise Prescription

Undergraduate

6cp; prerequisite: 27173 Efficiency of Human Movement 1

Examines principles related to the prescription of exercise to non-risk individuals. Considers exercise adherence, program development and evaluation, and special populations.

27223

Mechanics of Human Motion

Undergraduate

6cp

Enables students to develop an understanding of the fundamental concepts of mechanics applicable to the study of human motion, with implications for equipment design, injury prevention and performance optimisation.

27307

Sport Management

Undergraduate

6cp; prerequisite: 21130 Management and Organisations

Examines the scope and role of sport in contemporary Western societies with particular reference to Australia. Seeks to understand and account for policy development and implementation across the commercial, public and voluntary sectors. Addresses a number of professional issues surrounding contemporary trends in Australian sport.

27331

Motor Learning and Control

Undergraduate

6cp; prerequisite: 27181 Human Motor Development

Examines the processes underlying skilled motor performance, how skilled performances are learnt, and how to apply the principles of skilled performance and learning in instructional settings in human movement.

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 of 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 1 (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 1

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 HSC 2-unit 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 1

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 Mathematical 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 par-

ticular 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 Mathematical 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)**

Offered by the Faculty of Engineering 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 par-

ticular 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**

Offered by the Faculty of Engineering 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**

*Offered by the Faculty of Engineering 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 3cp 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**

*Offered by the Faculty of Engineering CE, CEE, CSE, ESE, EE, ME, SE, TE, BEBA, BScBE
0cp; prerequisite: 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**

*Offered by the Faculty of Engineering 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 transferred 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 3cp subjects 48141 and 48142 would unreasonably delay graduation.

48210**Engineering for Sustainability**

*Offered by the Faculty of Engineering 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

Offered by the Faculty of Engineering 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 program-

ming 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

Offered by the Faculty of Engineering 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 communication; 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

Offered by the Faculty of 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

Offered by the Faculty of Engineering 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 microeconomic 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 macroeconomics, microeconomics 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**

Offered by the Faculty of Engineering 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**

Offered by the Faculty of Engineering 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**

Offered by the Faculty of Engineering 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

Offered by the Faculty of Engineering 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

Offered by the Faculty of Engineering 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**

Offered by the Faculty of Engineering 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**

Offered by the Faculty of Engineering 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**

Offered by the Faculty of Engineering 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

144 Subject descriptions

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, airconditioning fan, sewerage or water pump, wind generator, substation, 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

Offered by the Faculty of Engineering 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 Lagrangian techniques; linearisation and development of linear, time-invariant transfer functions; development of lead-lag 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**

Offered by the Faculty of Engineering EE, BEBA BEBus

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 interdisciplinary 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**

Offered by the Faculty of Engineering CSE, EE, BE (CSE, EE), BA

6cp; prerequisites: 48540 Signals and Systems, 48441 Introductory Digital Systems

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.

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

Offered by the Faculty of Law
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

Offered by the Faculty of Law
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

Offered by the Faculty of Law
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**

Offered by the Faculty of 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**

Offered by the Faculty of Law
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**

Offered by the Faculty of Law
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**

Offered by the Faculty of Law
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

- Helmores B A, *Commercial Law and Personal Property in NSW*, 10th edn, by Carter J W et al, Law Book Company, 1992

70417

Corporate Law

*Offered by the Faculty of 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

*Offered by the Faculty of Law
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

*Offered by the Faculty of 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

*Offered by the Faculty of 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

Offered by the Faculty of Law
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

Offered by the Faculty of Law
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

Offered by the Faculty of Law
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, *Phillipson 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

79004

Environmental Law and Science

Offered by the Faculty of Law
6cp; prerequisite: 91312 Biology 2

This subject will explore the interdisciplinary nature of environmental law and the interface between environmental law and science in the context of environmental management and conservation of resources. Topics will include, but will not be limited to: introduction to environmental law; environmental ethics; principles of sustainability; the role of international conventions and federal, State and local governments; legislative framework of environmental law in Australia; community right to know legislation; use of economic instruments e.g. tradeable permits and environmental taxes, environmental impact assessment; contaminated land; methods of enforcement; alternative dispute resolution.

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.

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 2000, the following majors are offered through the Institute for International Studies: Argentina, Australia and the Asia-Pacific Region, Chile, China, France, Germany, Greece, Indonesia, Italy, Japan, Malaysia, Mexico, Russia, South China, Spain, Taiwan, Thailand and Vietnam. 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 2000 *Institute for International Studies Handbook*.

Subjects for students in the Bachelor of Health Science in Traditional Chinese Medicine/ Bachelor of Arts in International Studies

50140

Comparative 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.

971111, 972111, 973111, 974111

Chinese Language and Culture

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 *2000 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 *2000 Institute for International Studies Handbook*.

976111

Contemporary China

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

24cp; prerequisite: completion of 4 semesters of study in the International Studies program

978111

In-country Study 2: China

24cp; prerequisite: 977111 (above)

