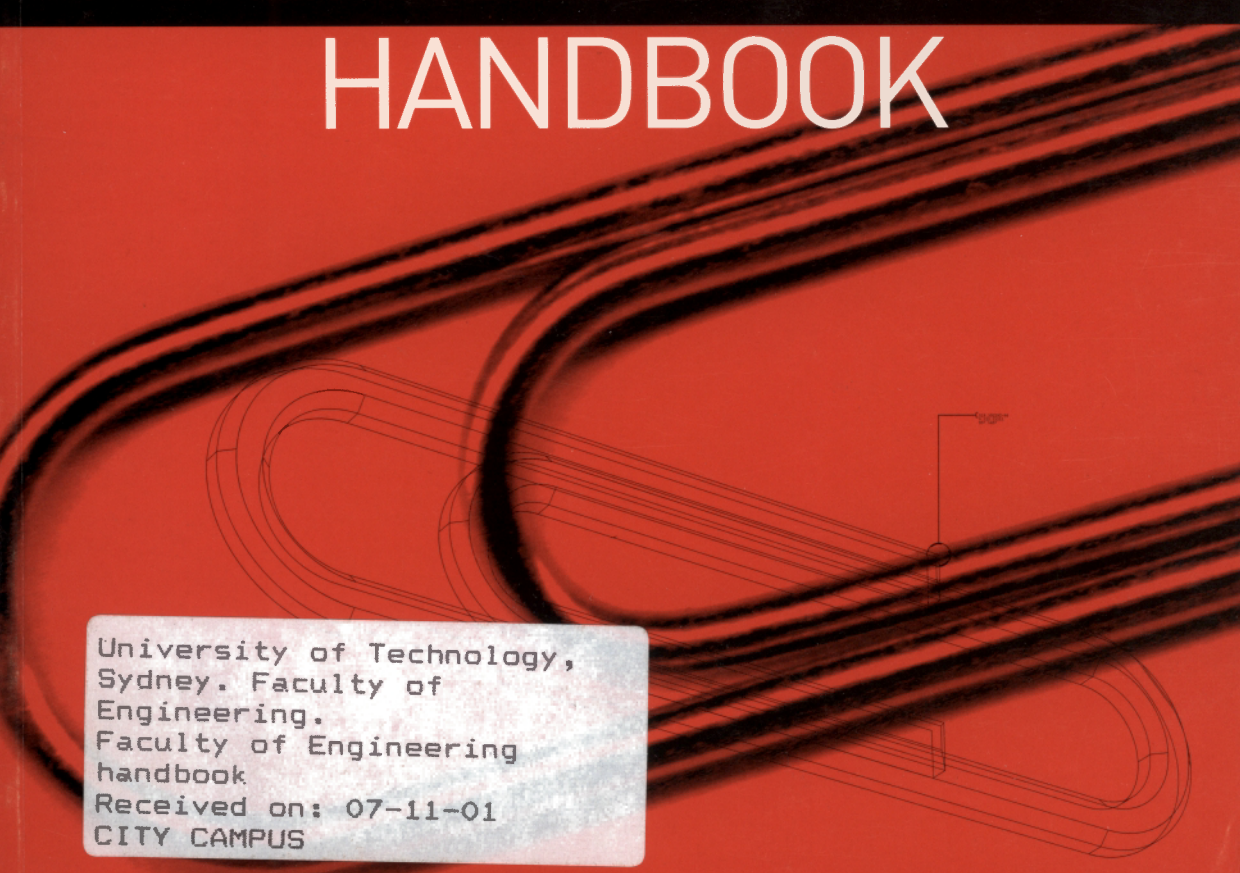
UNIVERSITY OF TECHNOLOGY SYDNEY

2002

UTS:ENGINEERING HANDBOOK



UTS:ENGINEERING

HANDBOOK 2002

EQUAL OPPORTUNITY

It is the policy of UTS to provide equal opportunity for all persons regardless of race; colour; descent; national or ethnic origin; ethno-religious background; sex; marital status; pregnancy; potential pregnancy; carer's responsibilities; disability; age; homosexuality; transgender status; political conviction; and religious belief.

FREE SPEECH

UTS 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.

www.equity.uts.edu.au/resources/language.html

ACCESS UTS ON THE WEB

www.uts.edu.au

Faculty Handbooks and Calendar
www.uts.edu.au/div/publications/

UTS Rules and Policies
www.uts.edu.au/div/publications/policies/

EDITORIAL AND PRODUCTION

Publications
Corporate Affairs Unit
Registrar's Division

COVER

Design by Emery Vincent Design
Production by UTS External Relations Unit

TABLE OF CONTENTS

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 are members of the workforce within a few 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 undergraduate and postgraduate degrees, developed by the Faculties of Business; Design, Architecture and Building; Education; Engineering; Humanities and Social Sciences; Information Technology; Law; Nursing, Midwifery and Health; and Science. Each of these faculties is responsible for 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 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.

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

For the latest information, see the University's website at:

www.uts.edu.au

STUDENT INQUIRIES

UTS Student Info & Admin Centre

telephone (02) 9514 1222
email info.office@uts.edu.au

www.uts.edu.au

City campus

CB01.4
(Level 4 foyer, Tower Building)
15 Broadway, Ultimo

Kuring-gai campus

KG01.6 (Level 6, Building K1)
Eton Road, Lindfield

Postal address

PO Box 123, Broadway NSW 2007

International Programs Office

10 Quay Street, Haymarket
telephone +61 2 9514 1531
fax +61 2 9514 1530
email intlprograms@uts.edu.au

www.ipo.uts.edu.au

CRICOS provider code: 00099F

Faculty student offices

Business

Undergraduate inquiries

CM05C.1
(Level 1, Building 5)
City campus at Haymarket
telephone (02) 9514 3500

KG01.5
(Level 5, Building K1)
Kuring-gai campus
telephone (02) 9514 5355

email undergraduate.business@uts.edu.au

Postgraduate inquiries

CM05B.5
(Level 5, Building 5)
City campus at Haymarket
telephone (02) 9514 3660
email graduate.business@uts.edu.au

Design, Architecture and Building

CB06.5
(Level 5, Building 6
(Peter Johnson Building))
City campus
telephone (02) 9514 8913
email dab.info@uts.edu.au

Education

CM05D.1.01
(Room D101, Building 5)
City campus at Haymarket

(from Autumn semester 2002)
CB10
(Room TBA, Building 10)
235 Jones Street
City campus
telephone (02) 9514 3900
email education@uts.edu.au

KG02.3.33
(Room 333, Building K2)
Kuring-gai campus
telephone (02) 9514 5621
email teached.office@uts.edu.au

Engineering

CB02.7
(Level 7, Building 2)
City campus
telephone (02) 9514 2666
email upo@eng.uts.edu.au

Humanities and Social Sciences

Faculty Student Centre

CB03.2
(Level 2, Building 3 (Bon Marche))
City campus
telephone (02) 9514 2300
email hss.studentcentre@uts.edu.au

Faculty Research Office

CB02.7
(Level 7, Building 2)
City campus
telephone (02) 9514 1959
email research.degrees.hss@uts.edu.au

Information Technology

CB04.3
(Level 3, Building 4)
City campus
telephone (02) 9514 1803
email info@it.uts.edu.au

Law

CM05B.3.03
(Room B303, Building 5)
City campus at Haymarket
telephone (02) 9514 3444
email admingen@law.uts.edu.au

Nursing, Midwifery and Health

KG05.3.97
(Room 397, Level 3, Building K5)
Kuring-gai campus
telephone (02) 9514 5202
email nmh@uts.edu.au

Science

CB04.3
(Level 3, Building 4)
City campus

SL01.2
(Level 2, Dunbar Building)
St Leonards campus

telephone (02) 9514 1756
email information@science.uts.edu.au

Institute for International Studies

10 Quay Street
Haymarket, City campus
telephone (02) 9514 1574
email iisinfo@uts.edu.au

Notes:

1. The Building ID system is a four-character code, comprising two letters describing a geographic location and two numerals that use existing building numbers. Office locations appear as BuildingID.FloorNo.RoomNo.

   The geographic location codes are:

   CB City campus, Broadway

   CC City campus, Blackfriars, Chippendale

   CM City campus at Haymarket

   KG Kuring-gai campus

   SL St Leonards campus

2. In 2002, City campus will extend into CB10 (Jones Street) and a number of faculties and administrative units will be relocated.

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 December; early closing dates may apply to some courses. 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 and do not have a UAC code.

Postgraduate

Applications for postgraduate courses should be made directly to UTS. For courses starting at the beginning of the year, most applications open in August with a first round closing date of 31 October. For courses starting in the middle of the year, applications open in May.

For further information, contact the UTS Student Info & Admin Centre.

International students

International student applications for both postgraduate and undergraduate courses can be made either directly to the International Programs Office (IPO) or through one of the University's registered agents. For courses starting at the beginning of the year, applications should be received by 30 November 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 IPO.

CRICOS provider code: 00099F

Non-award and cross-institutional 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 cross-institutional study. There are three application periods, and closing dates vary for each semester. For more information contact the appropriate faculty or the UTS Student Info & Admin Centre.

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, some students may be eligible for reduced service fees.

For full details of variations and exemptions to the fees listed below, contact the UTS Student Info & Admin Centre.

Fee components[1]

Union Entrance Fee	
a once-only charge for new students	$22
Union Fee	
a semester-based charge for currently enrolled students	$120 per semester
Students' Association Fee	
a yearly charge for currently enrolled students	$54.25 per year
Student Accommodation Levy	
a yearly charge for currently enrolled students	$61.50 per year
Student Identification Card Charge	
a yearly charge for students enrolled on a tuition fee basis	$15 per year

[1] Charges have been adjusted to reflect the University's liability for Goods and Services Tax (GST).

Course fees

No course fees are paid by local students undertaking undergraduate studies at UTS. Students are, however, liable for HECS charges (see following). Many postgraduate courses attract a course fee. These course fees are calculated on a course-by-course basis and are charged in addition to the service fees outlined above. Payment of course fees may vary depending on a student's status, and on conditions laid down by the faculty. Contact the relevant faculty for full details.

Details of course fees are outlined under each course entry in this handbook. Readers should note that fees quoted throughout the handbook are correct at the time of publication however they are subject to change and should be confirmed with the Student Info & Admin Centre.

Course fees for international students

At the time of publication, course fees for undergraduate international students range from A$5,000 to A$8,500 per semester, and for postgraduate international students from A$5,000 to A$8,700 per semester. These vary from time to time and the International Programs Office should be contacted for up-to-date information, or visit the website:

www.ipo.uts.edu.au/courses/index.html

International students in Australia on a student visa are required to undertake full-time study as a condition of their visa.

For more information contact the International Programs Office, or visit the website:

www.ipo.uts.edu.au

Other costs

Students may incur other costs while they study at UTS. These may include books, printed sets of reading materials, photocopying, equipment hire, the purchase of computer software and hardware, and Internet services.

HECS

The 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 varies 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 Australian 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.

The HECS census date for Autumn semester is 31 March and for Spring semester is 31 August (as the dates fall on a Sunday in 2002, the HECS census dates will be 28 March and 30 August). HECS census dates for other teaching periods can be obtained from the UTS Student Info & Admin Centre.

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 (www.hecs.gov.au) or the UTS Student Info & Admin Centre:

email info.office@uts.edu.au

2002 HECS rates

Differential HECS

In 2002, the full-time, full-year contributions for each band are as follows:

- Band 1: $3,598 (Arts, Humanities, Social Studies/Behavioural Sciences, Education, Visual/Performing Arts, Nursing, Justice and Legal Studies)
- Band 2: $5,125 (Mathematics, Computing, Other Health Sciences, Agriculture/Renewable Resources, Built Environment/Architecture, Sciences, Engineering/Processing, Administration, Business and Economics)
- Band 3: $5,999 (Law, Medicine, Medical Science, Dentistry, Dental Services and Veterinary Science).

Pre-differential HECS rate

If you commenced or deferred but did not complete your course before 1997, you may be eligible to pay a flat rate of HECS. In 2002, this rate is $2,702 for a full time study load.

POSTGRADUATE EDUCATION LOANS SCHEME (PELS)

As a result of the Government's *Innovation and Education Legislation Amendment Bill (No.2) 2001* being endorsed by Parliament, a new Postgraduate Education Loans Scheme (PELS) will be implemented on 1 January 2002.

PELS is an income-contingent loan facility similar to the Higher Education Contribution Scheme (HECS) for eligible students enrolled in fee-paying postgraduate non-research courses.

All eligible students enrolled in a postgraduate fee-paying non-research course in 2002 are eligible to apply for a loan. This means that both continuing and commencing students are eligible to apply.

Eligible students are able to borrow up to the amount of the tuition fee being charged by UTS for each semester for the duration of their course. Students are also able to pay part of their semester tuition fee to UTS for a course and obtain a PELS loan for the balance of their outstanding fees for each semester.

Students are required to complete a Loan Request form by the census date each semester requesting the Commonwealth to pay their tuition fees to UTS and declare that they are aware of their obligations to repay the loan under the scheme when their income reaches a certain amount. Students also have to provide a Tax File Number (TFN) to UTS in the same way that students choosing to defer their HECS payment already do.

The Student Fee Services Office will be coordinating the introduction of PELS at UTS. Queries in relation to the introduction of PELS should be directed to the Student Info & Admin Centre on telephone (02) 9514 1222, or further information can be obtained from the DETYA website at:

www.hecs.gov.au/pels.htm

FINANCIAL HELP

Austudy/Youth Allowance

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

Full-time students aged over 25 years 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 both Youth Allowance and Austudy are available from the Student Services Unit at Kuring-gai or City campuses.

Commonwealth legislation sets strict requirements for Austudy/Youth Allowance over which the University has no control. It is important that the students concerned understand these requirements.

Students who receive Austudy or the Youth Allowance and decide to drop subjects during the semester must be aware that to remain eligible they must be enrolled in a minimum of 18 credit points, or have a HECS liability for the semester of .375 equivalent full-time student units. The only exceptions made are for some students with disabilities which interfere with their studies, students who are single supporting parents or, in exceptional cases, those who have been directed by the University to reduce their study load.

For more information, talk to a Financial Assistance Officer in the Student Services Unit. Call for an appointment on:

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

Application forms for both Austudy and Youth Allowance should be lodged as soon as possible with any Centrelink office.

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, Indigenous House of Learning:

CB01.17
telephone (02) 9514 1902 or 1800 064 312

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 online reference assistance, training programs, Closed Reserve, loans, reciprocal borrowing and photocopying facilities. The Library's extensive range of electronic information resources, such as catalogues, databases and Electronic Reserve, and online services, such as research assistance, online training, loan renewal, reservations and inter-Library requests, can be accessed on campus and remotely 24 hours a day from the Library website.

The Library is open for extended hours. More information about the Library can be found at:

www.lib.uts.edu.au

City Campus Library

Corner Quay Street and Ultimo Road
Haymarket
telephone (02) 9514 3310

Kuring-gai Campus Library

Eton Road
Lindfield
telephone (02) 9514 5325

Gore Hill Library (St Leonards campus)

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

UNIVERSITY GRADUATE SCHOOL

The University Graduate School provides a focus for higher degree research students in all graduate research courses at UTS. It takes the lead in developing policy for graduate research studies in partnership with the faculties. The University Graduate School also works to enhance the quality of graduate research programs by monitoring quality and supporting research degree students and their supervisors.

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

telephone (02) 9514 1336
fax (02) 9514 1588
email ugs@uts.edu.au

www.gradschool.uts.edu.au

Note: In 2002, the University Graduate School will be relocating to CB10 (Jones Street), City campus.

INTERNATIONAL EXCHANGE STUDENT SCHEME

UTS encourages its students to develop an international perspective on their courses and careers. As part of their studies, students have the opportunity to spend one or two semesters studying at an overseas university and receive credit towards their UTS degrees. To enable this to happen, UTS has formal links with a large number of universities around the world. The UTS International Exchange Student Scheme assists students to study on exchange primarily at English-speaking universities in the United States and Europe, but also at other universities around the world.

UTS supports student participation in the International Exchange Student Scheme through the provision of a number of scholarships each semester as a contribution to the costs of going on exchange. While on exchange, students do not pay tuition fees in the overseas university. They pay their usual HECS fees or, if they are international students at UTS, their Australian tuition fees.

Further information and application forms for the Exchange Scheme and scholarships can be obtained from:

Institute for International Studies
10 Quay Street
Haymarket
telephone (+61 2) 9514 1537
email international.exchange@uts.edu.au

www.uts.edu.au/fac/iis/

SUPPORT FOR STUDENT LEARNING

Student Services Unit

To ensure student success, the University provides a range of professional services to support different aspects of student life and learning at UTS.

These services include:

- orientation and University transition programs
- student housing and assistance in finding private rental accommodation
- workshops and individual counselling to enhance effective learning
- assistance for students with disabilities and other special needs
- student loans and financial assistance
- health services
- personal counselling
- assistance with administrative problems or complaints
- assistance when extenuating circumstances impact on study
- help with getting a job, and
- campus interview program.

All these services are sensitive to the needs of students from diverse backgrounds and are available at City and Kuring-gai campuses with flexible hours for part-timers.

The Student Services Unit website offers a jobs database, 'where UTS graduates get jobs', virtual counselling and links to the 'student help' website:

www.uts.edu.au/div/ssu

Transition to university programs

Orientation 2002

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. There are specially tailored programs for part-time and international students as well as for recent school leavers. Students are informed of academic expectations, the skills needed to be an independent learner, and learning strategies which can help them successfully manage the workload. They are also provided with valuable information about how the University and its faculties operate, and the services provided.

Peer support network

The Peer Network Program enlists the aid of existing students to assist with the orientation of new students.

For more information, contact:

Student Services Unit
telephone (02) 9514 1177 (City campus) or
(02) 9514 5342 (Kuring-gai campus)

Careers Service

The Careers Service can help students make the link between various UTS courses and the careers they can lead to. The Careers Service also offers general career guidance, and assists with job placement for students seeking permanent or casual vacation work and employment. Contact the Careers Service on:

telephone (02) 9514 1471 (City campus)

www.uts.edu.au/div/cas

Chaplaincy

The Chaplaincy is coordinated through Student Services. Visiting Chaplains and Worship Rooms are available to students.

Chaplains represent different Christian denominations, as well as Buddhism, Judaism and Islam. Further information is available on:

telephone (02) 9514 1177

Counselling

Counsellors are available at both the City and Kuring-gai campuses for individual consultation. Group programs are also held throughout the year. This service is free of charge, confidential and sensitive to diversity. For further information, contact:

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

Telephone counselling is available on:

telephone (02) 9514 1177.

Financial assistance

Financial assistance staff assist students with personal financial matters and are the contact point for student loans. They can also advise on Youth Allowance, Austudy and other Centrelink benefits. Contact them on:

telephone (02) 9514 1177

Health

The Health Service offers a bulk-billing practice to students at two locations. For appointments, contact:

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. For further information, contact:

telephone (02) 9514 1509 (listings) or
(02) 9514 1199 (UTS accommodation)

Special Needs Service

The University has in place a range of services and procedures to improve access for students with disabilities, ongoing illnesses and other special needs. Students who have disabilities or illnesses which may impact on their studies are encouraged to contact the Special Needs Service for a confidential discussion of the assistance available on:

telephone (02) 9514 1177
TTY (02) 9514 1164
email special.needs@uts.edu.au

Contacting Student Services

telephone (02) 9514 1177
TTY (02) 9414 1164
fax (02) 9514 1172
email student.services@uts.edu.au

www.uts.edu.au/div/ssu

City campus

CB01.6.01
- Counselling Service
- Health Service
- Special Needs and Financial Assistance Service

CB01.3.01
- Careers Service

CB08.1 (9 Broadway)
- Housing Service

Kuring-gai campus

KG01.5.19 (Level 5, Building K1)
- Counselling Service
- Health Service

Computing facilities at UTS

UTS General Access Labs are located throughout all campuses of 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 (ITD) Support Centre on:

telephone (02) 9514 2222

www.itd.uts.edu.au

Access to these labs requires login and password. Call the Support Centre for assistance in setting up a login.

Student email accounts

UTS provides students with an email account, which gives all students access to email facilities via the web. To find out more about an email account, visit the website:

www.uts.edu.au/email/

Alternatively, pick up the brochure, *Your UTS Email Account*, available in all ITD General Access Labs and drop-in centres. If you have any problems with activating your account or the computing facilities in general, contact the ITD Support Centre on:

telephone (02) 9514 2222
email itsupport@uts.edu.au

Computer training

In general, where computer training is necessary as part of a course that attracts HECS, it is provided as part of that course. Students can also consult the Computing Study Centre (see below).

STUDENT LEARNING CENTRES

Chemistry Learning Resources Centre

The Chemistry Learning Resources Centre assists students in undergraduate courses in the faculties of Science; Nursing, Midwifery and Health; Engineering; and Business.

CB04.2.11
City campus

Rosemary Ward
telephone (02) 9514 1729
email Rosemary.Ward@uts.edu.au

www.science.uts.edu.au/cmf/chem/clrc/

Computing Study Centre

The Computing Study Centre assists students in developing skills in the use of various standard computer packages.

CB01.16.11
City campus

John Colville, Director
telephone (02) 9514 1854
email John.Colville@uts.edu.au

www.it.uts.edu.au/activities/csc/

English Language Study Skills Assistance (ELSSA) Centre

ELSSA, the UTS Centre for academic language development, provides free custom-designed programs in academic writing, reading, speaking, critical thinking and cultural knowledge to meet the needs of undergraduate and postgraduate UTS students completing their degree in English. ELSSA also collaborates with staff in the faculties to foster interest in, and knowledge of, literacy and learning through research, intellectual contributions and staff development. ELSSA values quality, diversity, internationalisation and flexibility as it serves the wider academic and professional communities. The Centre also offers several award programs. For details, refer to pages 112–118.

Alex Barthel, Director
CB01.18.22
City campus
telephone (02) 9514 2327

or

KG02.5.22
Kuring-gai campus
telephone (02) 9514 5160
email elssa.centre@uts.edu.au

www.uts.edu.au/div/elssa/

Jumbunna, Indigenous House of Learning

Student Support Unit

Jumbunna's Student Support Unit provides a range of academic and cultural support to Aboriginal and Torres Strait Islander students studying at UTS to ensure equal access and participation in higher education.

The support available to students includes academic assistance, cultural activities, cultural affirmation programs, group and private study areas, student common room and kitchen, and a computer laboratory and printing facilities.

Jumbunna, Indigenous House of Learning
CB01.17
City campus

telephone (02) 9514 1902 or 1800 064 312
fax (02) 9514 1894

Mathematics Study Centre

The Centre coordinates mathematics assistance across the University and is staffed by lecturers with expertise in mathematics and statistics.

CB01.16
City campus

Leigh Wood, Director
telephone (02) 9514 2268
email Leigh.Wood@uts.edu.au

KG02.2.52
Kuring-gai campus
telephone (02) 9514 5186

www.it.uts.edu.au/activities/msc/

Physics Learning Centre

This is a drop-in centre for first-year physics students.

CB01.11
City campus
(with an adjoining computer laboratory)

Peter Logan
telephone (02) 9514 2194
email Peter.Logan@uts.edu.au

www.science.uts.edu.au/physics/plc.html

EQUITY AND DIVERSITY

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 University also aims to assist members of under-represented groups overcome past or present discrimination, and to provide a supportive and open organisational culture in which students and staff are able to develop to their full potential.

UTS is committed to implementing its Equal Opportunity Statement which aims to ensure that all students and staff are treated fairly and equitably, and can work and study in an environment free of harassment. Discrimination, harassment and victimisation are unlawful, undermine professional relationships, diminish the experience of university life, and are not tolerated at UTS. All students and staff have a responsibility to contribute to the achievement of a productive, safe and equitable study and work environment.

The Equity & Diversity Unit provides a range of services for students and prospective students. These include the 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 discrimination and harassment-related grievances.

Equity & Diversity Unit
CB01.17
telephone (02) 9514 1084
email equity.diversity.unit@uts.edu.au

www.equity.uts.edu.au

JUMBUNNA, INDIGENOUS HOUSE OF LEARNING

Jumbunna was relaunched as the Indigenous House of Learning (IHL) in 2001. Jumbunna has grown from being, in 1986, an Aboriginal student support centre, to become a successful academic, research and support centre with approximately 300 Indigenous Australian undergraduate and postgraduate students studying at UTS.

Jumbunna's role within UTS is to contribute to Australia's educational and social development by making UTS staff and students aware of Indigenous Australian cultures and associated issues. Jumbunna is committed to improving the quality of teaching and research at UTS by facilitating active links with the Indigenous community, higher education institutions and other professions with particular emphasis on Australia's growth as a multicultural nation.

Jumbunna IHL has a wide ranging, long term agenda that includes:

- involving Indigenous Australians in institutional decision-making and consultative structures, academic policy development and curriculums, and strengthening partnerships between it and the faculties
- broadening the awareness and acceptance of Indigenous Australian cultures, achievements, contributions, and contemporary issues by developing teaching subjects and awards
- broadening economic, social and political opportunities for Indigenous Australians, in particular expanding employment and income opportunities
- enhancing the teaching and coordination of postgraduate studies in Indigenous studies

- the provision of consultancy services to community and government, and
- improving accessibility, retention and graduation rates of Indigenous Australians in studies at UTS.

Reconciliation Studies elective

The subject Reconciliation Studies is offered by Jumbunna to all students. Offered for the first time in Autumn semester 2002, the subject is a transdisciplinary 6- or 8-credit-point elective available at both undergraduate and postgraduate levels.

Undergraduate

85208	Reconciliation Studies	6cp
85209	Reconciliation Studies	8cp

Postgraduate

85210	Reconciliation Studies	6cp
85211	Reconciliation Studies	8cp

For further details of these subjects, refer to the Subject Descriptions section at the back of this handbook.

NSW CHILD PROTECTION LEGISLATION

Prohibited Person Declaration and Screening

In accordance with New South Wales Child Protection legislation, students participating in practical training placements which require them to have direct contact with children under 18 in designated child-related employment areas are required to complete a Prohibited Employment Declaration form on enrolment. In some circumstances students may also be subject to employment screening. Screening is carried out only with students' consent. Eligibility for participation in such programs is determined on the basis of information obtained through these checks.

OTHER SERVICES

Student Ombud

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

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

CB02.4.02
City campus
telephone (02) 9514 2575
email ombuds@uts.edu.au
www.uts.edu.au/oth/ombuds

Freedom of Information and Privacy

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

Personal information may also be accessed under the *Privacy and Personal Information Act 1998*. In addition to the requirements of the Act, UTS has a number of policies which govern the collection and use of private information.

David Clarke
FOI and Privacy Officer
CB01.4A.01
City campus
telephone (02) 9514 1240
email David.Clarke@uts.edu.au

Student complaints

UTS is committed to providing a learning and working environment in which complaints are responded to promptly and with minimum distress and maximum protection to all parties.

All students and staff have a responsibility to contribute to the achievement of a productive, safe and equitable study and work environment at UTS. The University's procedures for handling student complaints are based on confidentiality, impartiality, procedural fairness, protection from victimisation and prompt resolution.

Students should first raise their complaint directly with the person concerned where possible, or with an appropriate person in the faculty or administrative unit concerned. To seek advice and assistance in lodging a complaint, contact the Student Services Unit or the Equity & Diversity Unit.

The Policy on Handling Student Complaints is published on the Rules, Policies and Procedures website at:

www.uts.edu.au/div/publications/policies

Information on how to make a complaint is available on the Equity & Diversity Unit's website at:

www.equity.uts.edu.au/resources/gota.html

ENVIRONMENT, HEALTH, SAFETY AND SECURITY

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. Staff and students must take reasonable care of themselves and others, cooperate with actions taken to protect health and safety and not wilfully place at risk the health, safety or wellbeing of others.