ALPHABETICAL LIST OF SUBJECTS

Administrative Law	70617	Chinese Herbal Practice 2	99596
Advanced Digital Systems	48451	Chinese Language and Culture	97x111
Advanced Electron Microscopy Techniques	68557	Chinese Massage (<i>Tuina</i>)	99579
Advanced Mathematics and Physics	68038	Chinese Medical Classics	99629
Analogue and Digital Control	48560	Circuit Analysis	48530
Analytical Biochemistry	91326	Clinic – Level 2 (A&M)	99568
Analytical Chemistry 1	65306	Clinic – Level 2 and Point Location 2	99619
Analytical Chemistry 2	65409	Clinic – Level 5 (A&M) and Advanced Treatment Techniques	99582
Analytical Chemistry 3	65606	Clinical Acupuncture	99521
Anatomical Pathology	91354	Clinical Bacteriology	91338
Animal Ecophysiology	91363	Clinical Biochemistry 1	91344
Applied and Environmental Microbiology	91369	Clinical Biochemistry 2	91345
Applied Clastic Basin Analysis	66653	Clinical Features of Disease	99584
Applied Kinesiology	27171	Clinical Internship (A&M/INT.ST) A	99606
Applied Mechanics	68402	Clinical Internship (A&M/INT.ST) B	99607
Applied Organic Chemistry	65521	Clinical Practice 1	99630
Applied Palaeontology	66941	Clinical Practice 2	99631
Applied Physics	68412	Clinical Practicum	99627
Applied Physics 1	68312	Clinical Theory and Clinic – Level 3	99624
Applied Physics 3	68512	Clinical Theory and Clinic – Level 6 (A&M)	99588
Applied Sport Psychology	27172	Clinical Theory and Clinic Level 1	99616
Approved External Subject	68943	Coal Exploration and Mining Geology	66944
Approved External Subject	68946	Coastal and Marine Ecology	91124
Aquatic Ecology	91121	Coastal Environmental Assessments	66943
Australian Biota	91309	Coastal Resource Policy	98711
Behavioural Sciences	91704	Comparative Social Change	50140
Biochemistry 1	91313	Complex Forensic Cases (Chemistry)	65743
Biochemistry 2	91320	Complex Forensic Cases (Law)	79991
Biocomputing	91395	Composites	67608
Biological Evidence	91141	Computational Mathematics and Physics	33490
Biological Hazards and Toxicology	69338	Computing and Mathematics for Science	33290
Biology 1	91311	Computing for Groundwater Specialists	49550
Biology 2	91312	Computing for Science	31871
Biology and Ecology for Engineers	91150	Contaminated Site Management	66025
Biomedical Science Upgrade	91609	Contemporary China	976111
Biomonitoring	91315	Convergent Margin Tectonics	66651
Bioprocessing	91368	Coral Reef Ecosystems	91126
Capstone Project (6cp)	48006	Corporate Law	70417
Carbonates in Petroleum Exploration	66947	Corrosion and Degradation of Materials	67606
Chemical Safety (Management)	69332	Criminal Law	70217
Chemical Safety and Legislation	65410	Crustal and Mantle Processes	66508
Chemistry 1A	65012	Cytopathology	91377
Chemistry 1C	65101	Data Acquisition and Distribution	48570
Chemistry 2A	65022	Data Analysis in Occupational Health and Safety	69325
Chemistry 2C	65201	Deformation Processes	66956
Chemistry and Materials Science	60101	Disease States	99585
Chemistry and Pharmacology of Illicit Drugs	65741	Disease States	99628
Chinese Diagnostic System 1	99618	Earth Materials	66304
Chinese Diagnostic System 2	99621	Earth Resources	66408
Chinese Herbal Formulae	99623	Earth Science 1	66101
Chinese Herbal Practice 1	99594		

Earth Systems and the Environment	66062	Groundwater Computing	49554
Ecological Principles and Modelling	91112	Groundwater Engineering Projects (GD) F/T, P/T	44153, 44157
Ecotourism Planning and Management	27757	Groundwater Engineering Projects (M) F/T, P/T	44152, 44156
Efficiency of Human Movement 1	27173	Groundwater Geophysics	66018
Efficiency of Human Movement 2	27174	Groundwater Modelling	49555
Electromagnetics and Optics	68611	Groundwater Science Projects (GD) F/T, P/T	66022, 66024
Electronics	68314	Groundwater Science Projects (M) F/T, P/T	66021, 66023
Electronics and Interfacing	68514	Guiding and Interpretation Management	27773
Energetics of Human Movement	27175	Haematology 1	91355
Engineering and Groundwater Geology	66611	Haematology 2	91358
Engineering Communication	48230	Health Sciences 1	99563
Engineering Economics and Finance	48250	Health Sciences 2	99570
Engineering Experience 1	48110	History and Philosophy of TCM	99620
Engineering Experience 2	48130	Honours (Biological and Biomedical Sciences)	91304
Engineering for Sustainability	48210	Honours (Biological and Biomedical Sciences) (2yrs)	91305
Engineering Management	48260	Honours (Chemistry)	65854
Environmental and Quaternary Geology	66609	Honours (Environmental Science)	66855
Environmental Chemistry (new)	65621	Honours (Geoscience)	66854
Environmental Law and Science	79004	Honours (Materials Science)	67854
Environmental Management	91122	Honours (Physics)	68854
Environmental Measurement	91376	Honours Project	99593
Environmental Microbiology for Engineers	91651	Human Factors/Ergonomic Design	69323
Environmental Risk Assessment	98708	Hydrogeochemistry	66015
Equity and Trusts	70516	Hydrogeology	66014
Eukaryotic Microbiology	91352	Immunology 1	91351
Evaluating Occupational Health and Safety (Construction Industry)	69336	Immunology 2	91359
Exercise Prescription	27222	In-country Study 1: China	977111
Experimental Design and Sampling	91110	In-country Study 2: China	978111
Extractive Metallurgy	65062	Individual Project – Life Sciences	91399
Federal Constitutional Law	70616	Industrial Ceramics	67306
Field Studies 1	66204	Industrial Metallurgy	67408
Field Theory	68502	Informatics	48220
Fire and Explosion Investigation	65742	Inorganic Chemistry 1 (Transition Metal Chemistry)	65411
First Aid Certificate Course	99536	Inorganic Chemistry 2 (New Inorganic Materials)	65509
Fisheries Resources	91118	Interpretation of 2D and 3D Seismic Reflection Data	66953
Fold Belts and Cratons	66305	Introduction to Chinese Herbal Medicine	99567
Forensic Imaging	65341	Introduction to Geostatistical Data Analysis	66957
Forensic Research Project	65856	Introduction to Human Movement Studies	27183
Forensic Toxicology 1	65542	Introduction to Materials	67101
Forensic Toxicology 2	65642	Introduction to Phase Diagrams and Thermobarometry, An	66952
Foundations of Helping and Caring	92167	Introduction to TCM	99560
Foundations of TCM	99502	Introductory Digital Systems	48441
Freshwater Ecology	91117	Landscape Design and Plant Culture	91247
Fundamentals of Pathophysiology 1	91523	Law of Contract	70211
Fundamentals of Pathophysiology 2	91524	Law of Evidence	71216
Geochemical Analysis Techniques and Applications	66950	Law of Tort	70311
Geological and Structural Interpretation of Potential Field Data	66955	Learning in Science 1	028001
Geological Mapping	66612		
Geophysics	66510		
Geophysics and Remote Sensing of Groundwater Resources	66016		
Geopollution Management	66017		
Graduate Clinic Internship (CHM)	99597		
Graduate Clinic Level 1 (CHM)	99600		