Emergency procedures

Report emergencies to Security by dialling '6' from any internal telephone or Freecall 1800 249 559 (24 hrs).

Let the Security Officer know:

- the nature of the problem (e.g. fire, medical emergency, assault)
- the location of the emergency, and
- your name and the telephone extension you are calling from.

Evacuation procedures

The Evacuation Alarm consists of two tones:

BEEP...BEEP...BEEP... (Prepare)

When you hear this tone:

- shut down or secure machinery and computers
- prepare to evacuate, and
- check whether anyone needs assistance.

WHOOP...WHOOP...WHOOP... (Evacuate)

When you hear this tone:

- listen for instructions, a public announcement will tell you to 'Evacuate the building'
- leave the building via the nearest fire exit
- do not use lifts
- provide assistance where required
- proceed to the assembly area
- follow instructions from Emergency Authorities and Security, and
- do not return to the building until the all clear is given.

Hazards and risks

If you see a hazard or condition that presents a risk to your health and safety, report it to a staff member or Security Officer so that something can be done to remedy it. Help to fix it if you can.

To report a serious hazard after hours, contact Security by dialling '6' from any internal telephone or Freecall 1800 249 559 (24 hrs).

Safe work practices

Always follow safe work practices as provided by your lecturer or a technical staff member. Ask for help if you are unsure about how to use a piece of equipment or undertake a task, particularly before carrying out new or unfamiliar work.

First aid

There are a number of First Aid Officers in every building on each UTS campus. See the first aid poster in your study area for their names, location and phone number. Security Officers also have first aid training and can be contacted by dialling '6' from any internal telephone or Freecall 1800 249 559 (24 hrs).

Medical attention is also available from the Health Service at City (Broadway) and Kuring-gai campuses.

Accident/incident reporting

If you are involved in an accident or incident, report it to a staff member or Security Officer and then complete a UTS Accident/Incident Report form, available from your faculty office or Security.

If the accident/incident is serious, call Security immediately by dialling '6' from any internal telephone or Freecall 1 800 249 559 (24 hrs).

Smoking

Smoking is not permitted inside any building on any campus of the University, or in any University vehicle.

Campus shuttle bus

The University operates a number of shuttle bus services. These run between:

- City and Kuring-gai campus
- Kuring-gai campus main entry and the Kuring-gai campus carpark

- City campus at Haymarket and Broadway and the student accommodation facilities (Geegal and Bulga Ngurra). This shuttle covers the area bounded by William Henry Street, Bay Street and Broadway. All students living within this area are urged to use the service to ensure a safe passage home.

Shuttle bus timetables are available from the Security Office on your campus.

Lost and found

The Security Office on your Campus is the first point of call to check for lost property or to hand in found items. Items are kept for three months and if unclaimed become the property of the person who found the item.

Security systems

All buildings are accessible by a personal identification number (PIN) and are protected by an electronic intrusion detection system and a closed circuit TV network. You can obtain a PIN from your faculty office. Remember, your PIN is assigned to you and is not transferable. Do not misuse your PIN as this could compromise the safety of others.

Keeping yourself safe

- If studying/working in an isolated area, particularly after hours, lock the doors and don't let anyone in who you don't know. Do not leave doors propped open.
- If you think you are being followed or feel frightened for any reason, contact Security by dialling '6' from any internal telephone or Freecall 1 800 249 559.
- Do not take shortcuts through isolated areas, particularly at the St Leonards campus where the cemetery is a definite no-go area, even during the day. Keep to well-travelled routes and well-lit areas.
- Walk near the curb, away from doorways and bushes.
- Be alert when using toilet facilities, particularly in isolated areas. Check for strangers while you are still near the door. Whenever possible, ask a friend to accompany you.
- If you plan to have a drink after classes, make plans ahead of time for getting home. Don't leave with people you are not comfortable with.
- Do not hitchhike or accept a lift from a stranger.
- If you feel uncomfortable about who is in a lift/elevator, do not get in. Wait until the next lift/elevator arrives.
- Remember, UTS Security staff are available 24 hours a day, 7 days a week.

Keeping your belongings safe

The University consists of a number of large public buildings in the CBD and experiences a level of property crime in keeping with its location. Purses, wallets and particularly mobile phones are a prime target for thieves.

- Mark your name or other personal identification (e.g. your driver's licence number) on personal items of value. Marked items are less likely to be stolen.
- Use the lockers in the Library to store personal property, particularly if you plan on spending some time studying.
- Keep your possessions with you at all times. Do not leave wallets, purses or phones unprotected or out of your sight, particularly in the Library, computer laboratories or cafeterias.
- Do not carry large amounts of money – there are automatic teller machines (ATMs) on most campuses.

Bicycle storage

Bicycle racks are located outside major buildings and often covered by a security camera.

Recycling

UTS has facilities for recycling paper, glass, cardboard and aluminium. Reduce, reuse and recycle.

Contacts

Environment, Health and Safety

telephone (02) 9514 1326, (02) 9514 1062, (02) 9514 1063
email ehs.branch@uts.edu.au
www.ehs.uts.edu.au

Security

City campus at Broadway

telephone (02) 9514 1192
email security.general@uts.edu.au

City campus at Haymarket

telephone (02) 9514 3399
email security.haymarket@uts.edu.au

Kuring-gai campus

telephone (02) 9514 5551
email security.kuring-gai@uts.edu.au

St Leonards campus, Dunbar Building

telephone (02) 9514 4004
email security.dunbar@uts.edu.au

CAMPUS LIFE

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 (City campus)
telephone (02) 9514 1444
email office@utsunion.uts.edu.au

City campus (Haymarket)
telephone (02) 9514 3369

Kuring-gai campus
telephone (02) 9514 5011

www.utsunion.uts.edu.au

Union Sports Centre

The centre contains multipurpose spaces, squash courts, weights rooms, circuit training room and outdoor basketball court.

CB04.1
City campus
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 p.m. at both City and Kuring-gai campuses.

Care is available for 0–5 year olds throughout the year and for 5–12 year olds during school holidays. Child care can be accessed on a full-time, or part-time basis.

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

Child care subsidies

UTS child-care centres charge a fee, comparable to other child-care centres, of between $40–50 per day for 0–5 year olds and $24 a day for 5–12 year olds. All families who register with Centrelink can access Federal Government means-tested child-care subsidies of up to $27 per day through child-care centres.

Further subsidies are available at UTS child-care centres to all current UTS staff and students of up to $8 per day, funded by the University and the University Union and available on proof of employment/enrolment at UTS.

Low-income students may apply to the Equity & Diversity Unit for further assistance (funded by the Unit and the Students' Association) in cases of demonstrable financial hardship.

To obtain an application form, contact the Equity & Diversity Unit on:

telephone (02) 9514 1084

Co-op Bookshop

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

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

www.coop-bookshop.com.au

Students' Association

The Students' Association (SA) is the elected representative body of students at UTS and represents all students of the University on welfare and education issues. UTS students have the right to stand for election of the SA and to vote in the annual elections. The Students Representative Council enacts, directs and coordinates the work of the SA.

All enrolled students are members of the SA and pay an annual fee. Revenue from fees is used to employ professional educational and welfare staff; fund the student newspaper, *Vertigo*; run the Peer Tutor Scheme and Second-hand Bookshop; and facilitate and support various information, education and action campaigns.

City campus

CB01.3
telephone (02) 9514 1155

Kuring-gai campus

KG02.4
telephone (02) 9514 5237

Radio Station 2SER-FM (107.3 FM)

2SER-FM is a community-based radio station situated on Level 26 of the UTS Tower. 2SER is owned by Sydney Educational Broadcasting Ltd, a company established jointly by the University of Technology, Sydney and Macquarie University. The station broadcasts a diverse range of 'talk' and music programs, produced and presented by volunteers.

Students interested in broadcasting are welcome to visit the studios:

CB01.26.22
City campus
telephone (02) 9514 9514

or for more information visit the website at:

www.2ser.com

UTS Gallery and Art Collection

The UTS Gallery is a dedicated public gallery on the City campus. The UTS Gallery presents local, interstate and international exhibitions of art and design. The exhibitions change monthly.

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

CB06.4
City campus
702 Harris Street, Ultimo
telephone (02) 9514 1652
fax (02) 9514 1228
email uts.gallery@uts.edu.au

www.utsgallery.uts.edu.au

PRINCIPAL DATES FOR 2002

January

1	New Year's Day – public holiday
2	Summer session classes recommence (to 1 February)
2	Provisional examination timetable available for Summer session
4	UTS Advisory Day
7	Closing date for change of preference (main round) to the Universities Admissions Centre (UAC), by mail or in person. Closing date (midnight) for change of preference (main round) UAC Infoline and website (www.uac.edu.au)
7	Formal supplementary examinations for 2001 Spring semester students
11	Last day to submit appeal against exclusion from Spring 2001
11	Due date for payment of Autumn semester 2002 tuition fees for continuing international students
18	Final examination timetable for Summer session available
18	Closing date for applications for non-award and cross-institutional enrolment in Autumn semester 2002
18	Main round of offers to UAC applicants
21–25	Enrolment of new main round UAC undergraduate students at City campus
23	Closing date for change of preference to UAC for late round offers
25	Public school holidays end
26	Australia Day – public holiday
30	Closing date for applications for Postgraduate Equity Scholarships for Autumn semester 2002
31	Third round closing date for post-graduate coursework applications for Autumn semester 2002 (except Faculty of Business – closing date 15 February)

February

1 Late round of offers (UAC)

1 Summer session ends for subjects with formal exams

4–15 Formal examinations for Summer session

6–7 Enrolment of late round UAC students at City campus

8 Last day to lodge a Stage 2 appeal against assessment grade for Spring semester 2001

11–19 Enrolment of new postgraduate students at City campus

15 Third round closing date for Faculty of Business postgraduate coursework applications for Autumn semester 2002

21–22 Enrolment of new international students at City campus

22 Last round of offers (UAC)

25 Orientation week for new students commences (to 1 March)

25 Release of results for Summer session

27 Union 'O' Day – Clubs and activities day

27 Late enrolment day

March

4 Autumn semester classes commence

6 Late enrolment day

8 Last day to lodge a Stage 2 appeal against assessment grade for Summer session

15 Last day to enrol in a course or add subjects[1]

15 Last day to pay upfront HECS or Postgraduate Course Fees for Autumn semester 2002

18 Applications open for Vice-Chancellor's Postgraduate Research Student Conference Fund (for conferences July – December)

28 Last day to withdraw from a course or subject without financial penalty[1]

28 HECS census date (note 31 March is Easter Sunday)

29 Good Friday – public holiday

30 Easter Saturday – public holiday

31 Easter Sunday

April

1 Easter Monday – public holiday

1–5 Vice-Chancellors' Week (non-teaching)

3–5 Graduation ceremonies (Kuring-gai campus)

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

15–26 Public school holidays

25 Anzac Day – public holiday

May

1 Applications open for undergraduate courses, where applicable, and post-graduate courses for Spring semester 2002

6–17 Graduation ceremonies (City campus)

10 Provisional examination timetable for Autumn semester available

22 Closing date for applications for Vice-Chancellor's Postgraduate Research Student Conference Fund (for conferences July–December)

31 Final Autumn semester examination timetable available

31 Closing date for undergraduate and first round postgraduate coursework applications for Spring semester 2002 (except Faculty of Business – closing date 12 July)

31 Closing date for postgraduate research degree applications for Spring semester 2002

June

10 Queen's Birthday – public holiday

14 Last teaching day of Autumn semester

15 Formal examinations for Autumn semester commence (to 5 July)

27 Closing date for applications for Postgraduate Equity Scholarships for Spring semester 2002

28 Second round closing date for post-graduate coursework applications for Spring semester 2002 (except Faculty of Business – closing date 12 July)

28 Closing date for applications for non-award and cross-institutional enrolment in Spring semester 2002

July

5 Autumn semester formal examinations end (commenced 15 June)

5 Due date for payment of Spring semester 2002 tuition fees for continuing international students

8–12 Vice-Chancellors' Week (non-teaching)

8–19 Public school holidays

12 Closing date for Faculty of Business postgraduate coursework applications for Spring semester 2002

15–19 Formal alternative examination period for Autumn semester students

22–26 Enrolment of new students for Spring semester 2002

24 Release of Autumn semester examination results

25 Formal supplementary examinations for Autumn semester students

29 Spring semester classes commence

August

1 Applications available for undergraduate and postgraduate courses for Autumn semester 2003

1 Applications available for postgraduate research scholarships for Autumn semester 2003

2 Last day to withdraw from full-year subjects without academic penalty

2 Last day to lodge a Stage 2 appeal against assessment grade for Autumn semester 2002

9 Last day to enrol in a course or add subjects for Spring semester 2002[1]

16 Last day to pay upfront HECS or postgraduate course fees for Spring semester 2002

30 Last day to withdraw from a course or subject without financial penalty[1]

30 HECS census date
(note 31 August is a Saturday)

September

2 Applications open for Vice-Chancellor's Postgraduate Research Student Conference Fund
(for conferences January – June 2003)

2 Applications open for UTS Academic Internships

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

30 Public school holidays commence
(to 11 October)

30 Vice-Chancellors' Week (non-teaching) commences (to 4 October)

30 Graduation ceremonies (City campus) commence (to 4 October)

October

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

4 Provisional examination timetable for Spring semester available

7 Labour Day – public holiday

11 Public school holidays end
(commenced 30 September)

25 Final examination timetable for Spring semester available

30 Closing date for applications for Postgraduate Equity Scholarships for Summer session 2002/3

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

31 First round closing date for postgraduate coursework applications for Autumn semester 2003

31 Closing date for postgraduate research degree applications for Autumn semester 2003

November

8 Last teaching day of Spring semester

9–29 Formal examination period for Spring semester

15 Closing date for applications for UTS Academic Internships

19 Closing date for applications for Vice-Chancellor's Postgraduate Research Student Conference Fund (for conferences January–June 2003)

December

2 Summer session classes commence (to 7 February 2003)

9–13 Formal alternative examination period for Spring semester students

18 Release of Spring semester examination results

23 Public school holidays (to 28 January 2003)

25 Christmas Day – public holiday

26 Boxing Day – public holiday

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[1] HECS/Postgraduate course fees will apply after the HECS census date (31 March and August or last working day before). Contact the relevant Faculty Office for further information about enrolment and withdrawal deadlines for flexible delivery subjects.

Note: Information is correct as at August 2001. The University reserves the right to vary any information described in Principal Dates for 2002 without notice.

FACULTY INFORMATION

WELCOME TO THE FACULTY OF ENGINEERING

The UTS Faculty of Engineering has a clear mission: to be a world leader in practice-based engineering education. We have a unique cooperative education undergraduate course that includes two internships – each consists of a six month period of paid work in industry linked with academic preparatory and debriefing subjects. This contextualisation is critical in preparing students to be lifelong learners who are able to respond to any new challenge they subsequently meet. It also promotes an early identification of career preferences – in time to influence later subject choices, while helping students shape and form their career directions.

At the postgraduate level, world class coursework and collaborative research programs are offered and are closely targeted to 'industry-driven' needs. The Faculty is internationally focused and committed to globalising its programs, staff and students.

We are proud of our many achievements to date. These include:

- the recent growth of the UTS Engineering Cooperative Scholarship Program which demonstrates industry's commitment to the Faculty and its practice-based education philosophy
- the groundbreaking research in wireless communication technology for heart disease, innovative surgical instruments, global positioning systems, Solar Sailor electrical motors, rehabilitation of timber bridges, and renewable bio-fuel propulsion, and
- the expansion of the role played by the Faculty's Industry Advisory Network (IAN) in its provision of strategic advice to the Faculty. The network comprises senior industry representatives from all fields of engineering practice.

We will continue to strive to improve our student service and strengthen our links with our industry partners. I invite you to participate in this exciting journey – join with us, learn with us, collaborate with us, and succeed with us.

Professor Archie Johnston
Dean

HISTORY

The Faculty began teaching in 1965 as part of a new institute, soon to become the New South Wales Institute of Technology (NSWIT). In 1987, by Act of the Parliament of New South Wales, NSWIT was reconstituted as the University of Technology, Sydney, and commenced operation as UTS in January 1988. During 1988 and 1989, UTS amalgamated with several other institutions and parts of institutions, and the 'new UTS' came into being in its present form in 1990. None of the University's new partners had engineering schools, and so the Faculty of Engineering has continued in essentially the same form since its inception.

The first courses offered led to the award of Diploma in Technology. These were extended to Bachelor of Engineering level in 1971, and the Diploma courses gradually phased out. The first Bachelor of Engineering degrees were awarded in 1972. Programs leading to Master of Engineering by coursework and by research were offered in 1975. The degree of Doctor of Philosophy by research was made available in 1986, initially by arrangement with another university and, from 1988, by UTS in its own right.

In 2001, the Faculty has some 2,650 undergraduate students and 671 postgraduate students. Of the latter, some 74 are candidates for higher degrees by research, and 597 are enrolled for postgraduate awards by coursework.

MISSION

The mission of the Faculty of Engineering is to be the Australian leader, and among the world leaders, in practice-based engineering education and research.

PRACTICE-BASED ENGINEERING EDUCATION

What does it mean?

Engineering is about devising ways in which technology can contribute to human ends, and about developing, delivering and maintaining technical systems that do so. The practice of engineering is about doing this reliably and cost-effectively, in the context of real social and economic objectives and pressures, and in a variety of business and community settings. It embraces many technical and non-technical factors that cannot be replicated in the classroom, including the need to understand and interact with a wide range of people and perspectives as well as to deal with new or unexpected technical issues and with uncertainty and risk. It should recognise the fundamental need to ensure a sustainable future.

Education for professional engineering must include a strong intellectual training, and a strong grounding in engineering science. But over-concentration on engineering science can impart a narrow technical mindset; and an education that is exclusively academic can be remote from reality. Either of these can cause graduates serious difficulty later in coming to grips with the human aspects of engineering and with the demands of practice.

Practice-based engineering education requires students to experience the reality of engineering internship from an early stage in their professional formation. It actively relates this experience to their developing understanding of engineering theory, analysis and laboratory work, and to studies in other disciplines, and promotes critical and creative thinking based on knowledge gained outside as well as within the University. This interaction requires that most academic staff themselves have significant experience of engineering internship, and keep it constantly refreshed. Educational programs in which either students or a majority of staff do not have current experience of practice cannot validly be called practice-based.

Practice-based education is more than practice, and more than education. A university education should impart a thorough grasp of fundamental principles, a respect for knowledge, a capacity for critical inquiry and lateral thinking, a fluency in communication, a pride in excellence, and an eagerness to contribute to shaping the future. Practice-based engineering education claims that these attributes can be more effective when they have been developed in contact with the human and technical challenge of real engineering situations.

Engineering education at UTS

In Australia, the basic qualification for professional engineering internship is the Bachelor of Engineering degree (BE). At most universities the BE occupies four years of full-time academic study. At UTS, as well as completing the academic program, all undergraduate engineering students must gain substantial, approved engineering internship in industry, or in other authentic professional settings. This experience must be distributed over the period of the course and must meet standards of level, quality, and relevance. Traditionally, it has taken six years to complete a UTS Engineering degree. Since 1998, it has taken five years.

Graduates of most university engineering courses need up to two years' experience in industry, after graduation, before they are able to assume real responsibility. UTS Engineering graduates have already gained much of this experience, together with a real understanding of the interrelations between theory and practice, technology and human factors. They are equipped to undertake professional responsibility much sooner than graduates of other courses at other universities – often, immediately upon graduating.

The combination of formal academic learning in the University, and experiential learning in the workplace, is called Cooperative Education (or Co-op). UTS Engineering courses have embodied this principle for over 30 years. The courses have been highly regarded in industry and according to many reports and surveys, the graduates enjoy the highest employment rate of any engineering degree courses in Australia. UTS Engineering is by far the largest Co-op faculty in Australia, in any discipline. Co-op is well known and highly regarded in other countries also, particularly in North America. UTS is a member of the World Council for Cooperative Education.

The BE program has recently been completely redesigned. It retains the Co-op requirement for substantial work experience, but now goes much further. It extends the concept of practice-based engineering education into one of total professional formation, and leads to the combined award of Bachelor of Engineering, Diploma in Engineering Practice (BE DipEngPrac). Details appear in the relevant section of this handbook.

Other UTS Engineering courses, undergraduate and postgraduate, are also designed to interact strongly with industry, though the work-experience requirements are mostly less structured than those of the BE DipEngPrac. In all programs, the majority of students already have significant industrial experience, or are gaining it concurrently. The Faculty has policies for maximising opportunity for its academic staff to maintain first-hand experience in industry, and engages many practising engineers as adjunct teaching staff. It also strongly encourages collaborative research and consultancy with industry, and many of its research students are industry based. The predominant culture, therefore, is strongly practice oriented, and this also benefits the relatively small number of students who do not yet have engineering work experience.

The Faculty is actively exploring the new paradigms of work-based learning now developing in several countries, and has recently introduced a work-based learning program.

In all of its activities the Faculty seeks to promote better understanding of the role of engineering in society, and to promote and support service to the community through other channels as well as industry.

WOMEN IN ENGINEERING PROGRAM

The engineering profession in Australia has traditionally attracted few women. Currently, women represent around 6 per cent of practicing professional engineers and 14 per cent of enrolments in engineering degree courses nationally.

The Women in Engineering program was first established at UTS to improve this rate of participation by communicating a broadened conception of engineering to secondary students. This experience led to the development of curriculum resources on teaching technology for girls. The program now communicates with secondary schools in ways that are inclusive of the interests and capabilities of a diverse range of students, especially women, and also works to address educational, cultural and professional barriers that may inhibit the contribution of women to the engineering profession.

The program has been recognised in engineering education and professional spheres by its inauguration of the Annual Australasian Women in Engineering Forum, for its initiatives in curriculum development, and its contributions to the ground-breaking National Review of Engineering Education. It has strongly influenced the philosophy of engineering at UTS, and has been a catalyst for many innovations in the new Bachelor of Engineering, Diploma in Engineering Practice curriculum introduced in 1998. The program has recently translated its experience in communicating with schools about engineering into curriculum innovation in the Bachelor of Engineering at UTS. Women in Engineering promotes opportunities for inclusive team building for students, and student interaction with women engineers from diverse fields around current issues.

The Faculty of Engineering at UTS has the highest proportion of women academic staff of any Australian engineering faculty. Several are past coordinators of the program.

The Faculty strongly welcomes women students and values their contribution to an inclusive teaching and learning environment, and their insights from their internship experience in engineering. It also supports broader cultural change initiatives which will better enable women graduates to fulfil their potential as future engineering and management professionals.

INTERNATIONAL ENGINEERING PROGRAMS

Engineering is an international profession, and international interactions are essential to the development and professional currency of any engineering school. UTS Engineering has vigorous international partnerships in all its areas of activity, and works to build relationships with international as well as Australian leaders in engineering internship and practice-based education and research.

In its educational programs, the Faculty seeks to emphasise the international dimension of engineering and of professional development and practice. All students, undergraduate and postgraduate, are strongly encouraged to undertake international placements as part of their academic program, for full credit. Research students and Faculty staff are similarly encouraged to develop international partnerships and to gain international experience in the course of research projects or development leave. The Faculty has many staff with strong international backgrounds, and has many international visitors from overseas universities and engineering organisations.

The Faculty welcomes international students, both through exchange programs and as candidates for UTS degrees, and expects to recruit increasing numbers of international students to its undergraduate and graduate programs. These students provide an essential and welcome internationalising influence, and help Australian students and staff to become more fluent in their international interactions. It is the Faculty's business to offer a satisfying and rewarding experience to all its students, and in relation to its international students, this should contribute to the strengthening of personal, professional and economic links between Australia and other countries.

International exchange programs relating to the undergraduate degrees are outlined in the Undergraduate courses section of this handbook. Similar opportunities are available to students in graduate programs. All inquiries should be directed to the Undergraduate and Postgraduate Office or to the Director, International Engineering Program. International research partnerships are too numerous to list in this handbook, and are constantly evolving. Details appear in the course entry of particular research programs or are available from their directors.

STRUCTURE OF THE FACULTY

The Faculty is not subdivided into departments or other entities, but functions on an integrated basis.

Each member of academic and general staff belongs to a Staff Group, reflecting their professional interests and expertise. The Group titles are:

- Civil Engineering
- Computer Systems Engineering
- Electrical Engineering
- Engineering Management and Practice
- Environmental Engineering
- Mechanical and Manufacturing Engineering
- Telecommunications Engineering
- Technical Support
- Administrative Support.

The Faculty's governing body is the Faculty Board in Engineering. There is a Dean's Advisory Committee, a Faculty Budget Committee, a Committee on Educational Development, a Courses Committee, a Research Degrees Committee, and a Research Management Committee. There is also a network of advisory committees with membership drawn from industry, the profession and the community. See page 227 for further details.

In addition, the Faculty is represented on most of the University's boards and committees.

LOCATION

The Faculty of Engineering is located at City campus, Broadway, in Buildings 1 and 2. Main locations are:

- **CB02.7.093** (Level 7, Building 2) Dean, Faculty Manager, Undergraduate and Postgraduate Office, Industrial Liaison, International and Enterprise Development Office, and Women in Engineering program
- **CB01.24.27** (Level 24, Building 1) Associate Dean, Teaching and Learning Programs
- **CB02.7.078** (Level 7, Building 2) Associate Dean, International and Enterprise Development

- **CB02.5.11C** (Level 5, Building 2) Associate Dean, Research and Development

Undergraduate and Postgraduate Office

The UPO offices are located at CB01.7.100 (level 7, Building 2). This connects with Building 1 at the City campus, Broadway. The postal address is:

Faculty of Engineering
University of Technology, Sydney
PO Box 123
Broadway NSW 2007

The UPO is generally open from:

Monday to Thursday, 10 a.m. – 5.30 p.m., and Friday, 10 a.m. – 5 p.m.

Voicemail, fax or email contact may be made at any time.

General guide to locations of staff and facilities

- Civil, Structural, and Environmental Engineering: academic staff at CB02.5 (level 5, Building 2); laboratories mainly at CB02.1 and CB02.2 (levels 1 and 2, Building 2), and some at CB02.5 (level 5, Building 2)
- Electrical, Computer Systems, Software and Telecommunications Engineering: academic staff and laboratories at CB01.18–25 (levels 18–25, Building 1)
- Mechanical Engineering and Manufacturing: academic staff at CB02.6 (level 6, Building 2); laboratories mainly at CB02.2 and CB02.3 (levels 2 and 3, Building 2)
- Learning and Design Centres: CB01.25 (level 25, Building 1) and CB02.6 (level 6, Building 2)
- Centre for Local Government Education and Research: CB01.17 (level 17, Building 1)
- National Centre for Groundwater Management: CB01.17 (level 17, Building 1)
- APACE (Appropriate Technology for Community and Environment): CB02.4 (level 4, Building 2)

RESEARCH PROGRAMS

An outline of the Faculty's research interests and strengths appears in the Postgraduate section of this handbook under Research Areas and Associated Centres. Details of research programs are published separately.

ASSOCIATED CENTRES

The Faculty participates in the work of the several centres and organisations. For details refer to pages 14 and 84.

Insearch Limited

Insearch Limited, which is wholly owned by the University of Technology, Sydney, offers a Foundation Studies Certificate program in Engineering. The program is designed and supervised by the Faculty of Engineering staff for students who are not currently qualified for direct university entry. While the University cannot guarantee admission to its degree programs (except for international students), students who have completed the program may apply for admission to the first year of most engineering degree programs offered by the Faculty.