154 Alphabetical list of subjects

Learning in Science 2	028002	Pharmacology 1	91707
Legal Aspects of Occupational Health and Safety	69342	Pharmacology 2	91709
Legal Process and History	70113	PhD Thesis F/T	60988
Legal Research	70105	PhD Thesis P/T	60987
Mapping and Remote Sensing	91120	Physical Chemistry 1	65307
Master of Science Thesis F/T	91775	Physical Chemistry 2	65607
Master of Science Thesis P/T	91776	Physical Evidence 1	65541
Master's Thesis (Hydrogeology and Groundwater Management) F/T	60777	Physical Evidence 2	65641
Master's Thesis (Hydrogeology and Groundwater Management) P/T	60778	Physical Metallurgy	67304
Materials Engineering 2	67061	Physical Modelling	68036
Materials Technology	67023	Physical Optics	68602
Mathematical Modelling 1	33130	Physical Properties of Materials	67407
Mathematical Modelling 2	33230	Physics 1A	68041
Mathematical Modelling for Science	33190	Physics 1C	68101
Mathematics 1 (Life Sciences)	33101	Physics 2	68201
Mathematics and Scientific Software	33390	Physics 3	68311
Measurement and Development of Physical Capacity	27152	Physics 4	68411
Mechanical Properties of Materials	67303	Physiological Systems	91703
Mechanics of Human Motion	27223	Physiology of Qi, The	99564
Medical Devices and Diagnostics	91705	Plant Genetics and Breeding	91249
Medical Science 1	91701	Plant Pathology	91237
Medical Science 2	91702	Plant Physiology	91270
Meeting Special Needs in the Secondary School	023002	Plant Production and Growth Media	91233
Microbiology 1	91314	Plant Production Systems	91248
Microbiology 2	91330	Plant Structure, Function and Culture	91246
Microbiology 3	91331	Plants in the Landscape	91250
Microsystems	99578	Point Location 1	99617
Microsystems	99626	Pollution Assessment	91111
Molecular Biology 1	91332	Pollution Ecology	91113
Molecular Biology 2	91335	Polymer Science	67305
Motor Learning and Control	27331	Polymer Technology	67409
Mountain Ecology	91371	Power Electronics	48561
Neuroscience	91706	Power Systems	48550
Nuclear Physics	68501	Practice and Procedure	71005
Nutrition for Physical Activity	27105	Practice Management	99591
Occupational Hazard Analysis	69312	Principles and Practice of Biotechnology	91325
Occupational Health and Safety in Society	69311	Principles of Chinese Herbal Medicine	99599
Occupational Health and Safety Management	69344	Principles of Forensic Science	65241
Occupational Health and Safety Project	69351	Processing of Seismic Reflection and Ground Penetrating Radar Data	66954
Open Space Management	91245	Professional Experience (Biol/Biom) F/T	91997
Organic Chemistry 1	65202	Professional Experience (Biol/Biom) P/T	91999
Organic Chemistry 2 (Structure Elucidation and Synthesis)	65508	Professional Scientific Practice A	60811
Palaeobiology Part I	66942	Professional Scientific Practice B	60812
Palaeobiology Part II	66949	Professional Writing and Communication	51389
Pathophysiology 1	91520	Project (Honours)	68858
Pathophysiology 2	91521	Project Workshops	99542
Pathophysiology A	99539	Psychology of Secondary Students	023001
Pathophysiology B	99540	Psychophysiology	91708
People and the Physical Environment	69335	Quantum and Solid-state Physics	68511
Personal Property	70318	Quantum Physics 1	68401
		Quantum Physics 2	68601
		Real Property	70317
		Remedies	71116
		Research Design and Statistics for Human Movement	27155
		Research Methods	99625

Research Methods 2	91608	Statistical Design and Analysis	33106
Research Proposal (Occupational Health and Safety)	69353	Surface Chemistry of Materials	67508
Review of Engineering Practice 1	48120	Surface Hydrology and Groundwater	49551
Review of Engineering Practice 2	48140	Surficial Processes and Products	66409
Risk Management	69341	Technical Ceramics	67506
Secondary Practicum 1	023191	Technology and Innovation Forum	68515
Secondary Practicum 2	023192	Technology Assessment	48270
Semi-Arid Ecology	91370	Technology, Society and Change	95556
Signals and Systems	48540	Tectonics and Surface Dynamics	66509
Social Bases of Education	023502	Terrestrial Ecosystems	91119
Software Development	48430	Thermodynamics and Energy	68403
Solid-state Physics	68505	Toxicity Assessment	91114
Special Reading Assignment – Life Sciences	91398	Transfusion Science	91340
Special Reading Subject	69337	Uncertainties and Risks in Engineering	48240
Special Topics in TCM (Intermodal and Professional)	99590	Undergraduate Research Project	91125
Sport and Exercise Behaviour	27160	Uses of Australian Plants	91234
Sport Management	27307	Vacuum and Thin Film Physics	68405
		Wildlife Ecology	91116
		Workplace 2	27190

BOARDS AND COMMITTEES

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 Associate Professor R T Buckney
 Associate Dean (Research)
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 Alternate Dean
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 Faculty Administrator
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 and Forensic Science
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Vacant

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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

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Course Advisory Committee in Cell and Molecular Biology

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INDEX

A

Abstudy 8
 Administrative Law 148
 Advanced Digital Systems 142
 Advanced Electron Microscopy Techniques 107
 Advanced Mathematics and Physics 104
 Analogue and Digital Control 144
 Analytical Biochemistry 117
 Analytical Chemistry 1 91
 Analytical Chemistry 2 91
 Analytical Chemistry 3 92
 Anatomical Pathology 119
 Animal Ecophysiology 120
 Applications 6
 Applied and Environmental Microbiology 120
 Applied Clastic Basin Analysis 97
 Applied Kinesiology 133
 Applied Mechanics 106
 Applied Organic Chemistry 92
 Applied Palaeontology 98
 Applied Physics 106
 Applied Physics 1 105
 Applied Physics 3 107
 Applied Sport Psychology 133
 Approved External Subject 108
 Aquatic Ecology 112
 Australian Biota 116
 Austudy 8

B

Bachelor of Health Science in Acupuncture 50
 Bachelor of Health Science in Acupuncture
 (Honours) 50
 Bachelor of Health Science in Acupuncture/
 Bachelor of Arts in International Studies 51
 Bachelor of Health Science in Chinese Herbal
 Medicine 52
 Bachelor of Health Science in Traditional Chinese
 Medicine 49
 Bachelor of Health Science in Traditional Chinese
 Medicine (Honours) 50
 Bachelor of Medical Science 52
 Bachelor of Medical Science/Bachelor of Arts in
 Human Movement Studies 54
 Bachelor of Medical Science/Bachelor of
 Business 78
 Bachelor of Medical Science/Bachelor of Laws 74
 Bachelor of Science (Honours) 55
 Bachelor of Science (Honours) in Applied
 Chemistry 41
 Bachelor of Science (Honours) in Applied
 Chemistry – Forensic Science 41
 Bachelor of Science (Honours) in Applied
 Physics 47