For further information contact:

Registrar
Insearch Limited
Ground Floor
10 Quay Street
Haymarket

telephone (02) 9218 8688
fax (02) 9281 9875
email courses@insearch.edu.au

www.insearch.edu.au

Institutes of UTS

The Faculty also interacts closely with the following institutes at UTS:

- Institute for Interactive Media and Learning
- Institute for International Studies
- Institute for Sustainable Futures.

Further details of all these centres, institutes and other organisations are published in the *UTS: Calendar 2002*.

PRINCIPAL CONTACTS

		Location[1]	Telephone
Dean of Engineering	Professor Archie Johnston	CB02.7.092	2599
Faculty Manager	Ms Sandra Meiras	CB02.7.093	2594
Associate Dean, Teaching and Learning	Professor Warren Yates	CB01.24.27	2436
Director, Undergraduate Programs	Associate Professor David Lowe	CB02.7.100	2526
Manager, Undergraduate and Postgraduate Office	Ms Susana Tanuwijaya	CB02.7.098	2671
Associate Dean, International and Enterprise Development	Associate Professor Jim Parkin	CB02.7.078	2638
Director, Postgraduate Programs	Associate Professor Tom Anderson	CB02.7.088	2422
Manager, International and Enterprise Development	Ms Beate Buckenmaier	CB02.7.080	2590
Associate Dean, Research and Development	Professor Rod Belcher	CB02.5.11C	2423
Group Heads			
Civil	Professor Bijan Samali	CB02.7.070	2023
Computer Systems	Mr Noel Carmody	CB01.22.21B	2390
Electrical	Associate Professor Jianguo Zhu	CB01.18.23	2318
Engineering Management and Practice	Associate Professor Helen McGregor	CB02.6.28	2673
Environmental	Dr Pam Hazelton	CB02.5.12	2661
Mechanical	Dr Guang Hong	CB02.6.19	2677
Telecommunications	Professor Robin Braun	CB01.24.24	2460
Program Heads			
Capstone and double degrees	Dr David Eager	CB02.6.12B	2687
Civil and Civil and Environmental	Mr Alan Brady	CB02.5.11A	2627
Computer Systems	Associate Professor Chris Peterson	CB01.22.21A	2389
Core	Associate Professor Keith Crews	CB02.5.28	2619
Electrical	Dr Ben Rodanski	CB01.24.20B1	2426
Engineering Practice	Dr Ravindra Bagia	CB01.24.23	2432
Mechanical	Dr Phouc Huynh	CB02.6.16	2617
Telecommunications	Dr Tim Aubrey	CB01.24.17B	2360
Research Program Heads			
In Key University Research Strengths			
Built Infrastructure	Professor Bijan Samali (alternate Associate Professor Keith Crews)	CB02.5.11B	2023
Water and Waste Management	Professor Vigi Vigneswaran (alternate Professor Archie Johnston)	CB02.5.23	2641
Health Technologies	Professor Hung Nguyen (alternate Dr Ananda Sanagavarapu)	CB01.24.29	2451
In University Centres			
Electrical Machines and Power Electronics	Associate Professor Jianguo Zhu (alternate Dr Peter Watterson)	CB01.18.23	2318
Groundwater Management	Professor Michael Knight	CB01.17.15	2692
Satellite Systems	Associate Professor Sam Reisenfeld (alternate Dr Tim Aubrey)	CB01.25.12B	2448
In Faculty/Unit Designated Research Strengths			
Intelligent Transport Systems	Professor Chris Drane	CB01.22.21B	2390
In Emerging Research Strengths			
Energy Planning and Policy	Associate Professor Deepak Sharma	CB02.5.27	2422
Fluid Systems	Dr Simon Beecham	CB02.5.07	2623
Information Systems	Associate Professor David Lowe	CB02.7.100	2526
Mechanical Systems	Dr Nong Zhang	CB02.6.08	2662
Systems and Software Engineering	Associate Professor John Leaney	CB01.22.21A	2389
Wireless Communication	Professor Robin Braun	CB01.24.24	2460
Director, Industrial Liaison	Mr Paul Stapleton	CB02.7.097	2592
Director, International Engineering Program	Mr Paul Maloney	CB02.7.087	2591
Director, Women in Engineering Program	Ms Bronwyn Holland	CB02.7.071	2601
Community Outreach Coordinator	Ms Betty Jacobs	CB02.7.074	2450

Note: A list of academic staff by Groups, showing their professional interests, is given at the end of this section. The University's formal listing of Faculty of Engineering staff, with qualifications, appears at the end of this handbook and in the *UTS: Calendar 2002*.

[1] Note that some locations are provisional and may change.

PROFESSIONAL BODIES IN ENGINEERING

The Institution of Engineers, Australia

The Institution of Engineers, Australia (IEAust) is the principal professional engineering body and learned society in Australia. Its membership covers all branches of engineering, with specialist colleges catering for the main fields of practice. Its headquarters is located in Canberra, with operating divisions in capital cities and regional centres. The local division for UTS is Sydney Division, which runs an annual program of lectures, seminars and professional activities, with particular events for Young Engineers. Its offices are located in North Sydney, and can be contacted on telephone (02) 9929 8544.

Corporate membership of IEAust (in the grades of Member or Fellow) confers the status of Chartered Engineer and provides a listing in the National Professional Engineers Register. Students enrolled in courses leading to the Bachelor of Engineering degree may join IEAust as Student members, and upon graduation become eligible for Graduate membership. To attain the corporate grade of Member, certain professional competencies must be gained and demonstrated, normally in employment after graduation. UTS graduates may expect to receive credit towards this requirement for the industrial experience gained during their degree, although some further experience is normally needed (refer also to Professional recognition under Bachelor of Engineering, Diploma in Engineering Practice).

IEAust membership is also available in the categories of Engineering Associate (normally holding a TAFE Associate Diploma or equivalent) and Engineering Technologist (normally holding a Bachelor of Technology degree or an Advanced Diploma).

IEAust assesses degree courses conducted by Australian universities, and may recognise them as meeting its educational requirements for membership. All UTS Bachelor of Engineering degrees are so recognised.

The Association of Professional Engineers, Scientists and Managers, Australia

The Association of Professional Engineers, Scientists and Managers, Australia (APESMA) provides advice and assistance on employment-related matters for professional engineers, scientists and managers. Student members receive the publication *The Student Update* three times a year which gives practical insight into the workplace and employment issues that affect them as professional engineers. For information and student membership application forms, contact APESMA on telephone (02) 9264 9500.

Other bodies

There are a number of other national and regional associations representing particular branches of engineering. Faculty staff with interests in the field concerned are often active in these bodies, and glad to provide information.

ACADEMIC STAFF GROUPS – AREAS OF PROFESSIONAL INTEREST

(The staff list at the end of the handbook includes academic and general staff.)

		Location	Telephone
Civil Engineering			
Associate Professor Tom Anderson	Construction and Management	CB02.7.088	2639
Dr Simon Beecham	Water Engineering	CB02.5.07	2623
Mr Alan Brady	Surveying	CB02.5.11A	2627
Associate Professor Keith Crews	Timber Engineering, Structural Design	CB02.5.28	2619
Mr Ken Halstead	Local Government Engineering	CB02.5.22	2640
Dr Reza-ul Karim	Structural Mechanics, Analysis and Design	CB02.5.05	2621
Dr Kin Leung Lai	Structural Mechanics, Concrete Structures	CB02.5.10	2626
Dr R Sri Ravindrarajah	Concrete Technology	CB02.5.29	2625
Dr Gerald Ring	Soil Engineering	CB02.5.06	2622
Dr Ali Saleh	Structural Mechanics, Finite Element Analysis, Computational Mechanics	CB02.5.17	2635
Professor Bijan Samali	Structural Dynamics, Wind and Earthquake Engineering	CB02.7.070	2632
Mr Chris Wilkinson	Structural Design Philosophies, Structure of Steel, Reinforced and Prestressed Concrete Structures	CB02.5.18	2648
Postdoctoral Fellow			
Dr Danielle Simone Klimesch	Fibre-Cement Building Products, Advanced Materials Analysis/Characterisation	CB02.5.24	2642
Research Fellows			
Dr Jianchun Li	Dynamic Analysis and Testing, Fracture Mechanics	CB02.5.09	2651
Ms Yi Min Wu	Dynamic Testing	CB02.5.36A	2582
Adjunct Professor			
Professor Steve Bakoss	Structural Mechanics, Structural Design	CB02.5.03	2629
Computer Systems Engineering			
Mr Noel Carmody	Microcomputer System Design, Operating Systems, Computer Architecture, Digital Control Systems, Electrical Engineering	CB01.22.21C	2391
Professor Chris Drane	Positioning Systems, Intelligent Transport Systems, Software Engineering	CB01.22.21B	2390
Dr Martin Evans	Software Engineering, Philosophy in Engineering	CB01.22.24	2351
Dr K K Fung	Parallel Processing, Software Engineering, Computer Simulation, Microcomputer Engineering, Digital Systems	CB01.22.25	2394
Mr John Leaney	Software/Systems Engineering, Systems/Software Architecture, Open Systems	CB01.22.21A	2389
Associate Professor David Lowe	Hypermedia Information Modelling, Web and Hypermedia Development Processes, Web Project Scoping	CB02.7.100	2526
Mr Steve Murray	Embedded Systems, Real-time Systems, Operating Systems, Computer Systems Engineering	CB01.22.22	1553
Associate Professor Chris Peterson	Industry Research Policy, Year 2000 Software Compliance, Software Project Management	CB01.22.20A	2392
Dr Keiko Yasukawa	Mathematics Education, Nonlinear Systems and Control, Numeracy and Engineering	CB01.22.10C	2437

		Location	Telephone
Electrical Engineering			
Professor Hung Nguyen	Computer Control and Instrumentation, Biomedical Technology, Neural Networks and Fuzzy Logic	CB01.24.29	2451
Mr Peter McLean	Embedded Systems, Signal Processing, Numerical Methods	CB01.19.21	2339
Mr Andrew Mears	Biomedical Engineering, Instrumentation and Control, Biosensors, Signal Processing and Identification	CB01.24.32	2427
Dr Quang Ha	Control Theory, Robotics, Computer Control	CB01.24.17B	2453
Dr Venkat Ramaswamy	Power Electronics, Electrical Machines, Variable-Speed Drives, Computer Simulation and Modelling	CB01.24.17A	2418
Dr Ben Rodanski	Numerical Methods, Computer-aided Design, Device Modelling for CAD, Software Engineering	CB01.24.20B	2426
Associate Professor Jianguo Zhu	Electromagnetics, Electrical Machines and Drive Systems, Power Electronics	CB01.24.28	2318
Senior Research Fellow			
Dr Peter Watterson	Electromagnetics, Engineering Mathematics, Numerical Methods	CB01.18.23	2319
Engineering Management and Practice			
Dr H Akpolat	Engineering Management, Management Systems, Risk Management	CB02.7.070	2628
Mr Ravindra Bagia	Systems Engineering, Software Engineering, Engineering Management	CB01.24.23	2432
Professor Rod Belcher	Antenna and Microwave Systems, Systems Engineering	CB02.5.11	2423
Associate Professor Paul Bryce	Micro-hydroelectricity, Appropriate Technology, Renewable Energy and Development	CB01.24.20A	2425
Mrs Betty Jacobs	Engineering, Science and Design Education, Communication	CB02.7.074	2450
Mr R Jarman	Micro-hydroelectric Systems, Appropriate Technology, Engineering Communication	CB01.18.23	2368
Mr Peter Lewis	Engineering Education, Engineering Management, Project Management	CB01.24.31	2431
Mr Paul Maloney	International Engineering, Philosophy of Science	CB02.7.083	2591
Associate Professor Helen McGregor	Human Communication, Engineering and Social Issues, Cooperative Education, Engineering Documentation, Professional Development	CB02.6.28	2678
Ms Vicki McKain	Instrumentation and Control, Engineering Education and Biomedical Engineering	CB01.24.33	2443
Associate Professor Deepak Sharma	Energy Planning and Policy, Institutional Restructuring and Decision Processes, Project Planning and Performance	CB02.5.27	2422
Mr Paul Stapleton	Industrial Liaison	CB02.7.097	2592
Adjunct Professor			
Associate Professor Stephen Johnston	Appropriate Technology, Design, Ergonomics, Philosophy, Practice and Social Context of Engineering	CB02.6.27	2668

		Location	Telephone
Environmental Engineering			
Professor Vigi Vigneswaran	Environmental Engineering, Water and Waste Treatment, Management and Re-use, Industrial Waste Minimisation, Cleaner Production	CB02.5.23	2641
Professor Michael Knight	(National Centre for Groundwater Management) Land-based Waste Management Systems, Contaminated Site Investigation, Remediation Dry Land Salinity, Urban Water Resource Management	CB01.17.15	2692
Associate Professor Jim Parkin	Engineering Management, Environmental Planning, Decision Theory	CB02.7.087	2638
Dr Prasanthi Hagare	Water and Wastewater Treatment Plant Design, Industrial/Hazardous Waste Management, Auditing Landfill Management	CB02.5.20	1952
Dr Pamela Hazelton	Applied Soil Science, Land Resource Management	CB02.5.12	2661
Ms Bronwyn Holland	Environmental Engineering, Women in Engineering Program	CB02.7.071	2601
Mr James Irish	Environmental Risk Assessment, Risk Engineering, Statistical Hydrology	CB02.5.01	2617
Professor Archie Johnston	Environmental Hydraulic Engineering, Fluid Mechanics or Water Quality, Groundwater Pollution, Urban Drainage, Oil Spill Hydrodynamics, Riverbank Stabilisation	CB02.7.092	2599
Dr Robert McLaughlan	Ecohydrology, Contaminated Sites Management, Engineering Education (National Centre for Groundwater Management)	CB01.17.15	2614
Dr Noel Merrick	Groundwater Modelling, Flow Modelling and Optimisation (technical and economic coupling), Groundwater Management, Geophysical Mapping of Salinised Sites (National Centre for Groundwater Management)	CB01.17.15	2612
Dr William Milne-Home	Aquifer Pumping Test Analysis, Dry Land Salinity and its Management, Isotope Tracers (National Centre for Groundwater Management)	CB01.17.15	2654
Dr Hao Ngo	Advanced Water and Wastewater Treatment Processes, Water Quality Assessment and Monitoring, Argo-industries Waste Management	CB02.5.47	2653
Mr Derek Yates	Soilwater Physics, Unsaturated Flow, Groundwater Modelling (National Centre for Groundwater Management)	CB01.17.15	2702

		Location	Telephone
Mechanical Engineering and Manufacturing			
Mr Terry Brown	Experimental and Computer-aided Stress Analysis and Design, Adhesives	CB02.6.04	2658
Mr John Dartnall	Mechanical Engineering Design	CB02.6.22	2541
Dr David Eager	Acoustics, Project Management, Occupational Health and Safety, Building Services Engineering, Fire Engineering, Accident Investigation, Forensic Engineering, Children's Playgrounds and Amusement Parks and Devices	CB02.6.12B	2687
Dr Guang Hong	Internal Combustion Engines, Active Flow Control, Thermodynamics, Engineering Statistics	CB02.6.19	2677
Dr Phuoc Huynh	Computational Mechanics, Fluid Mechanics, Heat Transfer	CB02.6.16	2675
Ms Catherine Killen	Management of Technology, Computer-aided Design, Product Data Management	CB02.6.24	2697
Dr Austin Mack	Aerodynamics, Finite Element Methods, Computational Fluid Dynamics, Computational Electromagnetics	CB02.6.26	2684
Dr Jafar Madadnia	Sustainable Engineering, Renewable and Non-renewable Energy, and Jet Cutting Systems, Heat Transfer, Cooling Towers, EHD	CB02.6.06	2740
Mr Garry Marks	Political Economy of Technology, Industry Development Policy, Engineering Education	CB02.6.09	2683
Dr Fred Sticher	Advanced Kinematics and Dynamics, Instrumentation	CB02.6.23	2681
Dr Nong Zhang	Vibration Analysis, Turbo Machinery Vibration, Dynamics of Vehicle Powertrain Systems, Vibration and Motion Control	CB02.6.08	2662
Adjunct Professor			
Professor John Reizes	Computational Fluid Dynamics, Thermodynamics, Heat Transfer, Energy Ethics	CB02.6.10	2742
Telecommunications Engineering			
Dr Tim Aubrey	Antennas and Propagation, Microwave Engineering	CB01.24.17B	2360
Professor Robin Braun	Digital Communications, Information Theory of Coding, Digital Signal Processing, Teletraffic Engineering, Telecommunications Economics	CB01.24.24	2460
Dr Jules Harnett	Engineering Mathematics	CB01.24.19	2413
Mr Anthony Kadi	Real-time Signal Processing, Ultrasound Signal Processing, Signal Theory, Hardware Design and Construction, Communications Networks	CB01.24.20E	2459
Associate Professor Sam Reisenfeld	Communications Systems, Satellite Communication, Information Theory, Modulation, Channel Coding, Synchronisation, Mobile Communications, Wireless Networks, Neural Networks	CB01.25.12B	2448
Dr Ananda (Mohan) Sanagavarapu	High Frequency Electromagnetics, Wave Propagation, Microwave Engineering, Mobile Communication	CB01.25.12A	2447
Dr Kumbesan Sandrasegaran	Wireless Communication Systems, Knowledge-based Systems, Computer-based Learning, Broadband Residential Access Networks	CB01.24.20D	2428
Professor Warren Yates	Signal Processing, Communication System Theory, Packet Radio and Spread Spectrum Communications, Synchronisation Issues in Communications	CB01.24.27	2436

ENGINEERING LEARNING AND DESIGN CENTRES

The Faculty has a strong commitment to providing an effective and supportive learning environment for engineering students. The Learning and Design Centres are located at CB01.25.15 (Building 1, room 2515 (level 25)) and CB02.6.39 (Building 2, room 639 (level 6)). They serve students by providing access to tutors for individual and small group support, reference material, and software and hardware resources, on a drop-in basis, and are open for extended hours.

OTHER SUPPORT CENTRES

For a complete list of student support centres, refer to page 14 of this handbook, under Student Learning Centres.

ENGINEERING CLUBS AND SOCIETIES

Engineering clubs and societies at UTS include:

- The Faculty of Engineering Speakers Club
- SECSME (Society of Electrical, Civil, Structural and Mechanical Engineers)
- Society of Environmental Computer Systems and Telecommunication Engineers.

ENDOWMENTS, PRIZES AND SCHOLARSHIPS

A number of prizes and scholarships for academic excellence are awarded to students enrolled in the Faculty of Engineering. Prizes are awarded in respect of each academic year and are presented annually at a Faculty ceremony. These prizes are made available through the generosity of private individuals and organisations in the public and private sector.

Scholarships for commencing students are also available. Undergraduate scholarships are described below. Inquiries about postgraduate scholarships should be made with the Scholarships and Promotions Manager on telephone (02) 9514 1521.

Prizes available to students in all faculties of the University are described in the *UTS: Calendar 2002*.

Endowments

James N Kirby Chair of Manufacturing Engineering

In 1983, the James N Kirby Foundation commenced a series of donations to the Faculty of Engineering Development Fund towards the establishment of a Chair in an area relating to manufacturing industry. The capital fund to support the Chair was built up over some 12 years and is now expected to be capable of providing a substantial annual contribution in perpetuity.

Through the Foundation's generosity, the Council of UTS was able to establish the James N Kirby Chair of Manufacturing Engineering in 1988. The inaugural professor, Dr Frank Swinkels, was appointed in 1989 and took up duty in 1990. Dr Swinkels had previously been Director of the University's Centre for Industrial Technology.

Prizes

Aim Products Prize

This award was established in 2000 by donations from Aim Products Australia Pty Ltd.

The prize is awarded each semester to the student with the best performance in each of the following subjects: 48210 Engineering for Sustainability; 48510 Introduction to Electrical Engineering; 48520 Electronics; and 48441 Introductory Digital Systems. The prize consists of a cash award of $250.

Association of Consulting Structural Engineers Prizes

Two prizes from the Association of Consulting Engineers were established in 1986, and are awarded annually to students enrolled in the Civil or Civil and Environmental Engineering major. The Junior prize is awarded to the student in the Civil or Civil and Environmental Engineering major who achieves, at the first attempt, the highest aggregate in the subject 48321 Statics. The cash value of the prize is $200. The Senior prize is awarded to the student in the Civil Engineering major who achieves, at the first attempt, the highest aggregate in the subject 48369 Structural Design 2. The cash value of the prize is $250.

Australian Industry Group John Heine Memorial Prizes

These prizes were formerly known as the MTIA John Heine Memorial Prizes and have been re-named because the Metal Trades Industry Association of Australia merged with the Australian Chamber of Manufacturers in 1998 to form the Australian Industry Group.

The MTIA established the John Heine Memorial Foundation in 1950 in memory of John Heine who did much to advance the cause of the metal trades industry. In 1971 the Foundation decided to give support and encouragement to students by the annual award of prizes to outstanding students in the undergraduate Mechanical Engineering major of the Bachelor of Engineering, Diploma in Engineering Practice, at the end of their first year at UTS, on the basis of the aggregate mark in all subjects studied in their second semester. The Foundation continues to offer these prizes through the Australian Industry Group. The prizes are in the form of cash awards to help students cover costs for books and equipment for use in connection with their early years of study at UTS. Currently, prizes are awarded to students in their first three years of study. There are nine prizes and each is a cash award of $400.

L H Baker Medal

The medal was established in 1977 to perpetuate the memory of the late L H Baker, former Head of the School of Mechanical Engineering, who died in 1976. The prize consists of a medal and may be awarded annually to a student who, over the calendar year, has completed four subjects in the Mechanical Engineering field of practice and achieved the highest aggregate mark; the student must have been working full-time during the entire year.

Eldred G Bishop Prize

The prize was established in 1974 to commemorate the leadership of Eldred George Bishop in improving the standard and quality of manufacturing engineering in Sydney. The prize is awarded to a student who is an Australian citizen, generally entering his or her final year of studies towards the Bachelor of Engineering degree. Selection is by invitation initially, followed by written application and an interview. No candidate may be considered for the prize more than once. The prize consists of a commemorative trophy and a cash award of $1,600.

Trevor Buchner Design Prize

(Prize under review)

This prize was established in 1988 from a Trust Fund set up in recognition of the contribution and distinguished service of Trevor Buchner, the first academic member of staff of the School of Civil Engineering. This prize is awarded annually to the student enrolled in the Civil Engineering major, who achieves the highest aggregate mark, at the first attempt, in the subject 48369 Structural Design 2. The prize has a cash value of $200.

Electric Energy Society of Australia

Since 1976 the Electric Energy Society of Australia has offered encouragement, by way of an annual cash award of $200, to Electrical Engineering students. The purpose of the prize is to attract the interest of students in pursuing a course which enables them to become engineers in the electric power distribution industry. The prize is awarded to a sandwich pattern or part-time student who achieves best performance in the subject 48550 Electrical Energy Technology.

Energy Australia Prize in Power Engineering

This prize was established in 1986 and is awarded annually to the student who completes the requirements of the Electrical Engineering degree course and who obtains the highest WAM after completion of the Electrical Engineering degree and Energy Technology sub-major. The cash value of the prize is $250 and is subject to periodic review for the purpose of maintaining its real value.

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. Each prize is valued at $600.

The George J Haggarty Civil Engineering Prize

In 1981 the George J Haggarty Student Endowment Fund was established to commemorate the significant contribution made by the Foundation Head, School of Civil Engineering, to engineering education. From the Fund, the George J Haggarty Civil Engineering Prize is awarded annually to a student in the Civil Engineering major who, at his or her first attempt, achieves the highest aggregate in the subject 48331 Mechanics of Solids. The prize is a cash award of $200.

The IEAust MEM Prize

This prize was established in 1992 by the Institution of Engineers, Australia. The prize may be awarded in respect of each academic year but is not awarded if no candidate reaches a level acceptable to the Faculty Board in Engineering. The recipient of the prize shall satisfy the following conditions: (i) he or she must have been a registered student in the Master of Engineering Management degree, and (ii) he or she must have achieved the highest aggregate marks of students fulfilling the requirements to graduate. The prize is a cash award of $250.

The Institute of Public Works Engineering Australia — NSW Division Medal

This prize was established in 1975. It is awarded annually to the student, in either part-time study or sandwich mode, with the best overall academic performance in the Civil, or Civil and Environmental Engineering degree course and who is employed by a Local Government Authority at the time of completing the course. The recipient must have been employed by a Local Government Authority for at least three semesters during the period of his or her course. The award comprises $500 cash and a medal.

The Institute of Instrumentation and Control, Australia Prize

This prize was established in 1992 by the Institute of Instrumentation and Control, Australia. The prize may be awarded each academic year but is not awarded unless a candidate reaches a level acceptable to the Faculty Board in Engineering. The prize is awarded to Mechanical Engineering and Electrical Engineering students.

The recipient of the prize in Mechanical Engineering shall satisfy the following conditions: (i) he or she must have been a registered student in the Mechanical Engineering degree course during the year for which the award is made, and (ii) he or she must have achieved the best performance in the subject 48660 Dynamics and Control.

The recipient of the prize in Electrical Engineering shall satisfy the following conditions: (i) he or she must have been an enrolled student in the Electrical Engineering or Computer Systems Engineering major during the year for which the award is made, and (ii) he or she must have achieved the best performance in the subject 48560 Analogue and Digital Control.

Each prize is a cash award of $500.

Institution of Electrical Engineers Prize

This prize is offered by the Institution of Electrical Engineers (IEE) in the United Kingdom to institutions in which the degree programs have been mutually accredited by the IEAust and the IEE. It was established at UTS in 1991. The prize may be awarded in respect of each academic year but is not awarded if no candidate reaches a level acceptable to the Faculty Board in Engineering. The prize is awarded to a graduating Electrical Engineering student on the basis of outstanding performance in the final-year project. The prize consists of a certificate, a cash award of $250 and two years' free membership of the Institution of Electrical Engineers.

Institution of Electrical Engineers E C Parkinson Prize

The Sydney section of the Institution of Manufacturing Engineers donated a sum of money in 1964 to be used to establish a prize for the purpose of perpetuating the memory of the late E C Parkinson, a distinguished production engineer and, for many years, a senior executive of the AWA Company. Since 1970 the prize has been awarded to a student of the University. The prize is awarded annually to a graduating student with a Mechanical Engineering major, on the basis of the highest aggregate mark in the subjects studied in the student's last semester. Only students who undertake 18 credit points or more in their last semester are eligible. The prize is a certificate and a book allowance of $150.

Iplex Pipelines Award

This award was established in 1983 as the Hardie's Pipeline Systems Award. In 1998, it was re-named the Iplex Pipelines Award. It is awarded annually to the student in the Civil Engineering major who obtains the highest aggregate in the subject 48362 Hydraulics and Hydrology. The prize consists of a cash award of $250 and a prestigious trophy.

Jack Kaganer Prize

(Prize under review)

This prize was established in 1991 by donations from the family and friends of the late Jack Kaganer to commemorate his long and distinguished service to what was then the School of Civil Engineering of NSWIT. Jack Kaganar was the second member of staff to join the School of Civil Engineering and played an important role in its development until his retirement at the end of 1984. The prize is awarded annually to a student registered in either the Civil or Civil and Environmental Engineering major during the year in which the award is made, and who achieves, at the first attempt, the highest aggregate in the subject 48369 Structural Design 2. The prize is a cash award of $250.