Bachelor of Science (Honours) in Environmental
 Science 64
 Bachelor of Science (Honours) in Materials
 Science 44
 Bachelor of Science in Applied Chemistry 38
 Bachelor of Science in Applied Physics 45
 Bachelor of Science in Applied Physics/
 Bachelor of Engineering in Electrical Systems/
 Diploma in Engineering Practice 47
 Bachelor of Science in Biomedical Science 55
 Bachelor of Science in Biotechnology 59
 Bachelor of Science in Earth and Environmental
 Science 62
 Bachelor of Science in Environmental and Urban
 Horticulture 69
 Bachelor of Science in Environmental Biology 65
 Bachelor of Science in Materials Science 42
 Bachelor of Science/Bachelor of Arts in
 International Studies 75
 Bachelor of Science/Bachelor of Business 77
 Bachelor of Science/Bachelor of Laws 71
 Behavioural Sciences 123
 Biochemistry 1 116
 Biochemistry 2 117
 Biocomputing 121
 Biological Evidence 113
 Biological Hazards and Toxicology 109
 Biology 1 116
 Biology 2 116
 Biology and Ecology for Engineers 113
 Biomedical Science Upgrade 122
 Biomonitoring 117
 Bioprocessing 120
 Boards and Committees 156
 Bridging courses 27
 Chemistry bridging course 27
 Insearch Institute of Commerce –
 foundation program 27

C

Capstone Project 137
 Carbonates in Petroleum Exploration 99
 Careers Service 9
 Centre for Biomedical Technology 19
 Centre for Ecotoxicology 19
 Centre for Materials Technology 20
 Centres 19
 Centre for Biomedical Technology 19
 Centre for Ecotoxicology 19
 Centre for Materials Technology 20
 Chemistry Learning Resources Centre 26
 Cooperative Research Centre for
 Aquaculture 20
 Cooperative Research Centre for Renewable
 Energy 20

- National Centre for Groundwater Management 21
 - Physics Learning Centre 26
 - Student Support Centres in the Faculty of Science 26
 - Chemical Safety (Management) 109
 - Chemical Safety and Legislation 91
 - Chemistry 1A 89
 - Chemistry 1C 90
 - Chemistry 2A 90
 - Chemistry 2C 90
 - Chemistry and Materials Science 89
 - Chemistry and Pharmacology of Illicit Drugs 93
 - Chemistry bridging course 27
 - Chemistry Learning Resources Centre 9, 26
 - Child care 11
 - Chinese Diagnostic System 1 129
 - Chinese Diagnostic System 2 129
 - Chinese Herbal Formulae 130
 - Chinese Herbal Practice 1 128
 - Chinese Herbal Practice 2 128
 - Chinese Language and Culture 151
 - Chinese Massage (*Tuina*) 127
 - Chinese Medical Classics 130
 - Circuit Analysis 143
 - Clinic – Level 2 (A&M) 126
 - Clinic – Level 2 and Point Location 2 129
 - Clinic – Level 5 (A&M) and Advanced Treatment Techniques 127
 - Clinical Acupuncture 125
 - Clinical Bacteriology 118
 - Clinical Biochemistry 1 119
 - Clinical Biochemistry 2 119
 - Clinical Features of Disease 127
 - Clinical Internship (A&M/INT.ST) 128
 - Clinical Practice 1 130
 - Clinical Practice 2 130
 - Clinical Practicum 130
 - Clinical Theory and Clinic – Level 3 129
 - Clinical Theory and Clinic – Level 6 (A&M) 127
 - Clinical Theory and Clinic Level 1 129
 - Co-op Bookshop 11
 - Coal Exploration and Mining Geology 99
 - Coastal and Marine Ecology 112
 - Coastal Environmental Assessments 98
 - Coastal Resource Management Unit 18
 - Coastal Resource Policy 125
 - Code of Conduct for students of the UTS College of Traditional Chinese Medicine 24
 - College of Traditional Chinese Medicine 18
 - College of Traditional Chinese Medicine Policies 25
 - Committees 156
 - Comparative Social Change 150
 - Complex Forensic Cases (Chemistry) 93
 - Complex Forensic Cases (Law) 150
 - Composites 103
 - Computational Mathematics and Physics 136
 - Computer laboratories 10
 - Computing and Mathematics for Science 136
 - Computing for Groundwater Specialists 88
 - Computing for Science 135
 - Contacts, UTS 175
 - Contaminated Site Management 95
 - Contemporary China 51
 - Convergent Margin Tectonics 97
 - Cooperative Research Centre for Aquaculture 20
 - Cooperative Research Centre for Renewable Energy 20
 - Coral Reef Ecosystems 113
 - Corporate Law 148
 - Corrosion and Degradation of Materials 103
 - Counselling 9
 - Course Advisory Committees 157
 - Courses
 - Course Advisory Committees 157
 - Honours degree 36
 - Pass degree 35
 - Postgraduate 82
 - Science Education program 36
 - Courses and codes list 32
 - Criminal Law 147
 - Crustal and Mantle Processes 96
 - Cytopathology 121
- D**
- Data Acquisition and Distribution 145
 - Data Analysis in Occupational Health and Safety 109
 - Dates for 2000, Principal 12
 - Dean's Message 15
 - Deformation Processes 101
 - Diploma in Scientific Practice 38
 - Disease States 127, 130
- E**
- Earth Materials 95
 - Earth Resources 96
 - Earth Science 1 95
 - Earth Systems and the Environment 95
 - Ecological Principles and Modelling 111
 - Ecotourism Planning and Management 134
 - Efficiency of Human Movement 1 133
 - Efficiency of Human Movement 2 134
 - Electives
 - International Studies 34
 - Electromagnetics and Optics 108
 - Electronics 105
 - Electronics and Interfacing 107
 - Energetics of Human Movement 134
 - Engineering and Groundwater Geology 97
 - Engineering Communication 139
 - Engineering Economics and Finance 140
 - Engineering Experience 1 137
 - Engineering Experience 2 138
 - Engineering for Sustainability 138
 - Engineering Management 141
 - English Language Study Skills Assistance (ELSSA) Centre 9