Leica Geosystems Pty Ltd Prize

This prize was established in 1986 as the Leica Instruments Prize. In 1998 it was re-named the Leica Geosystems Pty Ltd Prize. The prize is awarded to the student who obtains the highest mark in the Surveying Practical Test. If the Practical Test is not conducted in either semester of the year for which the award is made, the prize is awarded to the student who has obtained the highest aggregate mark in the subject 48320 Surveying. The prize is an instrument chosen by the company.

Pioneer Concrete (Stage 5) Prize

This prize was established in 1987 by Pioneer Concrete (NSW) Pty Ltd. It is awarded annually to the student enrolled in the Civil, or Civil and Environmental Engineering major who achieves, at the first attempt, the highest aggregate in the subject 48352 Construction Materials. The prize has a cash value of $500.

RS Components Pty Ltd Prize

This prize was established in 1996 by RS Components Pty Ltd, an organisation which firmly believes in the principles of a strong technical education. The prize is awarded to a final-year student in Electrical Engineering who has achieved the highest level of academic excellence or who has conducted the best final-year project. The prize consists of an instrument or a combination of instruments to the value of $500, and a commemorative certificate from the company.

Society of Manufacturing Engineers (Stage 8) Prize

(Prize under review)

The Society of Manufacturing Engineers has supported this prize since the early 1970s. It is awarded annually to the student enrolled in the Mechanical Engineering or Manufacturing Engineering degree course who obtains the highest mark in the subject 48012 Capstone Project (12cp) for a thesis on a manufacturing engineering topic. The prize is a cash award of $250 together with one year's free membership of the Society and a framed certificate.

Richard Whitfeld Prize for Industrial Experience

This prize was established in 1992 by the Computer Systems Engineering Forum. In 1997 it was re-named in honour of the late Richard Whitfeld, an eminent figure in the computer industry, and an active contributor to the work of the Faculty.

The prize may be awarded each academic year but is not awarded if no candidate reaches a level acceptable to the Faculty Board in Engineering. The recipient shall satisfy the following conditions: (i) he or she must have been an enrolled student in the Computer Systems Engineering major during the entire calendar year for which the award is made, and (ii) he or she must have the highest mark in the subject 48142 Engineering Practice Review 2.

In selecting the prize winner, account is taken of industrial experience log books, reports, submissions from employers, and any other relevant material. The criteria include appropriateness of experience, engineering excellence, technical ability, communication skills, quality of report and degree of innovation shown during the work experience. The prize is in the form of a certificate and a cash award of $500.

Scholarships

Engineering Co-op Scholarship Program

Availability

Engineering Co-operative scholarships are awarded in 2002 to students who are successful candidates at the 2001 NSW Higher School Certificate examinations (or equivalent) and who are either Australian citizens or permanent Australian residents. Awards are made only to men and women who satisfy the requirements for admission to the Bachelor of Engineering, Diploma in Engineering Practice.

Scholarships are not normally available for the Bachelor of Engineering, Bachelor of Arts in International Studies, Diploma in Engineering Practice. Because of its special nature, this course has different employment and support arrangements in place, including scholarship support for study and work overseas.

Sponsors

The scholarships are derived from gifts made to the University by industry sponsors who are engaged in a variety of engineering endeavours. The value of each scholarship depends on the level and period of sponsorship but is between $5,000 and $10,000 per annum. The stipend to students is tax free.

The Faculty acknowledges the commitment and generous sponsorship of the Engineering Co-op Scholarship Program by the following organisations:

BP Australia; Canon Australia; Ci Technologies Pty Ltd; CMPS&F; Commonwealth Bank; Comalco; Delta Electricity; Energy Australia; GHD; IBM Australia; Insearch Limited; Institute of Municipal Engineering Australia; Keycorp Limited; Kinhill Engineers; Leighton Contractors; McMillan, Britton & Kell; National Facility for Dynamic Testing; Pacific Power; Optus; Ove Arup & Partners; Rose Consulting; Vodafone; Warman International. Sponsors of 2002 scholarships are not yet finalised.

Duration and payments

The scholarships are designed to provide students with financial support at the start of their course. Most scholarships operate only during the first academic year of each scholar's course; some commencing in 2002 may be available for longer periods.

An initial payment of 10 per cent of the total annual stipend is made at the time of enrolment. This is followed by fortnightly payments commencing during the second week of the Autumn semester 2002 and concluding at the end of the Spring semester 2002 examination period.

Engineering internship opportunities

During their second academic year, scholars may be given the opportunity to undertake one period of work experience with the sponsor of their scholarship.

Personal requirements

Scholars are selected jointly by the University and scholarship sponsors on the basis of a combination of academic achievements and personal attributes relevant to a career in professional engineering, such as an interest in engineering, communications skills, leadership and creativity.

Academic requirements

Competition for scholarships is strong and a UAI of approximately 97 is required for success. It is also a requirement that the professional engineering interests of each scholar be in the field of activity of the sponsor of the scholarship.

Applications and interviews

Application forms are available from high school careers advisers in August each year. The closing date is 27 September. Applicants who are short-listed are required to attend an interview in late November or early December. Other than in exceptional circumstances, scholarships are awarded only to applicants able to personally attend the interview.

Conditions of award

Conditions of award applying to individual scholarships are consistent with this information, and are advised when the offer is made.

The George J Haggarty Civil Engineering Scholarship

This scholarship was established in 1981 from funds made available from the George J Haggarty Student Endowment Fund. The George J Haggarty Civil Engineering Scholarship is aimed primarily at country-based students who are about to start a sandwich course. Preference is given to country students wishing to enter the area of Local Government engineering who have little other opportunity of alternative study programs or venues. The scholarship is offered occasionally as funds permit and is between $1,000 and $1,200.

Ove Arup Bursary

The Ove Arup Bursary was established in 1994. It provides financial support of up to $2,000 per annum to a student of Aboriginal or Torres Strait Islander descent who is enrolled in one of the Civil Engineering programs offered by the Faculty of Engineering. The aim of the bursary is to provide financial support to students who would otherwise be constrained by inadequate financial resources, to assist them to begin or to continue their studies.

Applications for the bursary are invited from eligible candidates by the relevant Program Director. The successful applicant is selected by a committee comprising a nominee from Ove Arup and Partners, the relevant Program Director or his or her nominee and the Faculty Manager, Engineering, who shall act as convener of the committee.

The financial support from the bursary is provided to the student while he or she undertakes full-time study. The benefits of the bursary continue to be provided to the student during academic semesters until completion of the course or withdrawal from it, subject to satisfactory academic progression being maintained. Only one bursary is current at any one time.

UNDERGRADUATE COURSES

The Faculty's flagship course is the five-year Bachelor of Engineering, Diploma in Engineering Practice. Students graduating with this award can major in Civil, Civil and Environmental, Computer Systems, Construction, Electrical, Mechanical, Mechanical and Mechatronic, Software and Telecommunications engineering, or graduate without specifying a major. In addition, a major can be combined with a sub-major in another discipline. The Faculty also offers a four-year Bachelor of Engineering and a three-year Bachelor of Engineering Science degree course as well as the combined awards Bachelor of Engineering, Bachelor of Arts in International Studies, Diploma in Engineering Practice; Bachelor of Engineering, Bachelor of Business; Bachelor of Engineering, Bachelor of Science; Bachelor of Engineering, Bachelor of Medical Science; Bachelor of Engineering, Bachelor of Biotechnology; and Bachelor of Engineering Science, Bachelor of Laws.

The same educational philosophy underpins all awards. In every case, students undertake a set of core subjects, a set of field of practice subjects that defines their major and in some cases, a set of electives. The different awards have a requirement of between zero and two internships. The advanced standing, scope and assumed knowledge is the same for all courses.

The Bachelor of Engineering, Diploma in Engineering Practice is described in full detail. Descriptions of the other awards cover only the differences between the award and the Bachelor of Engineering, Diploma in Engineering Practice, so for a full understanding, the Bachelor of Engineering, Diploma in Engineering Practice should be read in association with the appropriate award description.

Bachelor of Engineering, Diploma in Engineering Practice

- UTS course code: E001
- UAC code: Refer to majors
- Testamur title: Refer to majors
- Abbreviation: BE DipEngPrac
- Course fee: HECS (local)
  $8,000 per semester (international)[1]

Overview

The program leading to the combined award of Bachelor of Engineering, Diploma in Engineering Practice is a comprehensive preparation for careers in the professional practice of engineering.

The Bachelor of Engineering, Diploma in Engineering Practice is a combined degree and the awards are not available separately. Both elements of the program are closely interwoven and interdependent, and prepare students for the professional engineering internship by linking theory and application. The degrees combining engineering with business, biotechnology, science and medical science may also be combined with the Diploma of Engineering Practice by undertaking further work and study.

As noted earlier, the combination of formal academic learning in the University and experiential learning in the workplace is called Cooperative Education. UTS Engineering degree courses have embodied this principle for over 30 years. The courses are highly regarded in industry, and the graduates have enjoyed correspondingly high employment rates: according to many reports and surveys, the highest of any engineering degree courses in Australia. Co-op is well known and highly regarded in other countries also, particularly North America.

Engineering education in many countries is undergoing revolutionary change, and the UTS program is believed to be at the forefront.

At present, students can major in the combined award in one of eight areas. These are Civil Engineering, Civil and Environmental Engineering, Construction Engineering,

[1] $5,000 per semester during Engineering Internships.

Computer Systems Engineering, Electrical Engineering, Mechanical Engineering, Mechanical and Mechatronic Engineering, Software Engineering, and Telecommunications Engineering. The choice of major can be made at entry, or postponed until the end of the first year without extending completion time. Further majors will be introduced in subsequent years in response to technological developments and employment demand, and provision will be made to allow students to change from existing majors. It is also possible for students to negotiate a program which focuses on an area outside the designated majors. There is considerable elective scope, which can be used either to extend engineering knowledge or to take a sub-major in a different discipline such as business or social science.

Course aims

The UTS program aims to equip graduates with the skills and attributes needed for professional practice and professional leadership. The program is designed around the triple themes of academic development, personal development, and professional formation. It provides sound foundations in engineering theory, technical expertise, and knowledge of professional practice, while also developing academic literacy, advocacy skills and social awareness so that graduates are equipped to grow as lifelong learners and to become effective citizens in many different capacities. The concept has been strongly endorsed in wide-ranging industry consultations. Interaction between work experience and academic curriculum has been greatly strengthened, giving the program a depth that no other full-time academic course can match.

Admission requirements

Full details relating to admission are available from the UTS Student Info & Admin Centre at the University's postal address, or by telephone on (+61 2) 9514 1222. The following brief comments are offered as a general guide.

The main intake of students commences the program in March each year. Australian residents apply for admission through the New South Wales Universities Admissions Centre (UAC). Mid-year entry may be available, and inquiries for admission mid-year should be directed to the Associate Dean, Teaching and Learning.

NSW Higher School Certificate

Selection is competitive, and is made on the basis of UAI (Universities Admission Index) alone. The minimum UAI for entry varies from year to year and is likely to vary between majors, depending on the numbers of applications for entry and places available. The *UAC Guide*, published annually, quotes the UAIs applying in the previous year.

Although there are no formal subject prerequisites, the Bachelor of Engineering, Diploma in Engineering Practice is taught on the assumption that students have competencies equivalent to two units of English, three units of Mathematics and two units of Physics. Some bridging courses are available (see below).

TAFE qualifications or tertiary studies

UTS recognises the following tertiary qualifications for matriculation:

- completed TAFE Diplomas, Associate Diplomas, Advanced Diplomas, and Tertiary Preparation Certificate (TPC) – partially completed TAFE courses are not usually acceptable
- successful completion of at least one year full-time or two years part-time study in a degree course at an Australian university, and
- awards, or partial completion of degree programs, at recognised overseas universities.

Selection depends on the level of achievement in the qualification or course concerned, and may involve other factors.

Intending applicants are advised to ensure that their maths and English language skills are equivalent to those assumed for NSW Higher School Certificate applicants. If you are from a non-English speaking background, you are strongly advised to complete a TAFE course, English for further studies, or the TAFE Certificate IV, English for Academic Purposes, before enrolment at UTS. Applicants with little recent mathematics exposure are strongly advised to undertake the UTS subject Foundation Mathematics before enrolling. For further information telephone (02) 9514 2666.

Supplementary and bridging courses and English proficiency

Entrants who have not studied the equivalent of three units of HSC Mathematics, or who do not feel confident with this material, are encouraged to contact the Faculty's Under-

graduate and Postgraduate Office for advice. Lack of background and/or confidence may create obstacles to successful orientation to the University in the first year of study. There are mathematics bridging courses which may be recommended, as well as an option to take the first mathematics and physics subjects at a slower pace than the standard.

The Mathematics Study Centre, the Physics Learning Centre, the Engineering Learning and Design Centres, the Computing Study Centre, and the English Language and Study Skills Assistance Centre are all available to enrolled students. See page 14 for contact details.

International students

International students should apply through the UTS International Programs Office, from which all details of fees, requirements and procedures are available.

A Foundation Studies Program in Mathematics, Science, Computing Science and English is available to international students who do not meet the requirements for entry to degree programs. This program is offered through the Insearch Limited, affiliated to UTS, and the Institute's and the Faculty's policy is to guarantee an offer to full-fee-paying international students who complete the program with a WAM of 60 or better.

Note: The Computer Systems and Telecommunications Engineering majors require a WAM of 85 and the Software Engineering major requires a WAM of 95.

Engineering Co-op scholarships

UTS Engineering Co-op scholarships, sponsored by engineering employers, are awarded each year to students who are successful in the HSC examinations (or equivalent) and who are entering any of the majors available in the Bachelor of Engineering, Diploma in Engineering Practice. Refer to the Endowments, Prizes and Scholarships section for details.

Advanced standing

Students who have pursued relevant studies at another tertiary institution may be admitted with advanced standing and exempted from certain subjects. Extensive industrial experience gained prior to admission may qualify a student for exemption from part of the engineering internship requirements. Applicants for advanced standing should read the following sections carefully.

TAFE studies

Students with TAFE Diplomas are entitled to advanced standing in the Bachelor of Engineering, Diploma in Engineering Practice (BE DipEngPrac). The level of advanced standing depends on the relevance of the TAFE area of study to the proposed major in the BE DipEngPrac. For a TAFE Diploma in the same area, students could expect to get between 24 and 48 credit points depending on the grades obtained in the TAFE subjects. To qualify for 48 credit points, all subjects at TAFE would need to be 'A' passes. Once a student has been confirmed as qualifying for a specific credit point value of advanced standing, the individual subject exemptions will be negotiated by the student with an academic adviser, to make up the credit point total. 48 credit points corresponds to 25 per cent of the academic content of the course, equivalent to two semesters. Students who have taken specially designed TAFE-university articulation subjects, or who have completed advanced diplomas may gain more than 48 credit points.

Completion of particular TAFE qualifications does not guarantee the offer of a place at UTS: selection is competitive.

Partially completed Bachelor of Engineering studies

Students with partially completed studies in a Bachelor of Engineering course at another Australian university, accredited by the Institution of Engineers, Australia, who are admitted to a UTS BE course, are guaranteed full proportional credit for up to 50 per cent of the academic requirements for the degree. This is on a specified-credit, case-by-case basis. Further credit may be allowed, on a discretionary basis, up to a maximum of 75 per cent of the academic requirements for the degree.

Other studies and recognition of prior learning

The Faculty examines applications for advanced standing from entrants in all other circumstances on a case-by-case basis. This may include recognition of prior learning for candidates who do not hold formal qualifications but have extensive relevant experience.

Advanced standing in the Engineering Practice Program

Exemption from part of the Engineering Practice Program is granted only on the basis of actual work experience that can be shown to meet the required standards. The maximum exemption would be one work-experience semester, incorporating the subjects 48121 Engineering Practice Preview 1, 48110 Engineering Experience 1 and 48122 Engineering Practice Review 1.

In no circumstances is exemption granted from the whole of the engineering internship requirement.

Candidates transferring from a full-time degree course at another university are reminded that the academic and work-experience requirements of the UTS program have to be individually satisfied. Advanced standing in the academic program does not confer pro-rata advanced standing in industrial experience. Advanced standing in industrial experience is only granted on the basis of actual experience of the required standard. Candidates transferring from full-time courses elsewhere are welcome, but should seek advice on their attendance pattern and progression plan.

General proviso

The Faculty reserves the right to advise any student who is admitted with advanced standing, and who is not succeeding in the program, to undertake some or all of the subjects from which exemption had been granted.

Attendance

Attendance patterns are based on a semester calendar, with some additional flexibilities (see below). A semester consists of 13 weeks of formal teaching, a one-week tutorial week, a one-week study period prior to exams, and a two-week examination period. The Autumn semester runs from the beginning of March to early July, and the Spring semester from the beginning of August to early December. Refer to the Principal dates for 2002 under General Information for exact dates.

Course structures provide flexibility to students in negotiating their academic requirements with their work and other commitments. Each semester, students may enrol in up to four subjects and may combine their academic study with work. The only restriction is that subject prerequisites, and requirements of the Engineering Practice Program must be met. However, it should be understood that four subjects represent a heavy commitment for most people. Students who combine this with other substantial commitments run the risk of failure and frustration. Students are encouraged to take responsibility for their own arrangements, but should be guided by Faculty advice and by the experience of others.

The timetable of subject offerings is designed to guarantee a viable attendance pattern for students taking the published full-time pattern of four subjects in a stage, and also for students undertaking a four-subject stage on a part-time basis over a full year, with two subjects in each semester. The latter arrangement would normally require attendance on campus for at least one afternoon each week (usually two afternoons), as well as evenings.

The Faculty is aware that some employers appear to expect students to be able to undertake an entire degree program concurrently with a full-time job, without any allowance for study time. This is simply unrealistic, and is not condoned. The Faculty will be glad to advise students in such a situation.

In future years it is anticipated that some subjects will be available during a Summer session, between December and February. This may enable completion of the course in an accelerated timeframe, and also provide opportunity for students to recover missed subjects or to optimise their study–work arrangements. Also, the Faculty expects over the next few years to make increasing numbers of subjects available in flexible learning modes, including distance, block attendance, and work-based learning. Major projects may also often be conducted in the workplace.

Course duration

Students undertaking full-time academic enrolment will normally complete the program in eight academic semesters, each containing four subjects, plus two periods of engineering internship in the workplace totalling at least 48 weeks. On this basis the program takes five years, or 10 semesters, to complete. The internships must be interleaved with the academic semesters: an internship would typically be taken in the third or fourth semester and again in the seventh or eighth.

It is possible to complete the program entirely on a part-time attendance basis, with continuous concurrent employment, by enrolling in academic subjects at the rate of two subjects per semester (half the full-time rate). This

would require eight years overall, and is not recommended. Students wishing to make extensive use of part-time attendance are strongly encouraged to negotiate with their employers at least two full-time semesters somewhere through the program.

Course structure

Programs lead to the combined award of Bachelor of Engineering and Diploma in Engineering Practice. The Bachelor of Engineering cannot be awarded alone; nor can the Diploma in Engineering Practice.

The award may be taken out with a designated major. Areas in which majors are currently defined are Civil Engineering, Civil and Environmental Engineering, Construction Engineering, Computer Systems Engineering, Electrical Engineering, Mechanical Engineering, Mechanical and Mechatronic Engineering, Software Engineering, and Telecommunications Engineering. Majors in new areas of engineering practice will be introduced as they develop.

Students may select a particular major at entry, or may defer their choice until the end of their first year of study. Such deferment need not normally prolong the period needed to complete the program, nor add to the number of subjects required. Students may choose not to take any major, but to take a general program comprising subjects from different areas of engineering (refer to General degree, without major on page 49).

The program overall comprises six principal components: the core program; the Engineering Practice Program; the fields of practice subjects; the electives; the Capstone Project; and the portfolio. The core program, the Engineering Practice Program, the Capstone Project and the portfolio are common to all students undertaking the BE DipEngPrac.

The Engineering Practice Program comprises a minimum of two compulsory internships of not less than 48 weeks in industry, plus the associated two Preview and two Review subjects which relate the work experience to the academic program.

The choice of fields of practice subjects determines eligibility to graduate with a designated major. Electives may be chosen from a wide range available across and beyond the University, and certain combinations of electives may lead to a sub-major within Engineering or in another discipline. A total of 204 credit points are required for graduation, distributed in the following way:

- Core program: 60 credit points
- Engineering Practice Program: 12 credit points, plus 48 weeks of approved internship
- Fields of practice: 90, 96 or 102 credit points, depending on major
- Electives: 24 or 30 credit points, depending on major
- Capstone Project: 6 or 12 credit points, depending on major.

Students are expected to develop a personal portfolio over the entire duration of their course, to document, reflect upon, and synthesise their own understanding of engineering internship, drawing from all of their different learning experiences.

All subjects are rated at 6 credit points except for some electives offered by other faculties, and the Engineering Practice Preview and Review subjects. Face-to-face contact hours vary, depending on the nature of the subject and mode of delivery. Students need to spend at least nine learning hours per week, including class contact, for a 6 credit-point subject. Many students will find they need more time than this, particularly to achieve a high standard of performance. Subject outlines are given in the Subject Descriptions section.

Core program

This component provides a framework covering knowledge, skills, and attributes that are relevant to all engineers across all fields of practice. It consists of common mathematics and physics subjects, and common engineering subjects which draw on several fields of engineering practice to develop interdisciplinary knowledge and skills within the larger context of professional practice. It also develops awareness of the values debate in engineering, and promotes commitment to the principles of sustainability.

The core program is not a common first year, but runs throughout the course from admission to graduation. Students take differing combinations of subjects in their first year, and in each successive year, depending on their choice of major.

Subjects in the core have the following titles (not necessarily in chronological order):

48210	Engineering for Sustainability
33130/132	Mathematical Modelling 1
68037/039	Physical Modelling
33230	Mathematical Modelling 2
48221	Informatics VB

48222	Informatics C
48230	Engineering Communication
48240	Uncertainties and Risks in Engineering
48250	Engineering Economics and Finance
48075	Engineering Management
48270	Technology Assessment

Fields of practice and majors

This component relates theoretical and practical learning from core subjects to applications in specific fields of engineering internship. It develops knowledge of engineering science and technologies relevant to particular branches of engineering, and specialist technical expertise. Particular sets of subjects constitute majors in the respective fields of practice, as set out below. A major provides the essential foundations needed for practice in that field, familiarity with current practice, awareness of likely developments, and knowledge of resources available for future self-directed learning.

All majors emphasise and develop the essential engineering skills of observation and experimentation, analysis and synthesis, modelling, systems thinking, conceptual reasoning and judgment, and problem formulation and solving, using as case studies the technologies and contexts relevant to the particular field of practice. Each major involves substantial laboratory content, designed to integrate theoretical and practical understanding. All are designed to link with the core program and with engineering internship.

The totality of all fields of practice subjects across all majors provides the pool from which students wishing to graduate with a general degree may draw (subject to approval) to make up their field of practice component. The field of practice component requires 96 credit points, except in Computer Systems Engineering where it is 90 credit points, and in Civil Engineering and Civil and Environmental Engineering where it is 102 credit points. Some fields of practice include subjects taught wholly or partly by other faculties.

Electives

In general, students may devote 30 credit points to electives (exceptions below). Electives may be taken from subjects offered by any faculty of the University, or indeed other universities. Students may elect to deepen their knowledge and skills in their own field of practice by taking additional subjects in that field, possibly at graduate level; or to broaden their engineering knowledge by taking fields of practice subjects associated with another major; or to take subjects from another faculty, including part credit for a second degree. Some students may wish to explore two or more introductory engineering subjects before making their choice of major, in which case the additional subject/s may be counted (subject to conditions) as part of the elective component. The elective component also provides a mechanism for crediting prior learning and work-based learning.

Students are not permitted to take as an elective a subject which covers substantially the same material as a required subject or a subject already undertaken. Undergraduate students may enrol in Faculty of Engineering postgraduate subjects that have been approved for undergraduate enrolment provided they have already completed at least 120 credit points of their undergraduate degree. Undergraduate students may undertake up to four approved postgraduate subjects. A maximum of three approved postgraduate subjects recently undertaken as part of an undergraduate degree may be used to apply for exemptions from a Faculty of Engineering Master's degree provided the subjects fulfil the equivalent subject requirements.

Some courses and/or majors have an elective component of less than 30 credit points. The Civil Engineering and the Civil and Environmental Engineering majors have only 24 credit points of electives. In the case of the Civil and Environmental Engineering major, because of its dual disciplinary nature, students are strongly recommended to take as electives subjects drawn from one of the approved sequences of environmental subjects. In other instances, the elective provision is reduced in order to accommodate a second formal award. The combined degrees have no electives.

Sub-majors

The Faculty has defined a large number of sub-majors for students who wish to use their elective components to undertake a coherent program of study in a discipline complementary to their major. Some sub-majors are available to all students, others only to students in specific majors. Each sub-major is defined as a selection of any four subjects drawn from a larger set – typically six to eight. The subjects included in a sub-major set could consist of one or more of the following types: fields of practice subjects from another major,

graduate engineering subjects, and subjects offered by other faculties. Students who use graduate engineering subjects to meet their elective requirement can count the credit points towards a Master's degree. There are strict rules covering the number of graduate subjects that undergraduate students may undertake as electives and also the number of undergraduate credit points that must be accumulated before a graduate subject can be taken.

Availability

Some of the sub-majors currently available are shown in the following table. For further information, consult the following website: www.eng.uts.edu.au/enrol

Sub-major	Available to students majoring in
Aboriginal Cultures and Philosophies	All
Accounting	All
Advanced Communications	All
Biomedical	All
Business Management	All
Civil	All but Civil
Computer Control and Instrumentation	Electrical, Computer Systems
Computer Science	Computer Systems, Telecommunications, Electrical, Software
Construction Management	Civil
Cultural Studies	All
Economics	All
Electrical Energy	Electrical
Electronics	All, except Electrical, Computer Systems, Telecommunications
Software Development	Civil, Mechanical
Engineering Management	All
Environmental Engineering	Civil, Civil and Environmental
Health	All
Humanities and Communications	All
Instrumentation and Control	Electrical
Internet	Computer Systems, Telecommunications, Software
ISE	All
Journalism	All
Land, Waste	Civil
Manufacturing Management	All
Marketing	All
Materials	Civil, Mechanical
Mathematics	All
Mechanical Engineering	Not Mechanical
Mechanical Design	Mechanical
Optimisation Research	All
Quantitative Methodology	All
Software Development	Civil, Mechanical
Software Engineering	Computer Systems, Telecommunications, Electrical
Statistics	All
Structures	Civil
Telecommunications	All, except Telecommunications
Women's Studies	All
Writing	All

Engineering Practice Program

The Engineering Practice Program supports and assesses student learning in workplace and community environments. Its objectives are to prepare students for engineering work experience, to support them during that experience, and to assist them in maximising learning. The program also supports the integration of this experiential learning with the theoretical and practical aspects of the academic curriculum.

A fundamental objective is to develop the ability to learn actively in a wide variety of modes and contexts, and to critique and contribute to those learning environments on a lifelong basis.

The program is administered through a series of subjects, offered in flexible mode. Students enrol in the program as a whole and are guided through the respective modules. Students are ultimately responsible for their progression through the program. Academic staff and workplace mentors and supervisors act as facilitators; administrative staff assist in ensuring that students' progress is recorded and validated; and Industrial Partnering Unit staff assist students in securing suitable work placements and in establishing cooperative programs with industry and the community (see below).