Environmental and Quaternary Geology 97
 Environmental Chemistry (new) 93
 Environmental Law and Science 150
 Environmental Management 112
 Environmental Measurement 121
 Environmental Microbiology for Engineers 122
 Environmental Risk Assessment 124
 Equity and diversity 10
 Equity and Trusts 148
 Eukaryotic Microbiology 119
 Evaluating Occupational Health and Safety
 (Construction Industry) 109
 Exercise Prescription 134
 Experimental Design and Sampling 110
 Extractive Metallurgy 90

F

Faculty of Science 16
 Centres 19
 Faculty Board in Science 156
 Information 15
 Mission Statement 15
 Staff list 162
 Student Support Centres 26
 Units within the Faculty 17
 Federal Constitutional Law 148
 Fees 82
 Fees and costs 6
 Field Studies 1 95
 Field Theory 106
 Fire and Explosion Investigation 93
 First Aid Certificate Course 125
 Fisheries Resources 112
 Fold Belts and Cratons 96
 Forensic Imaging 91
 Forensic Research Project 94
 Forensic Toxicology 1 92
 Forensic Toxicology 2 93
 Four datations of Helping and Caring 131, 151
 Four datations of TCM 125
 Freedom of Information 11
 Freshwater Ecology 111
 Fundamentals of Pathophysiology 1 131
 Fundamentals of Pathophysiology 2 131

G

Geochemical Analysis Techniques and
 Applications 99
 Geological and Structural Interpretation of
 Potential Field Data 101
 Geological Mapping 97
 Geophysics 96
 Geophysics and Remote Sensing of Groundwater
 Resources 94
 Geopollution Management 94
 Graduate Clinic Internship (CHM) 128
 Graduate Clinic Level 1 (CHM) 128
 Graduate Diploma 82
 Graduate Diploma in Hydrogeology and
 Groundwater Management 83

Groundwater Computing 88
 Groundwater Engineering Projects 88
 Groundwater Geophysics 94
 Groundwater Modelling 88
 Groundwater Science Projects 94
 Guiding and Interpretation Management 135

H

Haematology 1 119
 Haematology 2 120
 Health 9
 Health Psychology Unit 18
 Health Sciences 1 126
 Health Sciences 2 126
 HECS (Higher Education Contribution
 Scheme) 7, 82
 History and Philosophy of TCM 129
 Honours (Biological and Biomedical Sciences) 116
 Honours (Chemistry) 94
 Honours (Environmental Science) 98
 Honours (Geoscience) 98
 Honours (Materials Science) 104
 Honours (Physics) 108
 Honours degree courses 36
 Honours Project 128
 Housing 9
 Human Factors/Ergonomic Design 109
 Hydrogeochemistry 94
 Hydrogeology 94

I

Immunobiology Unit 18
 Immunology 1 119
 Immunology 2 120
 In-country Study 1: China 151
 In-country Study 2: China 151
 Individual Project – Life Sciences 122
 Industrial Ceramics 102
 Industrial Metallurgy 103
 Informatics 139
 Information
 Code of Conduct for students of the UTS
 College of Traditional Chinese
 Medicine 24
 College of Traditional Chinese Medicine
 Policies 25
 Science Students 21
 Statement of good practice and ethics in
 informal assessments 22
 Inorganic Chemistry 1 (Transition Metal
 Chemistry) 91
 Inorganic Chemistry 2 (New Inorganic
 Materials) 92
 Inquiries, student 6
 Insearch Institute of Commerce – foundation
 program 27
 International Studies Electives 34
 Interpretation of 2D and 3D Seismic Reflection
 Data 100
 Introduction to Chinese Herbal Medicine 126

Introduction to Geostatistical Data Analysis 101
 Introduction to Human Movement Studies 134
 Introduction to Materials 102
 Introduction to Phase Diagrams and
 Thermobarometry, An 100
 Introduction to TCM 126
 Introductory Digital Systems 142

J

Jumbunna Centre for Australian Indigenous
 Studies, Education and Research (CAISER) 10

L

Landscape Design and Plant Culture 114
 Law of Contract 146
 Law of Evidence 149
 Law of Tort 147
 Learning in Science 1 132
 Learning in Science 2 133
 Legal Aspects of Occupational Health and
 Safety 110
 Legal Process and History 146
 Legal Research 146
 Library, UTS 8

M

Majors
 Second majors 78
 Mapping and Remote Sensing 112
 Maps 176
 Master of Health Science in Traditional Chinese
 Medicine 84
 Master of Occupational Health and Safety
 Management 84
 Master of Occupational Health and Safety
 Management (Honours) 85
 Master of Science in Hydrogeology and
 Groundwater Management 86
 Master of Science Thesis 124
 Master's degrees (by coursework) 83
 Master's Thesis (Hydrogeology and Groundwater
 Management) 89
 Materials Engineering 2 101
 Materials Technology 101
 Mathematical Modelling 1 135
 Mathematical Modelling 2 136
 Mathematical Modelling for Science 136
 Mathematics 1 (Life Sciences) 135
 Mathematics and Scientific Software 136
 Mathematics Study Centre 10
 Measurement and Development of Physical
 Capacity 133
 Mechanical Properties of Materials 102
 Mechanics of Human Motion 134
 Medical Devices and Diagnostics 123
 Medical Science 1 122
 Medical Science 2 122
 Meeting Special Needs in the Secondary
 School 132

Microbiology 1 117
 Microbiology 2 117
 Microbiology 3 118
 Microsystems 127, 130
 Molecular Biology 1 118
 Molecular Biology 2 118
 Molecular Genetics Unit 18
 Molecular Parasitology Unit 18
 Motor Learning and Control 134
 Mountain Ecology 121

N

National Centre for Groundwater Management 21
 Neuroscience 123
 Nuclear Physics 106
 Nutrition for Physical Activity 133

O

Occupational Hazard Analysis 108
 Occupational Health and Safety in Society 108
 Occupational Health and Safety Management 110
 Occupational Health and Safety Project 110
 Open Space Management 114
 Organic Chemistry 1 90
 Organic Chemistry 2 (Structure Elucidation and
 Syn 92

P

Palaeobiology Part I 98
 Palaeobiology Part II 99
 Pass degree courses 35
 Pathophysiology 1 131
 Pathophysiology 2 131
 Pathophysiology A 125
 Pathophysiology B 125
 People and the Physical Environment 109
 Personal Property 147
 Pharmacology 1 123
 Pharmacology 2 124
 PhD Thesis 89
 Physical Chemistry 1 91
 Physical Chemistry 2 92
 Physical Evidence 1 92
 Physical Evidence 2 93
 Physical Metallurgy 102
 Physical Modelling 104
 Physical Optics 108
 Physical Properties of Materials 102
 Physics 1A 104
 Physics 1C 105
 Physics 2 105
 Physics 3 105
 Physics 4 106
 Physics Learning Centre 10, 26
 Physiological Systems 122
 Physiology of *Qi*, The 129
 Plant Genetics and Breeding 115
 Plant Pathology 114
 Plant Physiology 115

Plant Production and Growth Media 114
 Plant Production Systems 115
 Plant Structure, Function and Culture 114
 Plants in the Landscape 115
 Point Location 1 129
 Pollution Assessment 111
 Pollution Ecology 111
 Polymer Science 102
 Polymer Technology 103
 Postgraduate courses 82
 External supervision 82
 Fees 82
 General information 82
 Graduate Diploma 82
 Master's degrees (by coursework) 83
 Postgraduate degrees by research/thesis 87
 Postgraduate degrees by research/thesis 87
 Postgraduate scholarships 82
 Power Electronics 145
 Power Systems 143
 Practice and Procedure 149
 Practice Management 128
 Principal dates for 2000 12
 Principles and Practice of Biotechnology 117
 Principles of Chinese Herbal Medicine 128
 Principles of Forensic Science 90
 Prizes and scholarships 27
 Processing of Seismic Reflection and Ground
 Penetrating Radar Data 100
 Professional Experience (Biol/Biom) 124
 Professional Scientific Practice A 89
 Professional Scientific Practice B 89
 Professional Writing and Communication 146
 Project (Honours) 108
 Project Workshops 126
 Psychology of Secondary Students 132
 Psychophysiology 124

Q

Quantum and Solid-state Physics 107
 Quantum Physics 1 105
 Quantum Physics 2 107

R

Radio Station 2SER (107.3 FM) 11
 Real Property 147
 Remedies 149
 Research Design and Statistics for Human
 Movement 133
 Research Methods 130
 Research Methods 2 122
 Research Office 8
 Research Proposal (Occupational Health and
 Safety) 110
 Review of Engineering Practice 1 138
 Review of Engineering Practice 2 138
 Risk Management 110

S

Scholarships 27
 Postgraduate scholarships 82
 Science Education program 36
 Second majors 78
 Secondary Practicum 1 132
 Secondary Practicum 2 132
 Semi-Arid Ecology 120
 Signals and Systems 143
 Social Bases of Education 132
 Software Development 141
 Solid-state Physics 107
 Special Needs Coordinator 9
 Special Reading Assignment – Life Sciences 121
 Special Reading Subject 109
 Special Topics in TCM (Intermodal and
 Professional) 127
 Sport and Exercise Behaviour 133
 Sport Management 134
 Staff list 162
 Statistical Design and Analysis 135
 Student Inquiries 6
 Student Ombud 11
 Student Services 9
 Student Support Centres 26
 Chemistry Learning Resources Centre 26
 Physics Learning Centre 26
 Students
 Information for Science Students 21
 Students' Association 11
 Subject descriptions 88
 For students of the Faculty of Nursing
 Midwifery and Health 131
 International Studies subjects 150
 Subjects offered by other faculties 132
 Subjects
 Alphabetical list 152
 Recommended subject strands 57
 Surface Chemistry of Materials 103
 Surface Hydrology and Groundwater 88
 Surficial Processes and Products 96
 Sydney Universities Consortium of Geology and
 Geophysics (SUCOGG) 64

T

Technical Ceramics 103
 Technology and Innovation Forum 107
 Technology Assessment 141
 Technology, Society and Change 124
 Tectonics and Surface Dynamics 96
 Terrestrial Ecosystems 112
 Thermodynamics and Energy 106
 Toxicity Assessment 111
 Transfusion Science 118

U

- Uncertainties and Risks in Engineering 139
- Undergraduate Research Project 113
- Union, UTS 10
- Units within the Faculty of Science 17
 - Coastal Resource Management Unit 18
 - College of Traditional Chinese Medicine 18
 - Health Psychology Unit 18
 - Immunobiology Unit 18
 - Molecular Genetics Unit 18
 - Molecular Parasitology Unit 18
- University Graduate School 9
- Uses of Australian Plants 114
- UTS contacts 175
- UTS Gallery and Art Collection 11
- UTS Library 8
- UTS Union 10

V

- Vacuum and Thin Film Physics 106

W

- Welfare 9
- Wildlife Ecology 111
- Workplace Learning 2 134

Y

- Youth Allowance 8

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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 Street and Broadway, Ultimo
- Building 4
Cnr Thomas and Harris Streets, Ultimo
- Building 6 (Peter Johnson Building)
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, Sydney

Blackfriars

- Cnr Blackfriars and Buckland Streets,
Chippendale
- Blackfriars Childrens Centre
Buckland Street, Chippendale

Smail Street

- 3 Smail 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

Institute for Sustainable Futures

- National Innovation Centre
Cnr Garden, Cornwallis and
Boundary Streets
Eveleigh, NSW, 1430
Telephone: (02) 9209 4350
Fax: (02) 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