The Engineering Practice Program comprises:

48121	Engineering Practice Preview 1	3cp
48110	Engineering Experience 1 (Minimum 22 weeks internship)	0cp
48122	Engineering Practice Review 1	3cp
48141	Engineering Practice Preview 2	3cp
48130	Engineering Experience 2 (Minimum 22 weeks internship)	0cp
48142	Engineering Practice Review 2	3cp

Note: Minimum time in the workplace to satisfy each engineering internship subject is 22 weeks. In total, however, 48 weeks must be gained to meet course requirements and to be eligible to graduate.

Students are encouraged to undertake additional work experience of a high standard.

In the table displaying standard programs, the internship is shown in a single semester. Students should note that in the semester prior to their internship they should undertake Engineering Practice Preview 1 or 2 (3cp) as appropriate to their internship. During their period of internship, they should enrol in Engineering Experience (0cp). In the semester following their internship, they should enrol in Engineering Practice Review 1 or 2 as appropriate to their internship.

Industry Partnering Unit

The Industry Partnering Unit (IPU) assists students in obtaining internships. Its staff maintain contact with industry, register students' intentions of seeking work experience, advise students on the preparation of résumés and presentation at interview, keep students' résumés on file, and advise on the availability of work opportunities in Australia and overseas. Students seeking work experience should register with the IPU in the semester preceding their intended period of work.

Full details of the process and extensive preparation for the Internship are given in the prerequisite subject Engineering Practice Preview.

Capstone Project

Each student undertakes a Capstone Project, supervised by a member of academic staff and designed to consolidate and integrate learning in all aspects of the program. Industry-linked projects, under joint supervision, are strongly encouraged. As a future objective, the Faculty intends to develop the capability to facilitate, supervise and assess team projects, where possible, on a multidisciplinary basis involving students from other disciplines as well as Engineering.

The project topic must be approved by an academic supervisor and must be relevant to the field of practice concerned. It may be largely technical in emphasis, or may encompass a range of technical and contextual challenges.

The Capstone Project results in a substantial report, which must be written and produced to professional engineering standards and must demonstrate the student's readiness for professional engineering practice.

Portfolio

An integral requirement of the course is the development of a personal portfolio by each student. The portfolio is used to document academic and workplace experiences, and to provide a personal resource for critical reflection and for educational and professional career planning, as well as personal development. The portfolio development process commences in the first semester of the course and is carried through to graduation, with increasing student autonomy in the content and structure of the documentation.

Honours

The Bachelor of Engineering, Diploma in Engineering Practice may be awarded with first or second class Honours for meritorious performance in the course as a whole.

Professional recognition

All Bachelor of Engineering courses offered by the Faculty have been accorded recognition by the Institution of Engineers, Australia (IEAust).

The Institution manages the National Professional Engineers Register (NPER-3), which is the only Australian register of practising professional engineers with legal recognition. Registration assures the community of the member's professional competence and commitment to ethical practice, may be cited in relation to quality assurance systems, and (particularly in New South Wales) can provide legally established professional limitation of liability. Professional engineers normally join the register concurrently with their recognition as a Chartered Member of the Institution (CPEng).

A candidate for NPER-3 registration must have completed an accredited undergraduate engineering course, have practised as an engineer, and be able to demonstrate competency against the Institution's competency standards. These are detailed under 11 headings: ethics and principles; practice skills; planning and design; business and management; communication; research, development and commercialisation; materials or components; education and training; manufacturing and production; project implementation; and asset management.

Graduates of full-time engineering degree courses at other universities, without work experience, will typically require three or more years of work experience after graduation to attain NPER-3. UTS Engineering graduates are able to apply to IEAust for recognition of their undergraduate work experience towards professional registration.

Other information

The Faculty publishes a *Student Survival Guide* each January available from the Undergraduate and Postgraduate Office, CB02.7.100 (Level 7, Building 2). The Faculty's website gives current information on all aspects of the Faculty's operations:

www.eng.uts.edu.au

General degree, without major

- UAC code: 603105
- Testamur title: Bachelor of Engineering Diploma in Engineering Practice

Students may choose not to take any of the specified majors but instead to make up a personal program drawing on several fields of engineering practice. The program of study would be:

- Core program: 60cp
- Engineering Practice Program: 12cp, plus 48 weeks of approved internship
- Fields of practice: 96cp
- Electives: 30cp
- Capstone Project: 6cp

Personal programs must be negotiated with an academic adviser and approved not later than the commencement of the student's third semester of study. All such programs must be approved by the Director, Undergraduate Programs. Any subsequent variations to the program must be approved by the academic adviser, or the Director, who has discretion to approve minor variations to the above program (for example, inclusion in the 96 credit point fields of practice subjects, of a subject from another faculty or discipline).

The fields of practice subjects must include an appropriate balance of introductory and advanced subjects, which the Director determines, and must represent a coherent theme or potential career interest.

Students are cautioned that such a general degree *may* not meet the requirements of the Institution of Engineers, Australia, for NPER-3 registration as a chartered professional engineer. Advice in this regard should be sought through the Associate Dean at the time of negotiating the program.

Civil Engineering major

- UTS major code: 01
- UAC code: 603015
- Testamur title: Bachelor of Engineering in Civil Engineering
  Diploma in Engineering Practice

Civil engineering covers a broad range of activities and working styles generally based on a commitment to serve society. Civil engineers may work on the design, construction, management, maintenance, rehabilitation or renovation of all types of industrial or commercial buildings or structures. They may be involved with infrastructure developments such as highways, airports or integrated transport systems; water storage, purification and distribution systems to provide safe drinking water and water for irrigation and industrial use; systems for the treatment and disposal of sewage, domestic and industrial waste; and flood mitigation and harbour protection works, with due consideration of safety and economy.

Graduates may be employed with private sector consultants, contracting companies, mining and process industries, commercial business, research organisations or with public sector federal, State and local government and regulatory organisations. Significant employment opportunities exist in Australia, South-East Asia and internationally.

This major is designed to develop technical skills, experience and confidence in engineering analysis, problem identification and problem solving; and to provide a consistent focus on engineering as a mix of technical skills, logical reasoning, common sense, judgment and the management of activities and people. It provides a thorough foundation in applied engineering science and progressively develops a basic understanding of the discipline of civil engineering, together with a recognition of the vital links with other professionals and community groups. Emphasis is given to the leadership role that engineers can play, and the need for engineers to be concerned with the social and environmental needs of the community and the impact of their creations on the public.

The program encourages skills in observation, collection and analysis of information, mathematical modelling of processes and behaviour, and thinking particularly in the abstract. It develops ability to communicate ideas, and capacity to listen to and understand the ideas of others. Students are required to take initiatives for their own learning, to develop critical thinking based on technical knowledge and to make rational judgments regarding the application of theory to practical situations. Reflection on tasks undertaken is strongly encouraged.

As well as submission of formal assignments and reports, students participate in class discussion groups, tutorial and laboratory sessions, seminar presentations and project work. The approach is structured to develop written, verbal and audiovisual communication skills. Group-based practical exercises, requiring consideration of engineering and non-engineering viewpoints, develop interdisciplinary skills and an ability to cooperate and liaise with colleagues.

Sub-majors

See page 47 for a list of available sub-majors.

Standard program

Subject number	Subject name	Core or fields of practice
Semester 1		
48210	Engineering for Sustainability	C
33130	Mathematical Modelling 1	C
68037	Physical Modelling	C
48310	Introduction to Civil Engineering	FP
Semester 2		
48221	Informatics VB	C
33230	Mathematical Modelling 2	C
48321	Statics	FP
48320	Surveying	FP
Semester 3		
48230	Engineering Communication	C
60101	Chemistry and Materials Science	FP
48331	Mechanics of Solids	FP
48330	Soil Behaviour	FP
Semester 4		
	Engineering Internship (may be taken in Semesters 3 or 4)	EPP
Semester 5		
48240	Uncertainties and Risks in Engineering	C
48641	Fluid Mechanics	FP
48349	Structural Analysis	FP
48340	Construction	FP
Semester 6		
48250	Engineering Economics and Finance	C
48352	Construction Materials	FP
48359	Structural Design 1	FP
48350	Environmental and Sanitation Engineering	FP
Semester 7		
48260	Engineering Management	C
48362	Hydraulics and Hydrology	FP
48369	Structural Design 2	FP
48360	Geotechnical Engineering	FP
Semester 8		
	Engineering Internship (may be taken in Semesters 6-9)	EPP
Semester 9		
48270	Technology Assessment	C
48370	Transport in the Environment	FP
	Two sub-major subjects/electives	
Semester 10		
	Capstone Project	
48389	Computer Modelling and Design	FP
	Two sub-major subjects/electives	

C = Core subject
FP = Fields of practice subject
EPP = Engineering Practice Program (refer to page 48 for details)

Note: All Engineering subjects are 6 credit points. Engineering Internship shown in Semester 4 and 8 is for illustration only.

Civil and Environmental Engineering major

- UTS major code: 02
- UAC code: 603005
- Testamur title: Bachelor of Engineering in Civil and Environmental Engineering
  Diploma in Engineering Practice

In addition to the need for all engineers to have an awareness of modern environmental issues (especially the challenges of sustainable development for engineering) and the growing demand for specialist environmental engineers, there is significant demand in Australia for civil engineers with enhanced skills and knowledge in related areas of environmental engineering. Civil and environmental engineers are sought by the water supply and sanitation industry, in waste management, in transportation, and in the rapidly growing environmental management sector of the economy, including rehabilitation of degraded areas as well as the minimisation of the environmental impact of new activities. Employers include local government, road and other infrastructure agencies, consultants, construction enterprises, and environmental planning and regulatory groups.

This major provides a broad understanding of the art and science of civil engineering, and a wider and more detailed understanding than has been traditional in Australia of those aspects of environmental engineering which are often required in the civil engineering field of practice. This is achieved by substituting four environmental science and engineering subjects for civil engineering field of practice subjects, and utilising a more advanced version of another. While students have a free choice for their four elective subjects, those undertaking the Civil and Environmental Engineering major are encouraged to choose from graduate subjects in the area of environmental engineering and management.

Civil engineers practising in areas closely identified with environmental engineering require an understanding of the traditional areas of civil engineering: behaviour of structures, characteristics of the main materials encountered in civil engineering (soil, steel and concrete), hydraulics and hydrology, water supply and sanitation, transportation engineering, management of resources, construction, and design. In addition, they require:

- an understanding of biology, ecology and microbiology, and of how such knowledge can be utilised in engineering internship to preserve and enhance environmental values
- knowledge of the social and political arena in which environmental decisions are made
- excellent communication skills, so that they may exercise leadership in resolving potential environmental problems and disputes
- knowledge of the ways in which our laws determine the framework for environmental planning, design, and monitoring, and
- more detailed knowledge than most civil engineers of water supply, sanitation, waste management, pollution control, and land and water resources management.

The curriculum aims to develop attributes which encourage involvement in environmental issues in the community as well as through employment. It highlights the need for engineers to work collaboratively with other professions, with their community, and with environmental interest groups to enhance each others' knowledge of the possibilities for environmental management.

Sub-majors

See page 47 for a list of available sub-majors.

Standard program

Subject number	Subject name	Core or fields of practice
Semester 1		
48210	Engineering for Sustainability	C
60101	Chemistry and Materials Science	FP
91150	Biology and Ecology for Engineers	FP
48310	Introduction to Civil Engineering	FP
Semester 2		
48221	Informatics VB	C
33130	Mathematical Modelling 1	C
68037	Physical Modelling	C
48820	Introduction to Environmental Engineering	FP
Semester 3		
48230	Engineering Communication	C
33230	Mathematical Modelling 2	C
48321	Statics	FP
48340	Construction	FP
Semester 4		
	Engineering Internship (may be taken in Semesters 3 or 4)	EPP
Semester 5		
48240	Uncertainties and Risks in Engineering	C
48641	Fluid Mechanics	FP
48331	Mechanics of Solids	FP
48840	Water Supply and Wastewater Engineering	FP
Semester 6		
48250	Engineering Economics and Finance	C
48330	Soil Behaviour	FP
48352	Construction Materials	FP
48850	Environmental Planning and Law	FP
Semester 7		
48260	Engineering Management	C
48362	Hydraulics and Hydrology	FP
48349	Structural Analysis	FP
48860	Pollution Control and Waste Management	FP
Semester 8		
	Engineering Internship (may be taken in Semesters 6–9)	EPP
Semester 9		
48270	Technology Assessment	C
48359	Structural Design 1	FP
	Two sub-major subjects/electives	
Semester 10		
	Capstone Project	
48370	Transport in the Environment	FP
	Two sub-major subjects/electives	

C = Core subject
FP = Fields of practice subject
EPP = Engineering Practice Program (refer to page 48 for details)

Note: All Engineering subjects are 6 credit points. Engineering Internship shown in Semester 4 and 8 is for illustration only.

Computer Systems Engineering major

- UTS major code: 03
- UAC code: 603025
- Testamur title: Bachelor of Engineering in Computer Systems Engineering
  Diploma in Engineering Practice

The Computer Systems Engineering major aims to develop graduates who are able to specify, design, and implement complex computer-based systems. The increasing complexity and popularity of computer systems creates significant demand for such graduates, evidenced by a graduate employment rate of almost 100 per cent.

Many graduates of the major will work in the technical computer industry in such areas as telecommunications, process control, manufacturing, defence, and electronics. Increasingly, graduates will also work in non-engineering industries that have a need for state-of-the-art computer systems, such as finance, retailing, and social services.

Computer systems engineering is a field of challenging intellectual knowledge and experience. Computer systems engineers are highly trained professionals who need to have knowledge not only of software and programming, but also of electronics, mathematics, physics, information theory, and computer hardware. With this breadth of training, they often work as software engineers or electronics engineers, or in other areas of information systems and technology.

The major concentrates on professional formation in the area of technical expertise and on providing the necessary technical tools, and incorporates a strong systems engineering approach. It emphasises professional values and an appreciation of the social context within which a computer systems engineer works, and develops information literacy, problem-posing, problem-solving and presentation skills.

A number of subjects are project-based, placing strong emphasis on interpersonal communications skills, team work, and providing opportunities for development of maturity and the achievement of self-fulfilment within a supportive environment.

Sub-majors

See page 47 for a list of available sub-majors.

Standard program

Subject number	Subject name	Core or fields of practice
Semester 1		
48210	Engineering for Sustainability	C
33130	Mathematical Modelling 1	C
68037	Physical Modelling	C
48510	Introduction to Electrical Engineering	FP
Semester 2		
48222	Informatics C	C
33230	Mathematical Modelling 2	C
48610	Introduction to Mechanical Engineering	FP
48520	Electronics	FP
Semester 3		
48230	Engineering Communication	C
48430	Software Development	FP
48531	Electromechanical Systems	FP
48530	Circuit Analysis	FP
Semester 4		
	Engineering Internship (may be taken in Semester 3 or 4)	EPP
Semester 5		
48240	Uncertainties and Risks in Engineering	C
48440	Software Engineering	FP
48441	Introductory Digital Systems	FP
	Sub-major subject/elective	
Semester 6		
48250	Engineering Economics and Finance	C
48450	Operating Systems	FP
48451	Advanced Digital Systems	FP
	Sub-major subject/elective	
Semester 7		
48260	Engineering Management	C
48540/1	Signals and Systems	FP
48740	Communications Networks	FP
	Sub-major subject/elective	
Semester 8		
	Engineering Internship (may be taken in Semesters 6–9)	EPP
Semester 9		
48270	Technology Assessment	C
48570	Data Acquisition and Distribution	FP
48470	Computer Systems Analysis	FP
	Sub-major subject/elective	
Semester 10		
	Capstone Project	
	Capstone Project	
48480	Computer Systems Design	FP
	Sub-major subject/elective	

C = Core subject
FP = Fields of practice subject
EPP = Engineering Practice Program (refer to page 48 for details)

Note: All Engineering subjects are 6 credit points. Engineering Internship shown in Semester 4 and 8 is for illustration only.

Construction Engineering major

- UTS major code: 1A
- UAC code: 603095
- Testamur title: Bachelor of Engineering in Construction Engineering
  Diploma in Engineering Practice

The Construction Engineering major prepares students to work in the professional disciplinary area of Construction Engineering and develops the capacity to capably manage large construction infrastructure projects.

The Construction Engineering major is an exciting new initiative that compliments traditional engineering skills with a strong core in construction management education.

Construction engineering covers many activities and working styles generally as service providers to public and private sector clients in an increasingly broad range of service industries. Invariably, construction engineering requires close liaison with the client, government and community.

The construction industry accounts for almost 7 per cent of the Australian GDP and is a major employer of engineers. Australian construction companies operate extensively in the Asia Pacific region on projects in Australia, Papua New Guinea, New Zealand, Hong Kong, Indonesia, the Philippines, Thailand, Malaysia, Vietnam, China and India. Construction engineers are also in demand throughout the world for their development, finance, project management, design and construction, operation and maintenance, and multidisciplinary expertise.

Work opportunities exist in the development of non-residential building in the commercial and recreation sectors. Examples include high-rise office towers, shopping centres, warehousing and distribution centres, manufacturing facilities, hotels, resorts, townhouses, sporting facilities, theatre complexes, tourist facilities, airport facilities, public and private hospitals and retirement villages. Extensive opportunities also exist in the infrastructure construction, maintenance and operation areas of roads and highways, railways, tunnels, marine developments, airports, water and sewerage treatment and reticulation, land development, agricultural land improvement, mining and quarrying, process engineering, telecommunications, waste management, environmental services and pipelines.

Through elective and project work, the course offers the opportunity to pursue studies in areas of special interest. Towards the later stages of the course, students can create specialist sub-majors such as soils and water, structures, management or further studies in construction are available. A sub-major provides a focus on a specialist area of construction prior to graduation.

The course offers an engineering education, which provides background technical knowledge and skills. In addition, it seeks to develop critical, analytical and evaluative skills and an ability to communicate ideas and work effectively within a multidisciplinary team. Graduates are well grounded in the mathematics and science of engineering, have a sound understanding of information technology and are adept at using computer applications in the workplace. A feature of the construction industry is that it introduces managerial opportunities to young engineers more quickly than almost any other discipline area, consequently the major has a focus on managerial aspects such as budgeting and finance, multidisciplinary capabilities and project management. The managerial nature of the discipline positions graduates to attract remuneration packages higher than the usual technical salaries of engineers with comparable years of experience.

Sub-majors

See page 47 for a list of available sub-majors.

Standard program

Subject number	Subject name	Core or fields of practice
Semester 1		
33130	Mathematical Modelling 1	C
16061	Construction Management 1A	FP
16062	Construction Management 2A	FP
48310	Introduction to Civil Engineering	FP
Semester 2		
33230	Mathematical Modelling 2	C
68037	Physical Modelling	C
16065	Construction Management 2S	FP
48320	Surveying	FP
Semester 3		
48221	Informatics VB	C
60101	Chemistry and Materials Science	FP
48340	Construction	FP
48321	Statics	FP
Semester 4		
	Engineering Internship (may be taken in Semester 3 or 4)	EPP
Semester 5		
48230	Engineering Communication	C
48330	Soil Behaviour	FP
48641	Fluid Mechanics	FP
48331	Mechanics of Solids	FP
Semester 6		
48240	Uncertainties and Risks in Engineering	C
48850	Environmental Planning and Law	FP
48352	Construction Materials	FP
48349	Structural Analysis	FP
Semester 7		
48250	Engineering Economics and Finance	C
16063	Construction Management 3A	FP
16064	Construction Management 4A	FP
48359	Structural Design 1	FP
Semester 8		
48360	Geotechnical Engineering	FP
16066	Construction Management 3S	FP
16087	Construction Management 4S	FP
	Sub-major subject/elective	
Semester 9		
	Engineering Internship (may be taken in Semesters 6–9)	EPP
Semester 10		
	Capstone Project	
	Three sub-major subjects/electives	

C = Core subject
FP = Fields of practice subject
EPP = Engineering Practice Program (refer to page 48 for details)

Note: All Engineering subjects are 6 credit points. Engineering Internship shown in Semester 4 and 8 is for illustration only.

Electrical Engineering major

- UTS major code: 04
- UAC code: 603035
- Testamur title: Bachelor of Engineering in Electrical Engineering
  Diploma in Engineering Practice

The benefits arising from the supply of electricity to residential, commercial and industrial sites is immense. Recent advances in electronics and micro-electronics have created a profound impact in homes, industries and hospitals. Automatic control has become an integral part of modern manufacturing and industrial processes, and has been a foundation for many important developments in medicine, economics, sociology and management. All these are part of electrical engineering.

This major aims to develop a new generation of electrical engineers who are more attuned to social and environmental sustainability and who have the technical expertise in various enabling disciplines, and the interdisciplinary skills, to contribute significantly towards the building of a more harmonious world. The Electrical Engineering major is concerned with the optimisation of energy systems, alternative energy sources, intelligent electronic systems, real-time computing, industrial networking, automated systems for social benefits, and devices for biomedical technology, etc.

Graduates of the major will work in numerous challenging areas: electronic and microelectronic industries, process control, mechatronics and robotics, power generation and distribution, power electronics, building services, manufacturing and transport industries, biomedical industries, mining and agriculture. Increasingly, electrical engineers are also involved in sports medicine, entertainment, environment control studies, and financial engineering.

The major develops technical expertise in electronics and microelectronics, power electronics, energy and power systems, analogue and digital control and automation, data acquisition and distribution, instrumentation and signal processing, artificial intelligence, real-time computing, and industrial networking. It incorporates substantial laboratory work, and most of the advanced subjects have 50 per cent theory and 50 per cent project work. Appropriate theoretical foundations are provided to ensure that

designs are based on social responsibility, sustainability, and sound engineering methodologies with guaranteed stability and accuracy. At the same time, strong encouragement is provided to help student projects to production-level completion using appropriate management techniques. Whenever possible, professional hardware systems are produced, and with a high degree of software validation and professional documentation. There is emphasis on development of comprehension, presentation, interpersonal and team skills, and on interdisciplinary interactions.

Students also have the opportunity to develop community involvement through interdisciplinary projects. Examples might include automated systems for people with disabilities, low-cost efficient hydro-electric systems for villages in developing countries, or non-invasive blood glucose monitors for patients with diabetes.

Computer control and instrumentation covers areas such as robotics, fuzzy logic, neural networks and software development, relating to practice in fields such as mechatronics, biomedical engineering and financial engineering. Typical thesis topics could be an intelligent robotic system using fuzzy logic, or a voice and handwriting system. Energy technology covers areas such as variable speed drives, energy and environment economics, power system design and power generation. Typical thesis topics could be wind energy, a solar vehicle, or economics of energy distribution. Biomedical technology covers areas such as anatomy and physiology, biomedical instrumentation and medical imaging. Typical thesis topics could be a laser-based spectrometer for measuring muscle energetics, or a blood pressure control system for intensive care.

Sub-majors

See page 47 for a list of available sub-majors.

Standard program

Subject number	Subject name	Core or fields of practice
Semester 1		
48210	Engineering for Sustainability	C
33130	Mathematical Modelling 1	C
68037	Physical Modelling	C
48510	Introduction to Electrical Engineering	FP
Semester 2		
48222	Informatics C	C
33230	Mathematical Modelling 2	C
48610	Introduction to Mechanical Engineering	FP
48520	Electronics	FP
Semester 3		
48230	Engineering Communication	C
48430	Software Development	FP
48531	Electromechanical Systems	FP
48530	Circuit Analysis	FP
Semester 4		
	Engineering Internship (may be taken in Semester 3 or 4)	EPP
Semester 5		
48240	Uncertainties and Risks in Engineering	C
68038	Advanced Mathematics and Physics	FP
48441	Introductory Digital Systems	FP
48540	Signals and Systems	FP
Semester 6		
48250	Engineering Economics and Finance	C
48550	Electrical Energy Technology	FP
48451	Advanced Digital Systems	FP
48551	Advanced Electronics	FP
Semester 7		
48260	Engineering Management	C
48560	Analogue and Digital Control	FP
48561	Power Electronics	FP
	Sub-major subject/elective	
Semester 8		
	Engineering Internship (may be taken in Semesters 6–9)	EPP
Semester 9		
48270	Technology Assessment	C
48570	Data Acquisition and Distribution	FP
	Two sub-major subjects/electives	
Semester 10		
	Capstone Project	
	Capstone Project	
	Two sub-major subjects/electives	

C = Core subject
FP = Fields of practice subject
EPP = Engineering Practice Program (refer to page 48 for details)

Note: All Engineering subjects are 6 credit points. Engineering Internship shown in Semester 4 and 8 is for illustration only.

Mechanical Engineering major

- UTS major code: 06
- UAC code: 603055
- Testamur title: Bachelor of Engineering in Mechanical Engineering
  Diploma in Engineering Practice

Mechanical engineering involves the design, control, management, repair or development of mechanical systems that transform energy and materials into useable forms. It remains one of the defining disciplines of professional engineering activity. The academic knowledge that is fundamental to mechanical engineering is concerned with forces and motion, energy conversion and transmission, and the materials that enable these to occur.

The major provides a strong foundation in dynamics, fluid mechanics, solid mechanics, thermodynamics, materials science, electrical theory and manufacturing technology. The practice of engineering is emphasised through work placements, structured opportunities to reflect on work experience, methods of class presentation and assessment, and the use of design subjects to encourage the development of engineering confidence.

Consideration of values, social contexts and sustainability is seen as part of the learning processes and is a legitimate concern of all subjects. Management skills are gained through work experience and through management subjects that provide intellectual rigor to what has been learned. Technical expertise is developed through the mechanical engineering fields of practice subjects which are structured to emphasise the relationship between engineering science and engineering internship. This is enhanced by the 'design' subjects, which provide a further practical focus on theoretical concepts – a practice and design component runs through each fields of practice subject.

Academic literacy, numeracy and oral comprehension and presentation skills are presented formally in early subjects, and enhanced progressively through the remainder of the program. All subjects require information retrieval and evaluation skills, also introduced at the outset. Particular emphasis is placed on problem posing and solving, on interaction with the core subjects, and on design.

The major aims to equip students to take control of their own learning, to develop the capacity for community involvement, to think 'big picture', and to act as professionals rather than technicians.

Sub-majors

See page 47 for a list of available sub-majors.

Standard program

Subject number	Subject name	Core or fields of practice
Semester 1		
48210	Engineering for Sustainability	C
33130	Mathematical Modelling 1	C
68037	Physical Modelling	C
48610	Introduction to Mechanical Engineering	FP
Semester 2		
48221	Informatics VB	C
33230	Mathematical Modelling 2	C
48621	Manufacturing Engineering	FP
48620	Fundamentals of Mechanical Engineering	FP
Semester 3		
48230	Engineering Communication	C
60101	Chemistry and Materials Science	FP
48331	Mechanics of Solids	FP
48510	Introduction to Electrical Engineering	FP
Semester 4		
	Engineering Internship (may be taken in Semester 3 or 4)	EPP
Semester 5		
48240	Uncertainties and Risks in Engineering	C
48641	Fluid Mechanics	FP
48640	Machine Dynamics	FP
48642	Strengths of Engineering Materials	FP
Semester 6		
48250	Engineering Economics and Finance	C
48651	Thermodynamics	FP
48531	Electromechanical Systems	FP
48650	Mechanical and Manufacturing Design	FP
Semester 7		
48260	Engineering Management	C
48660	Dynamics and Control	FP
	Restricted Choice subject 1[1]	FP
	Restricted Choice subject 2[1]	FP
Semester 8		
	Engineering Internship (may be taken in Semesters 6–9)	EPP
Semester 9		
48270	Technology Assessment	C
	Two sub-major subjects/electives	
48670	Engineering Design	
Semester 10		
	Capstone Project	
	Three sub-major subjects/electives	

C = Core subject
FP = Fields of practice subject
EPP = Engineering Practice Program (refer to page 48 for details)

Note: All Engineering subjects are 6 credit points. Engineering Internship shown in Semester 4 and 8 is for illustration only.