Yarrowood conference and research centre

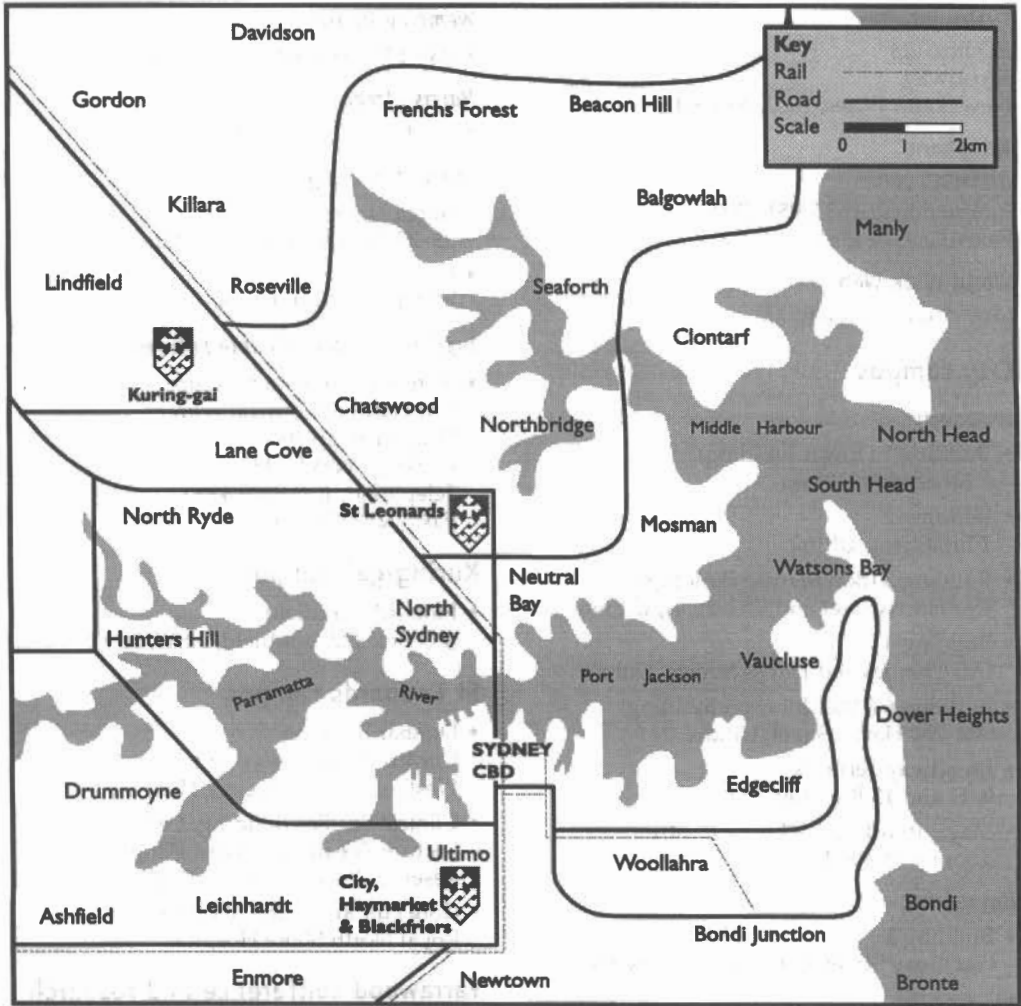
- 689 Springwood Road
Yarramundi, NSW, 2753

Stroud Field Station

- 2605 The Bucketts Way
Booral, NSW, 2425

MAPS

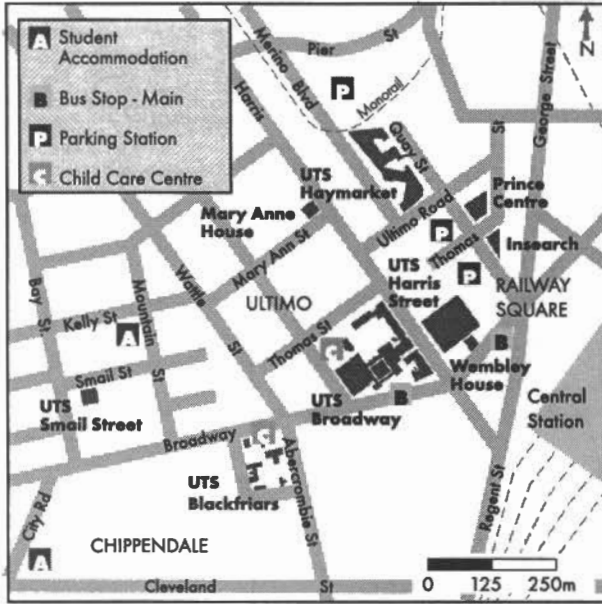
Sydney regional map



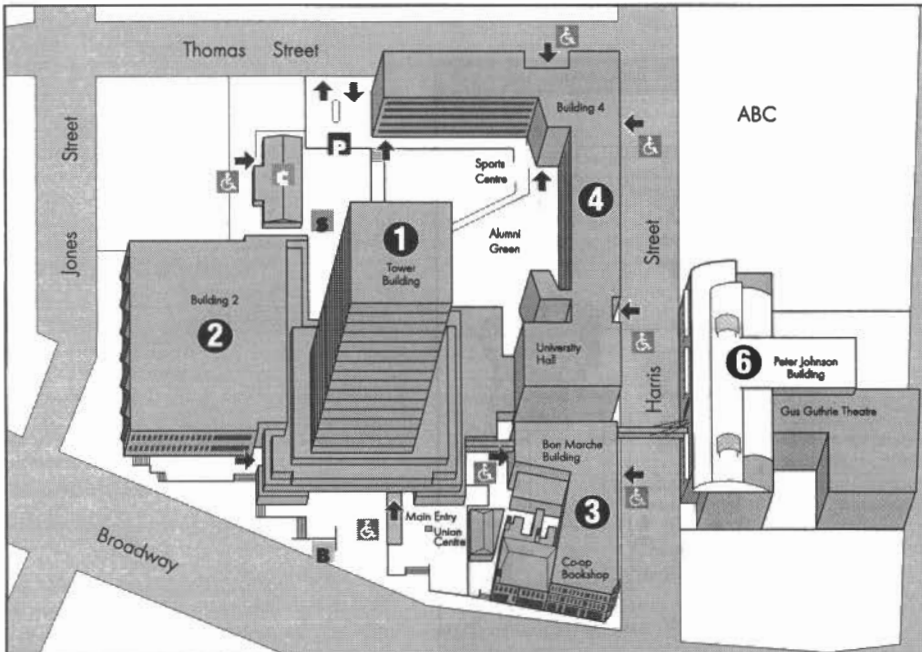
KEY

- ➔ Entry/Exit
- ♿ Disabled access
- B** Main bus stop
- S** UTS shuttle bus
- P** Parking
- 1** Building numbers
- C** Child care

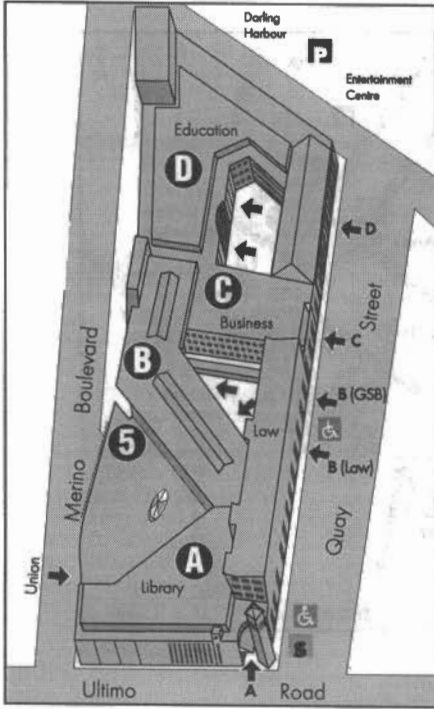
City campus



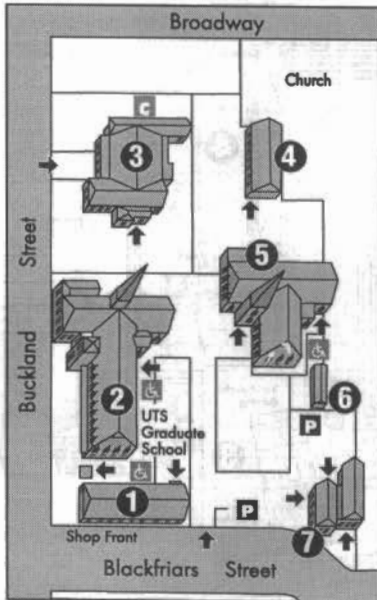
Broadway



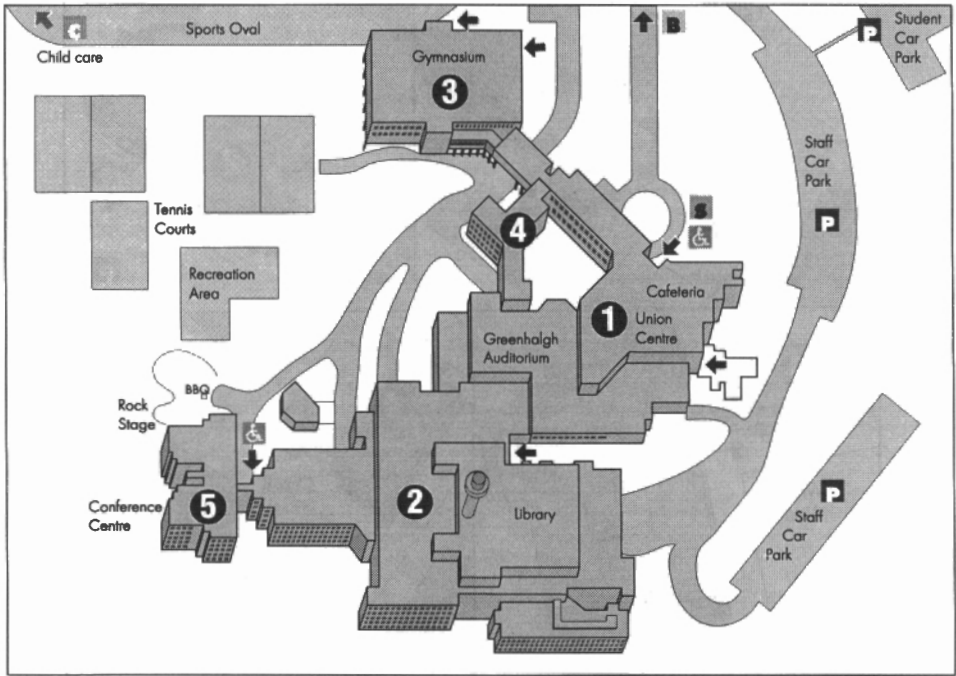
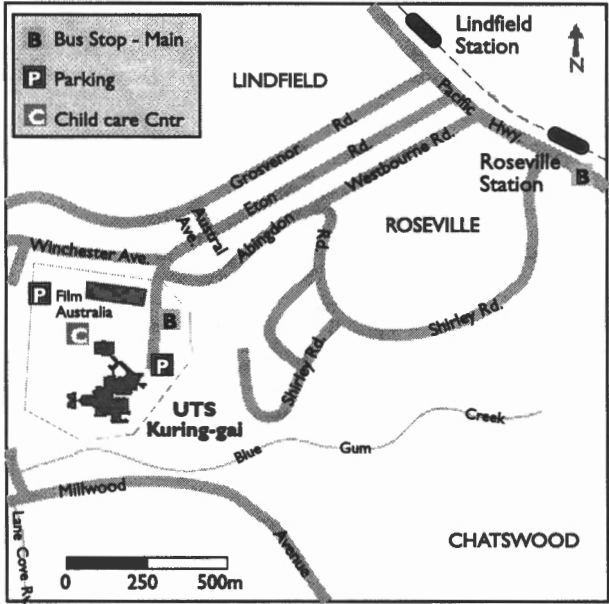
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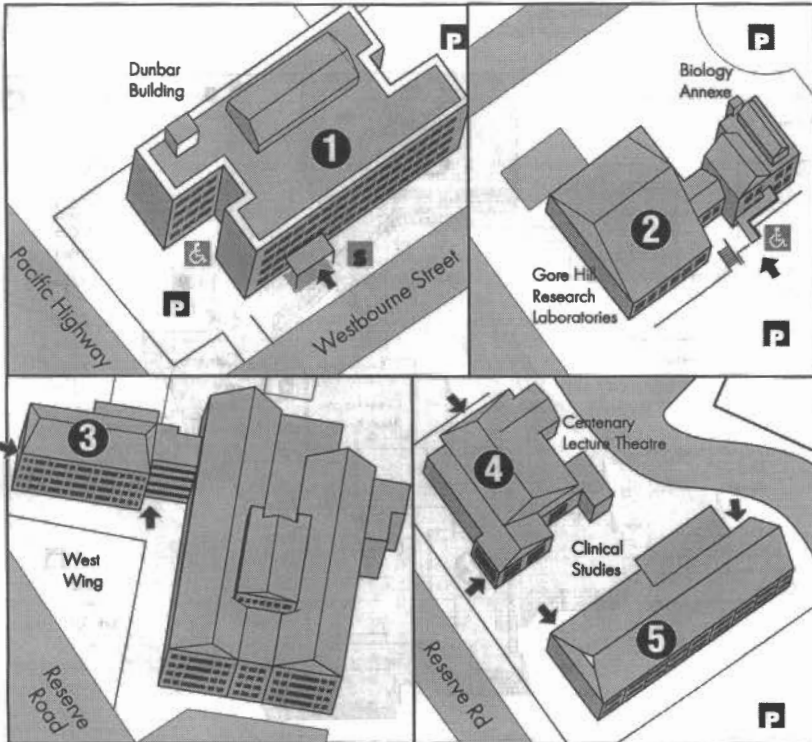
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