[1] Restricted Choice subjects: any two from the following – 48661 Energy Applications, 48662 Mechanical Applications, 48663 Advanced Manufacturing.

Mechanical and Mechatronic Engineering major

- UTS major code: 2A
- UAC code: 603115
- Testamur title: Bachelor of Engineering in Mechanical and Mechatronic Engineering Diploma in Engineering Practice

This is a new major introduced in 2002. It allows students to combine fundamental knowledge of mechanical engineering systems with the ability to exploit advanced electronics and information technology to embed intelligence in mechanical systems. Current examples of such systems are engine electronic control, automated manufacturing systems, robotics systems, micromachines and biomedical instrumentation systems.

Specialist options

Advanced Manufacturing

48663 Advanced Manufacturing
4xxxx PLC and Robotics[1]

Biomedical Technology

49312 Advanced Flow Modelling
49261 Biomedical Instrumentation

CAE

49325 Computer-aided Mechanical Design
49312 Advanced Flow Modelling

Control and Automation

4xxxx Embedded Microcontrollers[1]
4xxxx PLC and Robotics[1]

Electromechanical Systems

48531 Electromechanical Systems
4xxxx Embedded Microcontrollers[1]

Environmental Engineering

49312 Advanced Flow Modelling
48850 Environmental Planning and Law

Financial Management

22207 Accounting Transactions and Business Decisions
22107 Accounting for Business

IT Fundamentals

48440 Software Engineering
48740 Communications Networks

Mechanical System Design

48662 Mechanical Applications
49325 Computer-aided Mechanical Design

Quality Control

49309 Quality Planning and Analysis
49306 Quality and Operations Management Systems

Software

48440 Software Engineering
48475 Software Systems Analysis

Sustainable Energy Systems

48661 Energy Applications
49322 Airconditioning

[1] These subjects are being developed.

Sub-majors

See page 47 for a list of available sub-majors.

Standard program

Subject number	Subject name	Core or fields of practice
Semester 1		
48210	Engineering for Sustainability	C
33130	Mathematical Modelling 1	C
68037	Physical Modelling	C
48610	Introduction to Mechanical Engineering	FP
Semester 2		
48222	Informatics C	C
33230	Mathematical Modelling 2	C
48510	Introduction to Electrical Engineering	FP
48620	Fundamentals of Mehanical Engineering	FP
Semester 3		
48230	Engineering Communication	C
48331	Mechanics of Solids	FP
48430	Software Development	FP
48621	Manufacturing Engineering	FP
Semester 4		
	Engineering Internship (may be taken in Semester 3 or 4)	EPP
Semester 5		
48240	Uncertainties and Risks in Engineering	C
48640	Machine Dynamics	FP
48520	Electronics	FP
48650	Mechanical and Manufacturing Design	FP
Semester 6		
48250	Engineering Economics and Finance	C
48641	Fluid Mechanics	FP
48570	Data Acquisition and Distribution	FP
48642	Strength of Engineering Materials	FP
Semester 7		
48260	Engineering Management	C
48651	Thermodynamics	FP
48660	Dynamics and Control	FP
48670	Engineering Design	FP
Semester 8		
	Engineering Internship (may be taken in Semesters 6–9)	EPP
Semester 9		
48270	Technology Assessment	C
	Sub-major (Specialist Option 1)	
	Sub-major (Specialist Option 2)	
	Specialist Option 3/elective	
Semester 10		
	Capstone Project	
	Sub-major (Specialist Option 1)	
	Sub-major (Specialist Option 2)	
	Specialist Option 3/elective/ Capstone Project	

C = Core subject
FP = Fields of practice subject
EPP = Engineering Practice Program (refer to page 48 for details)

Note: All Engineering subjects are 6 credit points. Engineering Internship shown in Semester 4 and 8 is for illustration only.

Software Engineering major

- UTS major code: 08
- UAC code: 603085
- Testamur title: Bachelor of Engineering in Software Engineering
  Diploma in Engineering Practice

Software engineering is growing at a phenomenal rate and is now transforming every aspect of modern lifestyles. It underpins modern approaches to medical monitoring, vehicle guidance, industrial processing, robotic operation, telecommunication network management, flight supervision and many other applications.

The Software Engineering major brings together computing and physical sciences, providing the intellectual and practical framework for the conception, design, development, testing and maintenance of effective software-based systems. In addition to being well grounded in the fundamentals of computing science, mathematics, and electrical engineering, graduates are given the basis to be able to adapt and learn new discipline areas as they emerge.

Technical skills are developed in programming, analysis, design, testing, and specification of complex real-time software systems. These are complemented by academic skills such as problem posing and solving, critical reading, recollection of important facts, research skills, comprehension, written and oral presentation skills, and ability to carry out complex analysis. Through many team-based assignments, students learn to work together to develop leadership qualities and to become confident of their professional competencies. Through journal writing and the development of a personal portfolio, students will be able to reflect on both their academic and workplace experiences and to draw on these for their educational and career planning as well as personal development.

Sub-majors

See page 47 for a list of available sub-majors.

Standard program

Subject number	Subject name	Core or fields of practice
Semester 1		
48222	Informatics C	C
33130	Mathematical Modelling 1	C
68037	Physical Modelling	C
48510	Introduction to Electrical Engineering	FP
Semester 2		
48210	Engineering for Sustainability	C
33230	Mathematical Modelling 2	C
48520	Electronics	FP
48430	Software Development	FP
Semester 3		
48230	Engineering Communication	C
31514	Computing Theory	FP
48441	Introductory Digital Systems	FP
31425	Principles of Software Development B	FP
Semester 4		
	Engineering Internship (may be taken in Semester 3 or 4)	EPP
Semester 5		
48240	Uncertainties and Risks in Engineering	C
31429	Procedural Programming	FP
48450	Operating Systems	FP
	Sub-major subject/elective	
Semester 6		
48250	Engineering Economics and Finance	C
48440	Software Engineering	FP
31777	Human–Computer Interaction	FP
	Sub-major subject/elective	
Semester 7		
48260	Engineering Management	C
31434	Database Design	FP
48740	Communications Networks	FP
	Sub-major subject/elective	
Semester 8		
	Engineering Internship (may be taken in Semesters 6–9)	EPP
Semester 9		
48270	Technology Assessment	C
31931	Software Quality Assurance	FP
48475	Software Systems Analysis	FP
	Sub-major subject/elective	
Semester 10		
	Capstone Project	
	Capstone Project	
48485	Software Systems Design	FP
	Sub-major subject/elective	

C = Core subject
FP = Fields of practice subject
EPP = Engineering Practice Program (refer to page 48 for details)

Note: All Engineering subjects are 6 credit points. Engineering Internship shown in Semester 4 and 8 is for illustration only.

Telecommunications Engineering major

- UTS major code: 07
- UAC code: 603065
- Testamur title: Bachelor of Engineering in Telecommunications Engineering
  Diploma in Engineering Practice

Telecommunications is a rapidly expanding industry, and Sydney has the status of a global telecommunications hub. Enterprises covering the complete spectrum from large multinationals to small home businesses have recognised the critical role that effective use of communications and information technologies plays in maintaining competitiveness.

As in any rapidly expanding field, there is strong demand in the telecommunications industry for people with entry-level skills. These include familiarity with the products available and the ability to optimise the network interfaces of equipment at a software and hardware level. Typical tasks are those of local-level system design, system integration and system management, network security management, and restoration of service in the event of a fault. Training courses are offered by public and private providers to produce the skilled personnel needed; and industry, with its understandable focus on addressing immediate skill shortages, offers premium salaries. However, these skills are not the skills of engineers, but of technicians or technologists. Neither the individuals concerned, nor our society, are properly served by relying exclusively on such short-term strategies.

Telecommunications technology has the potential to make a major contribution to the achievement of a more intelligent, socially just and sustainable society. This cannot happen unless the community as a whole is able to effectively influence the manner in which the technology is developed, financed and deployed. This in turn needs broadly educated and socially aware technical experts who can stimulate and engage in community debate and in economic and business planning. The Telecommunications Engineering major at UTS is designed to develop these characteristics, and to attract able students with broadly-based interests.

The subjects in the major are designed to link with the core and the Engineering Practice

Program, and with the portfolio, to contribute progressively to professional formation over the 10 semesters of the course. An appreciation of concepts such as sustainability, ethical principles and technology assessment is developed by drawing out common themes illustrated in multiple case studies over multiple subjects. Competence in modelling, experimental methods, risk analysis, systems thinking, and mathematical analysis is developed alongside the personal effectiveness skills needed for employment. Many subjects engage the perspectives of other disciplines. The Capstone Project explores the complexity of balancing competing interests and requirements in order to find a design solution. The application of systems engineering methodology as one of the means of dealing with complexity is emphasised.

Information retrieval, writing, speaking, and critical reading skills are valued, and comprehensive feedback and assistance are provided in their development.

Through a guided sequence of design challenges, students are encouraged to value their own intellectual resources and to gain the confidence to tackle complex and ill-defined problems. They are encouraged to become 'reflective practitioners', to critique their own work and the work of others, to take responsibility for their own learning, and to pose and answer their own questions.

Sub-majors

See page 47 for a list of available sub-majors.

Standard program

Subject number	Subject name	Core or fields of practice
Semester 1		
48210	Engineering for Sustainability	C
33130	Mathematical Modelling 1	C
68037	Physical Modelling	C
48510	Introduction to Electrical Engineering	FP
Semester 2		
48222	Informatics C	C
33230	Mathematical Modelling 2	C
48720	Introduction to Telecommunications Engineering	FP
48520	Electronics	FP
Semester 3		
48230	Engineering Communication	C
48430	Software Development	FP
48730	Authentication and System Security	FP
48530	Circuit Analysis	FP
Semester 4		
	Engineering Internship (may be taken in Semester 3 or 4)	EPP
Semester 5		
48240	Uncertainties and Risks in Engineering	C
48440	Software Engineering	FP
48540/1	Signals and Systems	FP
48441	Introductory Digital Systems	FP
Semester 6		
48250	Engineering Economics and Finance	C
48771	Communication Theory	FP
48770	Signal Processing	FP
	Sub-major subject/elective	
Semester 7		
48260	Engineering Management	C
48740	Communications Networks	FP
	Sub-major subject/elective	
	and one of the following	
48780	Mobile Communications	FP
48785	Telecommunications Channels	FP
Semester 8		
	Engineering Internship (may be taken in Semesters 6–9)	EPP
Semester 9		
48270	Technology Assessment	C
48450	Operating Systems	FP
48750	Network Planning and Management	FP
	Sub-major subject/elective	
Semester 10		
	Capstone Project	
79371	Legal Issues in Communications	FP
	Two sub-major subjects/electives	

C = Core subject
FP = Fields of practice subject
EPP = Engineering Practice Program (refer to page 48 for details)

Note: All Engineering subjects are 6 credit points. Engineering Internship shown in Semester 4 and 8 is for illustration only.

Bachelor of Engineering

- UTS course code: EO07
- Testamur title: Bachelor of Engineering
- Abbreviation: BE
- Course fee: HECS (local)
  $8,000 per semester (international)

Overview

This course is identical to the Bachelor of Engineering, Diploma in Engineering Practice except that there is no requirement for students to undertake internships. It is offered to provide an opportunity for international students to experience practice-based education in an Australian context through their classroom interactions with students who have undertaken one or more internships. The course allows international students more flexibility to be able to negotiate their workplace experience before or after the completion of the course or during their periods of vacation.

Course duration

This course is offered on a four-year, full-time basis.

Course program

Students in the Bachelor of Engineering undertake the program as outlined in the Bachelor of Engineering, Diploma in Engineering Practice (see page 41) without the Engineering Practice program component.

Professional recognition

The degree has the same recognition as the Bachelor of Engineering, Diploma in Engineering Practice, provided graduates have at least 12 weeks of industrial experience in an equivalent setting.

Bachelor of Engineering Science

- UTS course code: EO06
- Testamur title: Bachelor of Engineering Science
- Abbreviation: BEngSc
- Course fee: HECS (local)
  $8,000 per semester (international)

Overview

This course is a shortened version of the Bachelor of Engineering (EO07). Students complete 75 per cent of the Bachelor of Engineering subjects.

Students enrolled in the Bachelor of Engineering Science may transfer to the Bachelor of Engineering. This involves completion of the remaining 25 per cent Bachelor of Engineering subjects which can be achieved in one year.

Course duration

This course can be completed after three years of full-time study.

Course structure

In addition to the standard majors (Civil, Civil and Environmental, Computer Systems, Electrical, Mechanical, Software, and Telecommunications), the Bachelor of Engineering Science is at present available in Singapore with a major in Aerospace Operations.

Note: The Construction and Mechanical and Mechatronic Engineering majors are not yet offered in this degree.

Professional recognition

The degree qualifies holders for membership of the Institution of Engineers, Australia, in the category of Engineering Technologist.

Course programs

Aerospace Operations major

Subject number	Subject name	Core or fields of practice
Semester 1		
48210	Engineering for Sustainability	C
33130	Mathematical Modelling 1	C
68037	Physical Modelling	C
48610	Introduction to Mechanical Engineering	FP
Semester 2		
48221	Informatics VB	C
33230	Mathematical Modelling 2	C
48401	Aerospace Operations 1	FP
48620	Fundamentals of Mechanical Engineering	FP
Semester 3		
48230	Engineering Communication	C
60101	Chemistry and Materials Science	FP
48402	Aerospace Operations 2	FP
48403	Aerospace Operations 3	FP
Semester 4		
48240	Uncertainties and Risks in Engineering	C
48641	Fluid Mechanics	FP
48640	Machine Dynamics	FP
49104	Aerospace Maintenance and Management	FP
Semester 5		
48250	Engineering Economics and Finance	C
48651	Thermodynamics	FP
48810	Introduction to Electrical Engineering	FP
	Sub-major subject/elective	FP
Semester 6		
48260	Engineering Management	
	Three sub-major subjects/electives	

C = Core subject
FP = Fields of practice subject

Note: All Engineering subjects are 6 credit points.

Civil Engineering major

Subject number	Subject name	Core or fields of practice
Semester 1		
48210	Engineering for Sustainability	C
33130	Mathematical Modelling 1	C
68037	Physical Modelling	C
48310	Introduction to Civil Engineering	FP
Semester 2		
48221	Informatics VB	C
33230	Mathematical Modelling 2	C
48321	Statics	FP
48320	Surveying	FP
Semester 3		
48230	Engineering Communication	C
60101	Chemistry and Materials Science	FP
48331	Mechanics of Solids	FP
48330	Soil Behaviour	FP
Semester 4		
48240	Uncertainties and Risks in Engineering	C
48641	Fluid Mechanics	FP
48349	Structural Analysis	FP
48340	Construction	FP
Semester 5		
48250	Engineering Economics and Finance	C
48352	Construction Materials	FP
48359	Structural Design 1	FP
48350	Environmental and Sanitation Engineering	FP
Semester 6		
	Four sub-major subjects/electives	

C = Core subject
FP = Fields of practice subject

Note: All Engineering subjects are 6 credit points.

Civil and Environmental Engineering major

Subject number *	Subject name	Core or fields of practice
Semester 1		
48210	Engineering for Sustainability	C
60101	Chemistry and Materials Science	FP
91150	Biology and Ecology for Engineers	FP
48310	Introduction to Civil Engineering	FP
Semester 2		
48221	Informatics VB	C
33130	Mathematical Modelling 1	C
68037	Physical Modelling	C
48820	Introduction to Environmental Engineering	FP
Semester 3		
48230	Engineering Communication	C
33230	Mathematical Modelling 2	C
48321	Statics	FP
48340	Construction	FP
Semester 4		
48240	Uncertainties and Risks in Engineering	C
48331	Mechanics of Solids	FP
48840	Water Supply and Wastewater Engineering	FP
48641	Fluid Mechanics	FP
Semester 5		
48250	Engineering Economics and Finance	C
48330	Soil Behaviour	FP
48352	Construction Materials	FP
48850	Environmental Planning and Law	FP
Semester 6		
	Four sub-major subjects/electives	

C = Core subject
FP = Fields of practice subject

Note: All Engineering subjects are 6 credit points.

Computer Systems major

Subject number	Subject name	Core or fields of practice
Semester 1		
48210	Engineering for Sustainability	C
33130	Mathematical Modelling 1	C
68037	Physical Modelling	C
48510	Introduction to Electrical Engineering	FP
Semester 2		
48222	Informatics C	C
33230	Mathematical Modelling 2	C
48610	Introduction to Mechanical Engineering	FP
48520	Electronics	FP
Semester 3		
48230	Engineering Communication	C
48430	Software Development	FP
48531	Electromechanical Systems	FP
48530	Circuit Analysis	FP
Semester 4		
48240	Uncertainties and Risks in Engineering	C
48440	Software Engineering	FP
48441	Introductory Digital Systems	FP
	Sub-major subject/elective	
Semester 5		
48250	Engineering Economics and Finance	C
48450	Operating Systems	FP
48451	Advanced Digital Systems	FP
	Sub-major subject/elective	
Semester 6		
48540/1	Signals and Systems	FP
48740	Communications Networks	FP
	Two sub-major subjects/electives	

C = Core subject
FP = Fields of practice subject

Note: All Engineering subjects are 6 credit points.

Electrical Engineering major

Subject number	Subject name	Core or fields of practice
Semester 1		
48210	Engineering for Sustainability	C
33130	Mathematical Modelling 1	C
68037	Physical Modelling	C
48510	Introduction to Electrical Engineering	FP
Semester 2		
48222	Informatics C	C
33230	Mathematical Modelling 2	C
48610	Introduction to Mechanical Engineering	FP
48520	Electronics	FP
Semester 3		
48230	Engineering Communication	C
48430	Software Development	FP
48531	Electromechanical Systems	FP
48530	Circuit Analysis	FP
Semester 4		
48240	Uncertainties and Risks in Engineering	C
68038	Advanced Mathematics and Physics	FP
48441	Introductory Digital Systems	FP
48540	Signals and Systems	FP
Semester 5		
48250	Engineering Economics and Finance	C
48550	Electrical Energy Technology	FP
48451	Advanced Digital Systems	FP
48551	Advanced Electronics	FP
Semester 6		
	Four sub-major subjects/electives	

C = Core subject
FP = Fields of practice subject

Note: All Engineering subjects are 6 credit points.

Mechanical Engineering major

Subject number	Subject name	Core or fields of practice
Semester 1		
48210	Engineering for Sustainability	C
33130	Mathematical Modelling 1	C
68037	Physical Modelling	C
48610	Introduction to Mechanical Engineering	FP
Semester 2		
48221	Informatics VB	C
33230	Mathematical Modelling 2	C
48621	Manufacturing Engineering	FP
48620	Fundamentals of Mechanical Engineering	FP
Semester 3		
48230	Engineering Communication	C
60101	Chemistry and Materials Science	FP
48331	Mechanics of Solids	FP
48510	Introduction to Electrical Engineering	FP
Semester 4		
48240	Uncertainties and Risks in Engineering	C
48641	Fluid Mechanics	FP
48640	Machine Dynamics	FP
48642	Strength of Engineering Materials	FP
Semester 5		
48250	Engineering Economics and Finance	C
48651	Thermodynamics	FP
48531	Electromechanical Systems	FP
48650	Mechanical and Manufacturing Design	FP
Semester 6		
	Four sub-major subjects/electives	

C = Core subject
FP = Fields of practice subject

Note: All Engineering subjects are 6 credit points.

Software Engineering major

Subject number	Subject name	Core or fields of practice
Semester 1		
48222	Informatics C	C
33130	Mathematical Modelling 1	C
68037	Physical Modelling	C
48510	Introduction to Electrical Engineering	FP
Semester 2		
48210	Engineering for Sustainability	C
33230	Mathematical Modelling 2	C
48430	Software Development	FP
48520	Electronics	FP
Semester 3		
48230	Engineering Communication	C
31429	Procedural Programming	FP
31425	Principles of Software Development B	FP
48530	Circuit Analysis	FP
Semester 4		
48240	Uncertainties and Risks in Engineering	C
31514	Computing Theory	FP
48450	Operating Systems	FP
	Sub-major subject/elective	
Semester 5		
48250	Engineering Economics and Finance	C
48440	Software Engineering	FP
31862	Principles of Human-Computer Interaction	FP
	Sub-major subject/elective	
Semester 6		
31434	Database Design	FP
48740	Communications Networks	FP
	Two sub-major subjects/electives	

C = Core subject
FP = Fields of practice subject

Note: All Engineering subjects are 6 credit points.

Telecommunications Engineering major

Subject number	Subject name	Core or fields of practice
Semester 1		
48210	Engineering for Sustainability	C
33130	Mathematical Modelling 1	C
68037	Physical Modelling	C
48510	Introduction to Electrical Engineering	FP
Semester 2		
48222	Informatics C	C
33230	Mathematical Modelling 2	C
48720	Introduction to Telecommunications Engineering	FP
48520	Electronics	FP
Semester 3		
48230	Engineering Communication	C
48430	Software Development	FP
48730	Authentication and System Security	FP
48530	Circuit Analysis	FP
Semester 4		
48240	Uncertainties and Risks in Engineering	C
48440	Software Engineering	FP
48441	Introductory Digital Systems	FP
48541	Signals and Systems	FP
Semester 5		
48250	Engineering Economics and Finance	C
31514	Computing Theory	FP
48770	Signal Processing	FP
48740	Communications Network	FP
Semester 6		
	Four sub-major subjects/electives	

C = Core subject
FP = Fields of practice subject

Note: All Engineering subjects are 6 credit points.

COMBINED DEGREE COURSES

Bachelor of Engineering, Bachelor of Arts in International Studies, Diploma in Engineering Practice

- Course code: E002
- UAC code: 609032
- Testamur title: Bachelor of Engineering
  Bachelor of Arts in International Studies
  Diploma in Engineering Practice
- Abbreviation: BE BA DipEngPrac
- Course fee: HECS (local)
  $8,000 per semester (international)[1]

Overview

Offered jointly by the Faculty of Engineering and the University's Institute for International Studies, this program leads to the combined degree of Bachelor of Engineering, Bachelor of Arts in International Studies, Diploma in Engineering Practice. The program links the Bachelor of Engineering, Diploma in Engineering Practice with the study of a language and culture other than English. All majors in the Bachelor of Engineering, Diploma in Engineering Practice are also available in this combined degree.

Course aims

The purpose of the program is to develop skills for leadership in the professional practice of engineering in an international setting. It reflects a belief in the international character of engineering, and the conviction that Australian professionals can benefit from early development of an international perspective and a fluency in cross-cultural interactions.

Admission requirements

Students normally enter the program directly from high school, and are selected on the basis of academic performance. Application is made through UAC in the normal way.

[1] $5,000 per semester during Engineering Internships.

Attendance

The program involves eight semesters of academic work in Australia, two semesters of academic work overseas, and two periods of engineering internship. The periods of engineering internship can be taken in Australia, or one in Australia and one overseas.

Course duration

Attendance may be full time or part time. Overall full-time duration is normally six years, although it may be possible to complete the degree in less than this.

Course structure

The program requires a total of 252 credit points of academic subjects, including those taken overseas, plus the normal minimum of 48 weeks of engineering internship. Some students choose to take their first period of engineering internship overseas, during their second or third year of enrolment. Most take this first period in Australia. Engineering and International Studies are interwoven throughout the program, and the combined degree is awarded on completion. It is not possible to take the Bachelor of Arts in International Studies separately, or to complete either degree at an intermediate point. However, a student unable for any reason to continue with International Studies could transfer to the Bachelor of Engineering, Diploma in Engineering Practice.

International Studies component

The Bachelor of Arts in International Studies requires undergraduates to study a major – a region or country specialisation – over a minimum of three years. In Sydney, students study Language and Culture for at least two years, followed by a period of study overseas.

In the International Studies program, students focus on one of the following countries or majors: Chile, China, France, Germany, Indonesia, Italy, Japan, Malaysia, Mexico, Spain or Thailand. There is also a Heritage major that permits students with previous exposure to a language and culture to continue their study in countries such as Croatia, Greece, Hong Kong, Korea, Poland, Russia, Taiwan, the Philippines, Vietnam and others.

Australia and the Asia-Pacific is only available as a major to international students. International students may access one of the other

majors offered provided that the country they choose as their major is able to grant them a visa to study there. This needs to be determined prior to commencing subjects within the International Studies major. If a visa cannot be granted, then it will not be possible to undertake the chosen major.

Students are admitted to the International Studies program with no guarantee of entry to a specific major, though every effort is made to meet student preferences. The Institute reserves the right to allocate places in majors according to its resources and arrangements with overseas universities.

Each major includes 32 credit points (four 8-credit-point subjects) of instruction in Language and Culture; 8 credit points of study of Comparative Social Change; 8 credit points of study of Contemporary Society; and 48 credit points (two semesters) of study at a university or institution of higher education in the country of the major.

There are no prior language requirements for the International Studies component of this combined degree, except for programs within the Heritage major.

Arrangements for In-country Study

Students are required to complete all appropriate subjects in their combined degree, including four consecutive semesters of study of Language and Culture before proceeding to In-country Study. There are different classes available for students according to their level of language proficiency.

The Institute for International Studies makes arrangements for students to spend two semesters of In-country Study at an institution of higher education in the country of their major. The costs of tuition in host institutions overseas and travel between Sydney and the designated host institutions are borne by UTS except in cases where a scholarship has been awarded to the student with provision for these costs. Under those circumstances, the funds that would have otherwise been allocated towards the student's tuition and travel are redirected to support the In-country Study program in general. In most cases, the cost of living for the period of In-country Study will not exceed the cost of living away from home in Sydney. However, students should be aware that the cost of living in some countries – notably Japan – may be higher than in Sydney.

Standard program

Subject number	Subject name	
Semester 1		
48210	Engineering for Sustainability	C
33130	Mathematical Modelling 1	C
68037	Physical Modelling	C
	Fields of practice subject	FP
Semester 2		
48221/2	Informatics	C
33230	Mathematical Modelling 2	C
	Two fields of practice subjects	FP
Semester 3		
	Two fields of practice subjects	FP
50140	Comparative Social Change (8cp)	I
971xxx	Language and Culture 1 (8cp)	I
Semester 4		
	Engineering Internship	EPP
972xxx	Language and Culture 2 (8cp)	I
Semester 5		
48240	Uncertainties and Risks in Engineering	C
	Two fields of practice subjects	FP
973xxx	Language and Culture 3 (8cp)	I
Semester 6		
	Two fields of practice subjects	FP
976xxx	Contemporary Society (8cp)	I
974xxx	Language and Culture 4 (8cp)	I
Semester 7		
977xxx	In-country Study 1 (24cp)	I
Semester 8		
978xxx	In-country Study 2 (24cp)	I
Semester 9		
48250	Engineering Economics and Finance	C
	Three fields of practice subjects	FP
Semester 10		
	Engineering Internship	EPP
Semester 11		
48260	Engineering Management	C
	Three fields of practice subjects	FP
Semester 12		
	Capstone Project	
	Fields of practice subject	FP

C = Core subject
FP = Fields of practice subject
EPP = Engineering Practice Program (refer to page 48 for details)
I = International Studies subject

Note: All Engineering subjects are 6 credit points unless otherwise stated.

Bachelor of Engineering, Bachelor of Business

- Course code: E005
- UAC code: 609350
- Testamur titles: Bachelor of Engineering
  Bachelor of Business
- Abbreviation: BE BBus
- Course fee: HECS (local)
  $8,000 per semester (international)[1]

Overview

This program, offered jointly by the Faculty of Engineering and the Faculty of Business, leads to a combined degree (two testamurs): Bachelor of Engineering, Bachelor of Business.

The course provides students with the opportunity of completing the core and major components of both the engineering and business degrees. In addition, the course includes a semester-length work experience component (refer to Engineering Practice Program, page 48).

Graduates with this combination of qualifications can expect to have a wide range of career opportunities spanning the two disciplines. Obvious opportunities exist for graduates in the application of advanced technology in commercial settings to enhance business competitiveness. Other attributes of engineering graduates such as a systems perspective and skill in the use of quantitative modelling techniques will provide further business career opportunities. For graduates choosing to practice as engineers, the business knowledge will prove invaluable in providing a sound foundation for entrepreneurial initiatives and the commercialisation of engineering innovations.

Admission requirements

Students normally enter this course directly from high school.

To be admitted to this combined degree program, applicants must achieve a UAI rank no lower than five points below the rank for the Bachelor of Business single degree program.

Students wishing to transfer from the combined degree program to the Bachelor of Business single degree program, and whose UAI is less than the current entry rank for the Bachelor of Business, will be required to apply for admission through the UAC in the Non-recent School Leaver category.

[1] $5,000 per semester during Engineering Internship.

Course duration

The program is offered on a five-year, full-time basis.

Students can gain the awards Bachelor of Engineering, Bachelor of Business, Diploma in Engineering Practice by undertaking one further semester of integrated work experience.

Course structure

Engineering component

Students undertake the engineering degree in any of the majors on offer, provided the UAI requirement for the selected major is met (presently Civil, Civil and Environmental, Computer Systems, Construction, Electrical, Mechanical, Mechanical and Mechatronic, Software or Telecommunications).

Business component

Students undertake the business degree with selected majors in Accounting, Banking, Economics, Electronic Business, Finance, International Business, Management, Marketing, Sport Management, or Tourism. The Information Technology major is not available to students in this program.

Standard program

The standard program for this course is shown on page 70.

Other information

Students should contact the Faculty of Engineering Undergraduate and Postgraduate Office (UPO) on telephone (02) 9514 2666 regarding administrative matters for this course.

Standard program

Subject number	Subject name
Semester 1	
48210	Engineering for Sustainability
33130	Mathematical Modelling 1
68037	Physical Modelling
48xxx	Introduction to xxxxx[1]
Semester 2	
25115	Economics for Business
48221/2	Informatics
33230	Mathematical Modelling 2
	Two fields of practice subjects[2]
Semester 3	
48230	Engineering Communication
24108	Marketing Foundations
79203	Business Law and Ethics
22107	Accounting for Business
Semester 4	
48240	Uncertainties and Risks in Engineering
	Three fields of practice subjects
2xxxx	Business core elective 1[3]
Semester 5	
48260	Engineering Management
	Three fields of practice subjects
2xxxx	Business core elective 2[3]
Semester 6	
48121	Engineering Practice Preview 1
	Two fields of practice subjects
2xxxx	Business core elective 3
2xxxx	Business major 1
Semester 7	
	Engineering experience semester
Semester 8	
48122	Engineering Practice Review 1
	Two fields of practice subjects
2xxxx	Business major 2
2xxxx	Business major 3
Semester 9	
	Three fields of practice subjects
2xxxx	Business major 4
2xxxx	Business major 5
Semester 10	
	Capstone Project
2xxxx	Business major 6
2xxxx	Business major 7
2xxxx	Business major 8

[1] Students must enrol in the subject which corresponds to their major.

[2] Students must complete 15 of the fields of practice subjects specific to their chosen Engineering major.

[3] Students must choose from 22207, 25300, 21128 and 21193.

Bachelor of Engineering, Bachelor of Business, Diploma in Engineering Practice

- Course code: E008
- Testamur titles: Bachelor of Engineering
  Bachelor of Business
  Diploma in Engineering Practice
- Abbreviation: BE BBus DipEngPrac
- Course fee: HECS (local)
  $8,000 per semester (international)[1]

Overview

This course (two testamurs) is essentially the same as the Bachelor of Engineering, Bachelor of Business double degree described previously with the addition of a second engineering internship and portfolio.

Course duration

The standard course can be completed full time in five-and-a-half years.

Course structure

The Bachelor of Engineering, Bachelor of Business, Diploma in Engineering Practice program requires a total of 252 credit points of academic subjects, including the engineering internship component.

[1] $5,000 per semester during Engineering Internships.

Bachelor of Engineering, Bachelor of Science

- UTS course code: E013
- UAC code: 609360
- Testamur titles: Bachelor of Engineering Bachelor of Science
- Abbreviation: BSc BE
- Course fee: HECS (local) $8,000 per semester (international)

Bachelor of Engineering, Bachelor of Medical Science

- UTS course code: E015
- UAC code: 609370
- Testamur titles: Bachelor of Engineering Bachelor of Medical Science
- Abbreviation: BMedSc BE
- Course fee: HECS (local) $8,000 per semester (international)

Bachelor of Engineering, Bachelor of Biotechnology

- UTS course code: tba
- UAC code: 609360
- Testamur titles: Bachelor of Engineering Bachelor of Biotechnology
- Abbreviation: BBiotech BE
- Course fee: HECS (local) $8,000 per semester (international)

Overview

There is a strong interrelation between the progress of engineering and developments in science, and a demonstrated need for professionals with a strong understanding and experience in both areas. These combined degree programs (two testamurs each) are designed to provide opportunities for students interested in science, the scientific basis of engineering and technology, and the technology itself. An interest in careers with a strong research and innovation component will be a key graduate attribute.

These double degree courses enable students to combine a Bachelor of Engineering in any one of the offered majors (Civil, Civil and Environmental, Computer Systems, Construction, Electrical, Mechanical, Mechanical and Mechatronic, Software, or Telecommunications) with a Bachelor of Science, Bachelor of Medical Science or Bachelor of Biotechnology.

Course aims

These courses are aimed at producing graduates with professional qualifications in science, medical science or biotechnology and engineering and who are well prepared to pursue a career in either field, or one that combines the skills of both. Depending on the science and engineering disciplines chosen, graduates of this course will work as cutting edge professionals where science and engineering interact most dynamically. Graduates could find themselves working in medical technology and instrumentation, biotechnology, environmental protection and management, energy and resource exploration and development, communications, mathematical modelling, transportation, construction, nanotechnology, molecular biology and materials technology.

Admission requirements

Australian students are required to apply for admission through the NSW University Admissions Centre (UAC). For school leavers, admission is based on UAI scores. We recommend that HSC studies include the following subjects: HSC English Advanced, Mathematics, and at least one science subject. Non-recent School Leavers should apply through UAC in addition to submitting a Personal Statement to UTS. Applications are taken from September to December each year.

International students should contact the UTS International Programs Office (IPO) for application procedures. In addition to academic requirements, students are required to meet English language proficiency requirements. Further details are available from IPO.

There is provision for students already enrolled in a Bachelor of Science or a Bachelor of Engineering degree to transfer to the combined degree program. Students currently enrolled in a Science or Engineering program are 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.

Advanced standing

UTS recognises prior tertiary level learning, including that from other universities and TAFE (Associate Diploma and Diploma only). Once a student's application to study has been accepted, they may apply to receive recognition of successful prior learning, and may therefore be able to complete the course in less than the standard time. Applications for credits and exemptions should be made to the Associate Dean (Coursework Programs) in the Faculty of Science.

Attendance

Full-time attendance involves approximately 24 hours each week at the University. This enables a full stage of the course to be completed in one semester. Part-time attendance involves approximately 12 hours each week at the University. 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.

Course duration

Each of these courses is offered over:

- five years, full time
- ten years, part time, or
- six years, full time with Honours.

Assessment

Depending on the subjects chosen, students can expect to undergo a variety of assessment types before completion of this course including formal and informal examinations, assignments and essays, practical reports and write-ups, and seminar presentations. Assessment tasks may be based on individual or group work. For further details for individual subjects, see the Subject Descriptions section, or contact the subject's coordinator.

Course structure

Engineering component

Students undertake the engineering degree in any of the majors on offer, provided the UAI requirement for the selected major is met (presently Civil, Civil and Environmental, Computer Systems, Construction, Electrical, Mechanical, Mechanical and Mechatronic, Software or Telecommunications).

Science component

Students are required to complete 96 credit points of science subjects, of which at least 72 credit points must focus on a major area of study in science, medical science or biotechnology.

Science majors may be taken in the following areas:

- Applied Chemistry
- Applied Physics
- Biomedical Science
- Earth and Environmental Science
- Environmental and Urban Horticulture
- Environmental Biology
- Nanotechnology.

Recommended Science strands

Applied Chemistry (78 credit points)

65101	Chemistry 1C	6cp
65201	Chemistry 2C	6cp
65202	Organic Chemistry 1	6cp
65306	Analytical Chemistry 1	6cp
65307	Physical Chemistry 1	6cp
65409	Analytical Chemistry 2	6cp
65410	Chemical Safety and Legislation	6cp
65411	Inorganic Chemistry 1 (Transition Metal Chemistry)	6cp
65508	Organic Chemistry 2 (Structure, Elucidation and Synthesis)	6cp
65509	Inorganic Chemistry 2 (New Inorganic Materials)	6cp
65606	Analytical Chemistry 3	6cp
65607	Physical Chemistry 2	6cp
xxxxx	Science elective	6cp

Materials Science (78 credit points)

65101	Chemistry 1C	6cp
67101	Introduction to Materials	6cp
65201	Chemistry 2C	6cp
67303	Mechanical Properties of Materials	6cp
67304	Physical Metallurgy	6cp
67305	Polymer Science	6cp
67306	Industrial Ceramics	6cp
67408	Industrial Metallurgy	6cp
67409	Polymer Technology	6cp
67506	Technical Ceramics	6cp
	plus any three of the following	
67608	Composites	6cp
67407	Physical Properties of Materials	6cp
65062	Extractive Metallurgy	6cp
67606	Corrosion and Degradation of Materials	6cp

Applied Physics (78 credit points)

65101	Chemistry 1C	6cp
65201	Chemistry 2C	6cp
68314	Electronics	6cp
68311	Atoms, Photons and Orbits (Physics 3)	6cp
68312	Electrotechnology and Data Analysis	6cp
33490	Computational Mathematics and Physics	6cp
68411	Vibrations, Quanta and Nucleons (Physics 4)	6cp
68412	Energy Science and Technology	6cp
68514	Electronics and Interfacing	6cp
68511	Quantum and Solid-state Physics	6cp
68512	Research Methods in Applied Physics	6cp
68611	Electromagnetics and Optics	6cp
xxxxx	Science elective	6cp

Medical Science (78 credit points)

65101	Chemistry 1C	6cp
91701	Medical Science 1	6cp
65201	Chemistry 2C	6cp
91702	Medical Science 2	6cp
91313	Biochemistry 1	6cp
91703	Physiological Systems	6cp
91704	Behavioural Sciences	6cp
91705	Medical Devices and Diagnostics	6cp
xxxxx	Approved [Bio]Medical Science elective	6cp
91707	Pharmacology 1	8cp
	plus any two of the following	
91706	Neuroscience	8cp
91708	Psychophysiology	8cp
91709	Pharmacology 2	8cp

Biomedical Science (78 credit points)

65012	Chemistry 1A	6cp
91701	Medical Science 1	6cp
65022	Chemistry 2A	6cp
91702	Medical Science 2	6cp
	at least 30 credit points from	
91313	Biochemistry 1	6cp
91314	General Microbiology	6cp
91354	Anatomical Pathology	6cp
91320	Biochemistry 2	6cp
91326	Analytical Biochemistry	6cp
91330	Epidemiology and Public Health Microbiology	6cp
	plus	
xxxxx	Biomedical Science electives	24cp

Biotechnology (78 credit points)

65012	Chemistry 1A	6cp
91701	Medical Science 1	6cp
65022	Chemistry 2A	6cp
91702	Medical Science 2	6cp
91313	Biochemistry 1	6cp
91314	General Microbiology	6cp
91128	Plant Biotechnology	3cp
91326	Analytical Biochemistry	6cp
91330	Epidemiology and Public Health Microbiology	6cp
91351	Immunology 1	3cp
	plus any three of the following	
91332	Molecular Biology 1	8cp
91369	Biobusiness and Environmental Biotechnology	8cp
91335	Molecular Biology 2	8cp
91368	Bioreactors and Bioprocessing	8cp

Earth Science (78 credit points)

66101	Earth Science 1	6cp
65012	Chemistry 1A	6cp
66204	Field Studies 1	6cp
65022	Chemistry 2A	6cp
66304	Earth Materials	6cp
66305	Fold Belts and Cratons	6cp
66408	Earth Resources	6cp
66409	Surficial Processes and Products	6cp
66508	Crustal and Mantle Processes	6cp
91120	Mapping and Remote sensing	6cp
66509	Tectonics and Surface Dynamics	6cp
66609	Environmental and Quaternary Geology	6cp
66611	Engineering and Groundwater Geology	6cp

Environmental Biology (78 credit points)

65012	Chemistry 1A	6cp
91101	Cells, Genetics and Evolution	6cp
65022	Chemistry 2A	6cp
91102	Functional Biology	6cp
91110	Experimental Design and Sampling	6cp
91111	Pollution Assessment	6cp
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

Environmental and Urban Horticulture (78 credit points)

91246	Plant Structure, Function and Culture	6cp
91101	Cells, Genetics and Evolution	6cp
91247	Landscape Design and Plant Culture	6cp
91102	Functional Biology	6cp
91233	Plant Production and Growth Media	6cp
91270	Plant Physiology	6cp
91234	Uses of Australian Plants	6cp
91237	Plant Pathology	6cp
91250	Plants in the Landscape	6cp
91245	Open Space Management	6cp
91248	Plant Production Systems	6cp
91249	Plant Genetics and Breeding	6cp
xxxxx	Science elective	6cp

Course program

BE (any major), Bachelor of Science – standard program

Subject number	Subject name
Semester 1	
	Science major 1[1]
33130	Mathematical Modelling 1
68037	Physical Modelling
48xxx	Introduction to xxxxx[2]
Semester 2	
	Science major 2
33230	Mathematical Modelling 2
	Two fields of practice subjects[3]
Semester 3	
48210	Engineering for Sustainability
48221/2	Informatics
	Science major 3
	Science major 4
Semester 4	
	Science major 5
	Science major 6
	Two fields of practice subjects
Semester 5	
48230	Engineering Communication
	Fields of practice subject
	Science major 7
	Science major 8
Semester 6	
48240	Uncertainties and Risks in Engineering
	Three fields of practice subjects
Semester 7	
48250	Engineering Economics and Finance
	Three fields of practice subjects
Semester 8	
	Science major 9
	Science major 10
	Science major 11
	Science major 12
Semester 9	
48260	Engineering Management
	Two fields of practice subjects
	Science major 13
Semester 10	
48270	Technology Assessment
	Fields of practice subject
	Capstone Project
	Capstone Project/elective

[1] The 13 Science major subjects are listed under Recommended Science strands.

[2] Students must enrol in the subject which corresponds to their Engineering major.

[3] Students must complete the 14 fields of practice subjects specific to their chosen Engineering major.

BE (any major), Bachelor of Medical Science – standard program

Subject number	Subject name
Semester 1	
91701	Medical Science 1
33130	Mathematical Modelling 1
68037	Physical Modelling
48xxx	Introduction to xxxxx[1]
Semester 2	
91702	Medical Science 2
33230	Mathematical Modelling 2
	Fields of practice subject[2]
65101	Chemistry 1C
Semester 3	
48210	Engineering for Sustainability
48221/2	Informatics
65201	Chemistry 2C
91703	Physiological Systems
Semester 4	
91704	Behavioural Sciences
	Three fields of practice subjects
Semester 5	
48230	Engineering Communication
	Fields of practice subject
91707	Pharmacology 1
91313	Biochemistry 1
Semester 6	
48240	Uncertainties and Risks in Engineering
	Three fields of practice subjects
Semester 7	
48250	Engineering Economics and Finance
	Three fields of practice subjects
Semester 8	
91705	Medical Devices and Diagnostics
91708	Psychophysiology
	(Bio) Medical Science elective
Semester 9	
48260	Engineering Management
	Two fields of practice subjects
	and one of the following
91709	Pharmacology 2
91706	Neuroscience
Semester 10	
48270	Technology Assessment
	Fields of practice subject
	Capstone Project
	Capstone Project/elective

[1] Students must enrol in the subject which corresponds to their Engineering major.

[2] Students must complete the 14 fields of practice subjects specific to their chosen Engineering major.

BE (any major), Bachelor of Biotechnology– standard program

Subject number	Subject name
Semester 1	
91701	Medical Science 1
33130	Mathematical Modelling 1
68037	Physical Modelling
48xxx	Introduction to xxxxx[1]
Semester 2	
91702	Medical Science 2
33230	Mathematical Modelling 2
	Fields of practice subject[2]
65012	Chemistry 1A
Semester 3	
48210	Engineering for Sustainability
48221/2	Informatics
91313	Biochemistry 1
91314	General Microbiology
Semester 4	
65022	Chemistry 2A
	Three fields of practice subjects
Semester 5	
48230	Engineering Communication
	Fields of practice subject
	Molecular Biology 1
Semester 6	
48240	Uncertainties and Risks in Engineering
	Three fields of practice subjects
Semester 7	
48250	Engineering Economics and Finance
	Three fields of practice subjects
Semester 8	
	one of the following two subjects
91128	Plant Biotechnology
91351	Immunology 1
	and
91326	Analytical Biochemistry
91330	Epidemiology and Public Health Microbiology
	and one of the following
91335	Molecular Biology 2
91368	Bioreactors and Bioprocessing
Semester 9	
48260	Engineering Management
	Two fields of practice subjects
91369	Biobusiness and Environmental Biotechnology
Semester 10	
48270	Technology Assessment
	Fields of practice subject
	Capstone Project
	Capstone Project/elective

[1] Students must enrol in the subject which corresponds to their Engineering major.

[2] Students must complete the 14 fields of practice subjects specific to their chosen Engineering major.

Honours

The Honours program is designed to introduce students to more advanced coursework and to research work in sciences. It allows selected students to continue on with postgraduate studies if desired and enhances their employment prospects. For further information contact the Course Director.

Professional recognition

Depending on disciplines chosen, students may be eligible for entry to the relevant professional associations. This degree meets the requirements for admission into the Institute of Engineers

Other information

For further information on Engineering majors and approved study programs, consult this handbook, or the Undergraduate and Postgraduate Office (UPO) in the Faculty of Engineering.

All academic inquiries relating to the science component should be made to:

Associate Dean (Coursework Programs)
Associate Professor Rod Buckney
telephone (02) 9514 4044
fax (02) 9514 4095
email Rod.Buckney@uts.edu.au

Bachelor of Engineering, Bachelor of Science, Diploma in Engineering Practice

- Course code: E014
- Testamur titles: Bachelor of Engineering in (name of Engineering major)
  Bachelor of Science in
  (name of Science major)
  Diploma in Engineering Practice
- Abbreviations: BE BSc DipEngPrac
- Course fee: HECS (local)
  $8,000 per semester (international)[1]

Overview

This combined degree (two testamurs) course is the same as the Bachelor of Engineering, Bachelor of Science except for the additional requirement of two internships and completion of the Engineering Practice Program of the Bachelor of Engineering, Diploma in Engineering Practice. The combined course is 252 credit points and has a nominal completion time of six years.

Students in the combined Bachelor of Engineering, Bachelor of Medical Science and Bachelor of Engineering, Bachelor of Biotechnology can transfer to the program including the Diploma in Engineering Practice.

[1] $5,000 per semester during Engineering Internships.

Bachelor of Engineering Science, Bachelor of Laws[1]

- Course code: LL14
- Testamur titles: Bachelor of Engineering Science
  Bachelor of Laws
- Abbreviation: BEngSc LLB
- Course fee: HECS (local)
  $7,000 per semester (international)

Overview

This combined degree (two testamurs) course allows students to combine a Bachelor of Engineering Science in any one of the offered majors (Civil, Civil and Environmental, Computer Systems, Electrical, Mechanical, Software, or Telecommunications) with the standard professional level qualification in Law, the Bachelor of Laws. The course was developed in response to the ever growing demand for legal services in areas in which an in-depth appreciation of complex technical matters by the legal team is essential.

Admission requirements

Local students are required to apply for admission through the NSW Universities Admissions Centre (UAC). For school leavers, admission is based on UAI scores. Non-recent School Leavers should apply through UAC in addition to sending a Personal Statement to UTS. Applications are taken from August to end of October each year. Considerations for admission as a Non-recent School Leaver takes into account the following:

- English proficiency and written expression
- previous legal study
- tertiary study
- legal experience or employment
- motivation and the reason for wanting to study law (and other discipline in the case of a combined or double degree)
- commitment to study law, and
- supporting material such as professional and personal references and/or letter of employer's support.

International students should contact the UTS International Programs Office (IPO) for application procedures. In addition to academic requirements, students are required to meet English language proficiency requirements.

[1] Subject to approval.

Course duration

The course is completed in five-and-a-half years of full-time study. However, most students are able to complete the course at accelerated rate in five years or less.

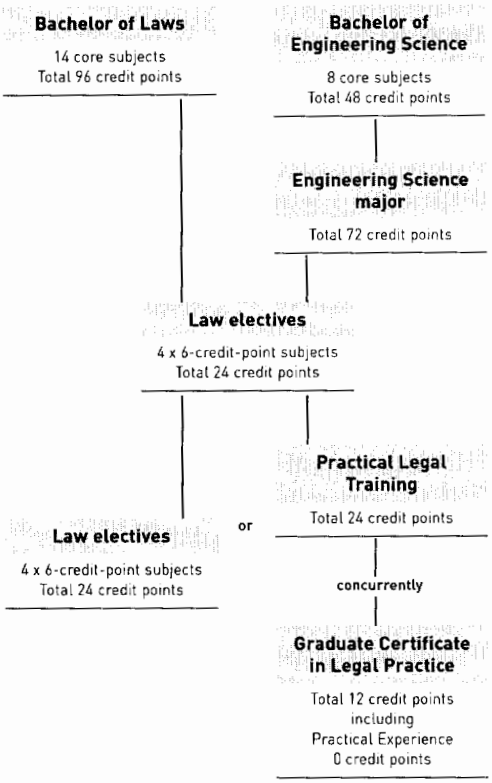
Course structure

The course is 264 credit points with 120 credit points covering the standard Bachelor of Engineering Science subjects, less the 24 credit points of electives specified for that course. The remaining 144 credit points are made up of Bachelor of Laws subjects. Students may progress through the course taking subjects in any sequence provided prerequisites are met. The structure of the course, as taken by a typical student, is described below.

The course allows students to graduate with the separate degrees of Bachelor of Engineering 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 engineering component comprises 120 credit points of study consisting of the core subjects in the Bachelor of Engineering Science degree course and the field of practice subjects associated with the student's chosen engineering major.
3. On completion of the engineering component as set out in 2 above, a student who has also completed at least 24 credit points of law subjects approved by the Faculty of Law will be eligible for the award of Bachelor of Engineering Science.
4. A student who qualifies for the award of Bachelor of Engineering 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.

Course diagram



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

Field of practice subjects are detailed under the relevant major's standard program table (see page 50 and following).

Course program

Stage 1 – Autumn semester

70113	Legal Process and History	10cp
70105	Legal Research	4cp
33130	Mathematical Modelling 1	6cp
68037	Physical Modelling	6cp

Stage 2 – Spring semester

70217	Criminal Law	6cp
70211	Law of Contract	8cp
48210	Engineering for Sustainability	6cp
48221	Informatics VB	6cp

Stage 3 – Autumn semester

70311	Law of Tort	8cp
70616	Federal Constitutional Law	8cp
48230	Engineering Communication	6cp
xxxxx	Engineering major subject	6cp

Stage 4 – Spring semester

70318	Personal Property	4cp
70317	Real Property	8cp
33230	Mathematical Modelling 2	6cp
xxxxx	Engineering major subject	6cp

Stage 5 – Autumn semester

70417	Corporate Law	8cp
70617	Administrative Law	8cp
48240	Uncertainties and Risks in Engineering	6cp
xxxxx	Engineering major subject	6cp

Stage 6 – Spring semester

70516	Equity and Trusts	8cp
76xxx	Law elective	6cp
xxxxx	Engineering major subject	12cp

Stage 7 – Autumn semester

71216	Law of Evidence	6cp
71005	Practice and Procedure	4cp
xxxxx	Engineering major subject	12cp

Stage 8 – Spring semester

71116	Remedies	6cp
76xxx	Law elective	6cp
48250	Engineering Economics and Finance	6cp
xxxxx	Engineering major subject	6cp

Stage 9 – Autumn semester

76xxx	Law elective	6cp
76xxx	Law elective	6cp
xxxxx	Engineering major subject	12cp

Stage 10 – Spring semester

	Practical Legal Training (PLT)	24cp
	or	
	Four Law electives	24cp

Stage 11 – Autumn semester

xxxxx	Engineering major subject	12cp

Professional recognition

Law component

Students completing the Bachelor of Laws and the Professional Program will be able to apply for admission as either solicitors or barristers of the Supreme Court of New South Wales.

Engineering component

The Bachelor of Engineering Science meets the requirements of the Institution of Engineers, Australia for recognition as a professional technologist. Students wishing to obtain full recognition as graduate professional engineers have the option of completing a Bachelor of Engineering in place of the Bachelor of Engineering Science with an additional one year of study.

INTERNATIONAL EXCHANGE PROGRAMS

Engineering is an international profession. Most practice standards are now international, and draw upon international experience. Australian engineering projects depend on products and services sourced overseas, and Australian products and services depend on overseas markets. Most of the major issues facing engineers, and the socioeconomic issues to which engineering can contribute, are global or regional in character. Any person commencing an engineering career in Australia today can expect major involvement with overseas engineering, and is likely to practice overseas at some time. Early international experience is an important formative influence, and an excellent investment, for any aspiring engineer.

All UTS Engineering students have the opportunity to study and work overseas, by participating in the Faculty's Student Exchange program, and are strongly encouraged to do so. Subject to conditions, students gain full academic credit for studies completed at an overseas university, and may obtain overseas work experience which satisfies UTS engineering course requirements.

The Student Exchange program operates between the Faculty of Engineering and many overseas universities, including:

- California State University, Sacramento, USA
- Chonnam National University, Korea
- Halmstad University, Sweden
- Huazhong University of Science and Technology, China
- Institut National des Sciences Appliquées de Lyon, France
- Institut National des Sciences Appliquées de Toulouse, France
- Institut Teknologi Bandung, Indonesia
- King Mongkut's Institute of Technology, Thonburi, Thailand
- Kungl Tekniska Högskolan (Royal Institute of Technology), Sweden
- Kyushu Institute of Technology, Japan
- Mikkeli Polytechnic, Finland
- Nanyang Technological University, Singapore
- Pontífica Universidad Católica de Chile
- The Technical University of Budapest, Hungary
- Tongji University, Shanghai, China
- The Swiss School of Engineering for the Timber Industry, Switzerland
- The University of Electro-Communications, Tokyo, Japan
- University of Waterloo, Canada.

Students participating in the Exchange program are exempt from paying tuition fees at the host university, but are required to pay the usual UTS fees (such as Union fees) and Australian HECS. They are also required to arrange appropriate general and health insurances, and to meet their own living and travel costs. Some overseas universities can arrange accommodation at attractive rates, and students can often obtain paid work experience which meets UTS degree requirements and helps defray living costs.

Some universities require participating students to develop foreign language skills prior to departure from Australia. The Institute for International Studies offers one-semester electives in language studies, and in the study of contemporary societies in parts of the non-English-speaking world (see below). Students may be able to credit one or more of these electives towards their engineering degree.

Each university participating in the Student Exchange program has particular strengths. Selection of a particular university requires careful consideration and planning well in advance. Faculty staff can provide advice about student exchange opportunities and about ways to develop appropriate language skills and cultural awareness. For further information students should contact the Undergraduate and Postgraduate Office on (02) 9514 2666.

Further opportunities, and additional university partnerships, are available to selected students through the combined award of Bachelor of Engineering, Bachelor of Arts in International Studies, Diploma in Engineering Practice.

In addition to these formal programs, international opportunities are continually arising, and are often initiated by students themselves. The Faculty is willing to recognise and facilitate any arrangement consistent with its objectives. Any student wishing to propose or explore such opportunities should contact the Director, International Engineering Program.

INTERNATIONAL STUDIES ELECTIVES

The UTS Institute for International Studies 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 8 credit points.

Language studies

Students wishing to take language studies as a credited part of their degree are required to enrol through the Institute for International Studies.

Contemporary society

The Institute also offers a number of subjects providing an introduction to the contemporary societies, politics, economics and culture of the countries of South-East Asia, Latin America and Europe. Subjects on China, Japan, South-East Asia, Latin America and Europe are available. There are no prerequisites for any of these Contemporary Society subjects, which are taught in English. These subjects are only offered in the Spring semester.

Other information

Further information is available from the 2002 handbook for the Institute for International Studies, or through the Faculty's Director, International Engineering Program. International Studies subject descriptions are available at the back of this handbook.

POSTGRADUATE COURSES

THE FACULTY OF ENGINEERING

The Faculty of Engineering at UTS offers postgraduate coursework and research programs that maintain UTS Engineering as an international node providing a wide range of professional development opportunities to engineers and other graduates. In fulfilling these responsibilities, the Faculty draws on its close links with industry to offer distinctive programs which are highly regarded by engineering-dependent enterprises.

In 2001, approximately 74 research students and 597 coursework students were enrolled in the Postgraduate Program.

Details of all postgraduate courses are provided in this handbook. Information is given on the objectives, structure, content and duration of the courses, together with admission requirements and rules governing progression. Information is also provided on teaching and supervisory staff.

Postgraduate award courses may be taken by coursework or research. The Faculty supports research, through its management of postgraduate research, encouragement of individual researchers and research teams, facilitation of interdisciplinary research, and sponsorship of visits to UTS Engineering by internationally renowned experts.

In addition to award courses, the Faculty provides opportunities for continuing professional development through studies undertaken on a non-award basis.

The following information is intended to assist postgraduates to plan and complete their studies within the Faculty of Engineering. Additional information produced by the Faculty can be obtained on the Internet and from other publications, or by direct inquiry. Inquiries relating to postgraduate studies within the Faculty are always welcome.

Staff

The Undergraduate and Postgraduate Office (UPO) provides a first point of contact for inquiries from current and prospective students, together with a range of services relating to undergraduate and postgraduate program management.

telephone (02) 9514 2666
fax (02) 9514 2611
email upo@eng.uts.edu.au

For more information on UPO, see page 28.

All inquiries, except for courses in Groundwater Management, should be made through the UPO.

For courses in Groundwater Management, contact

Professor Michael Knight
CB01.17.15
telephone (02) 9514 1984
fax (02) 9514 1985
email groundwater.management@uts.edu.au

http://groundwater.ncgm.uts.edu.au/ncgm

Director, Postgraduate Coursework Program
Associate Professor Tom Anderson
telephone (02) 9514 2639
fax (02) 9514 2549
email tom.anderson@uts.edu.au

Manager, Postgraduate Coursework Programs
Ms Beate Buckenmaier
telephone (02) 9514 2590
fax (02) 9514 2549
email beate.buckenmaier@uts.edu.au

For a list of program coordinators and their contact details, see page 82.

RESEARCH PROGRAMS AND CENTRES

The Faculty of Engineering at UTS has a lively and cutting-edge research culture driving advances in engineering technology, practice and education. Our research is needs-driven and collaborative and we work with many enterprises in business partnerships. Our researchers are world-class and recognised leaders in their fields, responsible for delivering new, better and more cost-effective solutions to complex engineering challenges.

Faculty research is varied and utilises modern laboratories and research facilities on the City

Postgraduate coursework programs	Coordinators	Location	Telephone
Computer Control Engineering	Professor H T Nguyen	CB01.24.29	2451
Energy Planning and Policy	Associate Professor D Sharma	CB02.5.21	2422
Engineering Management	Associate Professor T Anderson	CB02.7.088	2639
Environmental Engineering	Dr P Hazelton	CB02.5.12	2661
Graduate Project Special Course and Foundation Subjects	Dr H Akpolat	CB02.7.070	2628
Groundwater Management	Professor M Knight	CB01.17.15	2692
Information Systems Engineering	Associate Professor D Lowe	CB02.7.100	2526
Local Government Engineering	Mr K J Halstead	CB02.5.22	2640
Local Government Management	Mr Rob Mellor	CB01.17.14	2595
Manufacturing Engineering and Management	Dr G Hong	CB02.6.19	2677
Software and Information Systems Engineering	tba	tba	tba
Software Engineering	tba	tba	tba
Structural Engineering	Professor B Samali	CB02.5.11B	2023
Telecommunications Engineering	Professor R Braun	CB01.24.24	2460
Telecommunications Networks	Professor R Braun	CB01.24.24	2460
Water Engineering	Dr S Beecham	CB02.5.07	2623

For a major in Computer Systems Engineering, contact Associate Professor David Lowe or Mr John Leaney on the numbers shown above.

campus, Broadway. These are supported by extensive computing facilities and library services. The laboratories have excellent back-up workshops and expert support staff. Many opportunities exist for professional development through challenging, well-resourced research programs.

Research profile

The Faculty has a number of key research areas and strengths. These include:

- Key University research strength in Managing Waste and Water in Local Communities
- Key University research strength in New Technologies for Developing and Sustaining Physical Infrastructure
- Key University research strength in Health Technologies
- Australian Cooperative Research Centre for Renewable Energy
- Cooperative Research Centre for Satellite Systems
- Centre for Electrical Machines and Power Electronics
- Centre for Built Infrastructure Research
- National Centre for Groundwater Management
- Centre for Local Government Education and Research
- Australian Graduate School of Engineering Innovation
- Faculty designated research strength in Intelligent Transport Systems
- Faculty designated research strength in Wireless Communications.

In addition to the above strengths, many of the Faculty's research capabilities are interdisciplinary in nature, spanning:

- engineering innovation
- engineering management
- environmental management
- biomedical engineering
- hypermedia information systems
- software engineering
- risk analysis and management
- systems engineering
- asset management
- regional development technology
- engineering communications and documentation, and
- engineering education and practice.

Collaborative research

The Faculty's researchers work with private and public companies to achieve their strategic objectives in engineering research and development. These collaborative programs

tend to be long-term and offer mutually beneficial outcomes, with the economic, business, social and environmental dimensions of engineering being addressed explicitly. Most collaborative research is supported by sponsorships or grants.

Research opportunities

Research opportunities encompass the following areas of specialisation:

Civil and Structural Engineering: engineering materials, water engineering, public health engineering, environmental risk assessment, local government engineering, structural analysis and design, timber engineering, prestressed and reinforced concrete, steel structures, construction and project management, FEM and computer applications, concrete technology, regional planning, road and transportation engineering, stormwater management, structural dynamics, motion and vibration control, wind and earthquake engineering.

Computer Systems Engineering: information theory applied to position-fixing systems, multimedia/hypermedia systems, software engineering, image processing, embedded computer systems.

Electrical Engineering: electrical machines and industrial drives, numerical analysis of electromagnetic fields, magnetic components in power electronic systems, magnetic testing, power electronics, instrumentation and data acquisition systems, micro-hydroelectric control and instrumentation, power systems analysis, adaptive multi-variable control, speech and image coding, multimedia/hypermedia, robotics, neuro-fuzzy systems.

Engineering practice and management: research generic to engineering as a discipline including engineering innovation, environmental engineering, biomedical engineering, energy planning and policy, telecommunications planning and policy, risk-analysis and management, systems engineering, socio-technical systems, asset management, sustainable design, regional development technology, engineering communication and engineering documentation; international and Australian practice and engineering ethics. Candidates who wish to pursue research in engineering management in association with their professional (workplace) responsibilities can often be accommodated.

Environmental Engineering: solid–liquid separation techniques for water and wastewater treatment, fundamental and applied research related to using new chemicals in removing specific pollutants such as organics and herbicides, development of new and compact hybrid systems for water and wastewater treatment, membrane technology, solid waste and sludge management, green waste recycling, domestic wastewater treatment systems, specific industrial wastewater treatment, hazardous waste treatability, characterisation of specific soils in engineering context, neutralisation of acid sulphate soils and environmental risk assessment.

Mechanical Engineering: advanced mechanical design, airconditioning and refrigeration, kinematics and dynamics, energy conservation, control engineering, computational and experimental fluid dynamics and turbomachinery, slurry flows, heat transfer, machine tools, computer-integrated manufacturing, computer-aided engineering robotics, experimental and finite element stress analysis, internal combustion engines and alternative fuels, product and process development, occupational health and safety.

Telecommunications Engineering: image processing, intelligent networks, ATM networks, protocol engineering, digital transmission, teletraffic engineering, multiple access schemes, spread spectrum communication, neural networks, speech and image coding, microwave processing of materials, microwave circuit design, antennas, mobile communications, EM wave propagation, microwave applications in medicine, satellite communications, digital signal processing, adaptive signal processing in communications, electromagnetic interference, human visual perception, signal compression, signal processing for environmental imaging, data fusion.

Research management

Research management within the Faculty is coordinated through two committees.

The Faculty **Research Degrees Committee** is responsible, under delegations from the Faculty Board in Engineering, for recommendations relating to the admission, progression and examination of research degree candidates, together with the development of policies and practices across the Faculty to assist candidates and enhance outcomes.

The **Research Management Committee** is responsible for enhancing research outcomes in the Faculty. It has responsibility (inter alia) for developing, implementing and maintaining the Faculty's Research Management Plan, including program allocations and infrastructure development funded by the Faculty; the collection and dissemination of research information; and the promotion of research partnerships with industry and other bodies.

Research centres and Key University Research Strengths

The Faculty of Engineering supports several centres, and has numerous key strengths in engineering and other related fields. These include:

Australian Cooperative Research Centre for Renewable Energy

The Australian Cooperative Research Centre for Renewable Energy (ACRE) seeks to create an internationally competitive renewable energy industry. ACRE brings together excellent research capabilities and market knowledge into a world class centre for innovation and for the commercialisation of renewable energy systems.

Inquiries may be made to:

Associate Professor Joe Zhu
Director, Academic Programs, CEMPE
Faculty of Engineering
CB01.18.28
telephone (+61 2) 9514 2318
fax (+61 2) 9514 2435
email joe.zhu@uts.edu.au

www.phys.murdoch.edu.au/acre/

Australian Graduate School of Engineering Innovation

The Australian Graduate School of Engineering Innovation (AGSEI) was formed jointly by UTS, the University of Sydney and a number of industry partners in 1992. AGSEI's establishment has been funded in part by the Commonwealth Government's Advanced Engineering Centres scheme, under policies intended to 'increase higher education's contribution to Australia's design and engineering capacities and to assist in the development of internationally competitive, value-added industries'.

AGSEI's purpose is to help Australian enterprises build wealth-creating capability by combining the best of engineering and management into an effective culture of innovation. Its structure provides a basis for industry–university educational partnerships.

AGSEI offers modular course programs, multidisciplinary in nature and strongly interactive with industry. These are of interest to professionals in all sectors and from a range of disciplines, including engineering. Initially at least, programs are being directed at the experienced professional levels.

AGSEI builds specifically on the capability of engineers, and focuses on the organisation and application of engineering effort to innovation and business performance. Its programs cover topics central to the process of engineering such as product and process innovation, strategic planning, technology management, project management, system and concurrent engineering, quality management, design, information engineering, computer-aided engineering, logistics engineering, human resources and change management, communication, professional and business ethics, manufacturing, project financing, risk management, integrated marketing, contract management, engineering economics, and legal and government interfaces.

Participants may aggregate course modules towards the award of the Master of Engineering Practice and other postgraduate awards through the Faculty of Engineering and other faculties of UTS.

Inquiries may be made to:

Professor Vernon Ireland
AGSEI Ltd, Australian Technology Park
Cornwallis Street, Eveleigh
(PO Box 1686, Strawberry Hills, NSW 2012)
telephone (+61 2) 9209 4111
fax: (+61 2) 9319 3088
email v.ireland@agsei.usyd.edu.au

www.usyd.edu.au/su/agsei/

Centre for Built Infrastructure Research and Key University Research Strength in New Technologies for Developing and Sustaining Physical Infrastructure

The Centre for Built Infrastructure Research (CBIR), encompasses multidisciplinary researchers from the Faculties of Engineering; Science; and Design, Architecture and Building. It aims to develop new technologies to enhance the quality and performance of new infrastructure and to underpin cost-effective strategies for the maintenance and rehabilitation of exiting infrastructure. The Centre currently focuses on collaborative

research with industry in areas which include the application of new advanced materials in construction; assessment, maintenance and remediation of structural performance; minimisation of hazard resulting from earthquake, wind or wave action; the assessment and health monitoring of timber bridges; and use of renewable materials and recycled construction and demolition materials. It is located at the Australian Technology Park, Eveleigh. Directors: Professor Steve Bakoss and Professor Bijan Samali.

Inquiries may be made to:

Professor Bijan Samali
CB02.5.11B
telephone (+61 2) 9514 2023
fax (+61 2) 9514 2633
email bijan.samali@uts.edu.au

www.cbir.uts.edu.au

Centre for Local Government Education and Research

The Centre has links with several faculties – especially Business and Engineering. Research areas relating to local government include: environmental management (development, planning and assessment); strategic planning and management; community governance and local government training.

Inquiries may be made to:

Associate Professor Graham Sansom
Centre Director
CB01.17.14
telephone (+61 2) 9514 1689
fax (+61 2) 9514 2274
email graham.sansom@uts.edu.au

www.clg.uts.edu.au/

Centre for Materials Technology

The Centre for Materials Technology is operated jointly with the Faculty of Science. Research topics relating to engineering include: development, characterisation and applications of advanced materials, including composites; materials processing; industrial applications of microwave energy; new carbons and cements.

Inquiries may be made to:

Professor Geoff Smith
Centre Director
CB01.12.30
telephone (+61 2) 9514 2224
fax (+61 2) 9514 2219
email gbs@phys.uts.edu.au

Cooperative Research Centre for Satellite Systems

The Cooperative Research Centre for Satellite Systems (CRCSS) was established in 1997 to design and build robust and innovative satellite systems and has a budget of $56 million over seven years, including contributions from research and industry participants. Participants in the CRCSS include UTS, the CSIRO, University of South Australia, La Trobe University, Queensland University of Technology, University of Newcastle, Auspace Limited, VIPAC Scientists and Engineers Pty Ltd, Curtin University of Technology, the Defence Science and Technology Organisation, the ARIES Consortium, D-Space Ltd, Optus Communications, and Kodak Ltd.

As a core member of the CRCSS, UTS is represented on the management board for the program. UTS is part of the telecommunications group of the CRCSS with the specific role to design and develop Ka band microwave earth stations to be used with the Federation Satellite One (Fedsat-1). Fedsat-1 will be a low cost micro-satellite, conducting telecommunication, space physics, remote sensing and engineering experiments. The Ka band is a new commercial band in the higher end of microwave spectrum being utilised by a number of low earth orbit satellite business ventures for global direct satellite access to the Internet and Internet-based services. The Ka band is 30 Gigahertz on the uplink from earth to the satellite and 20 Gigahertz from the satellite to the earth station. The two frequencies are used to separate received signals from transmitted signals. Using the Ka band requires the development of new communication techniques, and subsystems.

Inquiries may be made to:

Associate Professor Sam Reisenfeld
Director, UTS CRCSS Program
Faculty of Engineering
CB01.25.12
telephone (+61 2) 9514 2448
fax (+61 2) 9514 2435
email sam.reisenfeld@uts.edu.au

Dr Ananda Mohan Sanagavarapu
Telecom Group, Faculty of Engineering
University of Technology, Sydney
CB01.25.12A
telephone (+61 2) 9514 2447
fax (+61 2) 9514 2435
email ananda@eng.uts.edu.au

www.eng.uts.edu.au/crcss
or
www.cress.csiro.au

Faculty Research Strength in Wireless Communication

The increasing demand for data communications has led to an explosion of applications which exploit wireless transmission. The Wireless Communications group is in a position to take advantage of this through continuing applied research in the area. We have a strong ongoing project (CRC Satellite Systems), involving satellite transmission of Ka band, and there is research in the area of 'smart' antennas, the development of microwave electronics, and at a higher level, video delivery over the Internet.

Inquiries may be made to:

Associate Professor Robin Braun
Faculty of Engineering
telephone (+61 2) 9514 2460
fax (+61 2) 9514 2435
email robin.braun@eng.uts.edu.au

www.eng.uts.edu.au

Institute for Coastal Resource Management

Inquiries should be made directly to the Faculty of Science.

Key Faculty Research Strength in Intelligent Transport Systems

The research plan has three key research beacons focused on the goal of developing technologies for Integrated Traveller Services and Control Systems. The beacons, Integrated Positioning/Communications Systems, Advanced Traveller Services, and Integrated Traffic and Transit Management Systems, represent areas of endeavour where members of the group have already made significant contributions and formed strategic relationships.

Inquiries may be made to:

Professor Chris Drane
Faculty of Engineering
telephone (+61 2) 9514 2390
fax (+61 2) 9514 2381
email cdrane@eng.uts.edu.au

www.sinta.uts.edu.au/its/

Key University Research Strength in Health Technologies

Continued advances in health care and quality of life in the future will come from new knowledge and innovative scientific/technological breakthroughs. Our research team, which forms a joint faculty designated research strength from the Faculties of Engineering and Science, has an extensive national and international reputation in the field of health technology with more than $6 million in competitive research funding over the last five years. This group brings together complementary interdisciplinary research skills unique in Australia in the development of revolutionary devices and novel systems for health technology applications.

Based on several significant devices which have already been developed by the Core Group (the Mind Switch, the Non-Invasive Hypoglycaemia Monitor), and numerous novel systems (membrane electrophysiology, dry electrodes, fatigue monitoring, diabetic complication predictive techniques, and fusion of tomology images), a new and ambitious program has been developed to enhance our capacity to deal with major illnesses in terms of effective prediction, diagnosis and rehabilitation. The focus of the group is on the study of health and disease processes, and the development of new devices and advanced techniques for the prediction, diagnosis and rehabilitation of lifestyle diseases such as cardiovascular disease, diabetes mellitus, neurologial disorder and cancer.

Inquiries may be made to:

Professor Hung Nguyen
Faculty of Engineering
telephone (+61 2) 9514 2451
fax (+61 2) 9514 2435
email htn@eng.uts.edu.au
www.eng.uts.edu.au/~htn

Professor Ashley Craig
Faculty of Science
telephone (+61 2) 9514 1358
fax (+61 2) 9514 1359
email a.craig@uts.edu.au

Health Technologies website:
www.eng.uts.edu.au/~htn/health.html

Key University Strength in Managing Waste and Water in Local Communities

The UTS managing waste and water in local communities group brings together researchers from the UTS Faculties of Engineering and Science and from the Centre for Local Government to work on research aimed at encouraging the community to take responsibility for their own waste and water management.

The group research concentrates on the application of new technologies and social policy to conserve, optimise and wisely manage waste and water in local communities. Three critical areas are being addressed:

1. water conservation and localised effluent treatment, storage and reuse
2. waste management and minimisation, and
3. optimisation of land-based waste management in the local community.

Inquiries may be made to:

Professor Vigi Vigneswaran
Faculty of Engineering
telephone (+61 2) 9514 2641
fax (+61 2) 9514 2633
email s.vigneswaran@uts.edu.au

www.uts.edu.au/research/wastestrength.html

National Centre for Groundwater Management

The National Centre for Groundwater Management is operated jointly with the Faculty of Science. Research areas include: contaminated land evaluation and rehabilitation; groundwater quality management strategies for industrial, agricultural and urban use; contaminant transport and water resource modelling; optimisation; groundwater geophysics and remote sensing; and hydraulic modelling, with applications such as irrigation management.

Inquiries may be made to:

Professor Michael Knight
Centre Director
CB01.17.15
telephone (+61 2) 9514 1984
fax (+61 2) 9514 1985
email
groundwater.management@uts.edu.au

http://groundwater.ncgm.uts.edu.au/ncgm/

University Centre for Electrical Machines and Power Electronics

This centre is principally concerned with electrical variable speed drives and generation of electricity using rotating electrical machines and renewable sources (wind, hydro). The technical research disciplines necessary for these two areas are very similar, covering electrical machines design, power electronics, and mechanical design. The interest in renewable energy generation is primarily for remote areas and developing countries, so the incorporation of expertise in design for such areas is valuable, with the inclusion of technology transfer and human management issues. Research topics cover:

- new models for analysis and design (electrical, thermal, mechanical)
- new control techniques (new theories and computer processors)
- new practical designs for commercialisation (new materials and components), and
- new processes relevant to remote areas and developing nations (local organisations, high reliability).

Major interdisciplinary projects include:

- 2.5–20kW electric generators and controllers for wind turbines for remote area power supplies
- 40kW hydroelectric scheme for Solomon Islands
- very low-cost, efficient variable-speed drive for small fan motors
- implantable rotary blood pump with integrated motor, impeller and bearings
- brushless, doubly-fed, twin-stator drive for large fans and pumps, and
- 40kW brushless motor controllers and battery chargers for 105-seat hybrid electric ferry.

Inquiries may be made to:

Associate Professor Joe Zhu
Director, Academic Programs, CEMPE
Faculty of Engineering
CB01.24.28
telephone (+61 2) 9514 2318
fax (+61 2) 9514 2435
email joe.zhu@uts.edu.au

www.eng.uts.edu.au/~joe/

CONTINUING PROFESSIONAL EDUCATION

Most subjects offered through the Faculty of Engineering are available in single-subject mode, class sizes permitting, with their successful conclusion creating the possibility of advanced standing credit under existing Faculty policies.

All enrolments on this non-award basis incur full-cost recovery fees, currently $220 per credit point for the majority of postgraduate subjects.

In addition, in-house short courses, seminars, workshops and other professional development programs are offered from time to time, frequently in response to corporate invitations

or opportunities arising from visits by international experts.

Engineers and others requiring further information on continuing professional opportunities through the Faculty of Engineering are invited to contact the Undergraduate and Postgraduate Office at any time.

INFORMATION FOR STUDENTS

The following information is only an outline. Additional information is provided to all students upon enrolment.

Admission requirements

Intending postgraduate students must lodge an application for admission by the due date (where appropriate). Separate application forms are available for:

- Postgraduate coursework awards (Graduate Certificates, Graduate Diploma in Groundwater Management and Master's degrees by Coursework)
- Master's degrees by Thesis
- Doctoral degree programs.

Research degrees

In general, applications for most Doctoral and Master's by Thesis programs are accepted between October and December each year for commencement at the beginning of the following year.

There are, however, mid-year intake opportunities depending on available places.

For applications completed in accordance with University and Faculty instructions, a decision should be expected within six weeks. However, failure of applicants to supply all the required information may extend decision processes considerably.

Applicants are advised to apply well in advance following discussion of research possibilities with potential supervisors. Refer also to the detailed information on these courses in the following pages.

Coursework degrees

UTS application forms for coursework awards may be requested (by phone, mail or in person) from the Undergraduate and Postgraduate Office and from the UTS Student Info & Admin Centre.

Admission to courses is competitive and applicants are advised to exercise care in completing the application form. The offer of a place is determined principally on the basis of information supplied in the application.

Applications must be submitted to UTS Student Info & Admin Centre. Refer to page 7 of this handbook for contact details.

Enrolment

Enrolment for postgraduate programs involving coursework takes place in February for Autumn semester, and in July for Spring semester. Complete enrolment details are forwarded to successful applicants. Enrolment must be in person.

Students from outside the Sydney basin may complete formal enrolment procedures by mail.

Enrolment for Doctoral and Master's by thesis degrees, for those who do not apply in the normal admission period, is arranged through the University Graduate School.

Deferral of enrolment

Deferral of enrolment is not allowed for graduate courses.

Late applications

Applications may be accepted for some postgraduate courses after the closing date. Applicants should contact the UTS Student Info & Admin Centre to check which courses are still open.

The following conditions apply to all late applicants:

1. subject to availability of class places, late applicants will be considered for offers only after on-time applications have been considered
2. the nominal closing date for late applications is 31 January or 30 June 2002. However, the University reserves the right to close late applications at any time for any course without prior notice.

English proficiency

Applicants whose tertiary education was conducted in a language other than English are required to demonstrate proficiency in the English language. The most effective way of doing this is by obtaining a satisfactory result in a recognised English test.

UTS accepts the results from the following tests:

- the **IELTS (International English Language Testing System) test**: an international test of English that is offered through Australian Education Centres and British Council Offices overseas. The IELTS test is available in Australia in all capital cities and many regional centres. For further information on IELTS, contact UTS International Programs – refer to page 7 of this handbook for contact details.

  A satisfactory result on the IELTS test is a minimum overall band score of 6.5 with a minimum of 6.0 in the writing section.
- UTS also accepts the **CULT** and **TOEFL** test.

An application for admission is not considered until proficiency in English has been demonstrated. For further information, contact UTS International Programs or the UTS Student Info & Admin Centre.

Documentation

Original documentation or a certified copy is required to support all applications. Failure to submit required documentation may delay or even jeopardise an applicant's admission to a course. Details of the documentation required are given on the application form. Applicants who are uncertain of the documentation required should contact the UTS Student Info & Admin Centre.

Applicants with overseas qualifications are advised to contact the UTS Student Info & Admin Centre to determine whether their qualifications lie within the University's assessment guidelines.

Those applicants who are subsequently advised that their qualifications lie outside the guidelines may contact the following body to request an educational assessment of their qualifications:

National Office of Overseas Skills Recognition (NOOSR)
PO Box 1407, Canberra, ACT 2601
telephone 1800 02 0086

As the processing of a NOOSR assessment may take some weeks, applicants are advised to contact the UTS Student Info & Admin Centre well before the 2002 closing date for assessment advice.

All applicants submitting documentation for assessment are encouraged to apply well in advance of the course closing date. Applicants who are applying for admission solely on the basis of professional qualifications and/or relevant experience are particularly encouraged to make an early application, as it is often necessary to interview such applicants.

Result of application

Applicants who apply by the appropriate closing dates (31 October / 31 May) will normally be advised within four weeks of receipt of their application.

Fees

Service fees

All students are required to pay compulsory student service fees. For further information, see page 9 of this handbook.

Course fees

In addition to the student service fees, most Australian-resident students are required to contribute towards the cost of their postgraduate education, either through the Higher Education Contribution Scheme (HECS) or through the payment of postgraduate course fees. Research students who qualify for a Research Training Scheme Place (see below) are exempt from postgraduate course fees.

Students admitted to the Faculty of Engineering in 2002 will be required to pay course fees according to a schedule which will be available late in 2001. The schedule will be provided on inquiry by the Faculty of Engineering or the UTS Student Info & Admin Centre. Full information on fees is included with the application form and with offers of admission.

The basis for calculating postgraduate course fees is EFTSU (equivalent full-time student units). For candidates in degrees by coursework, each subject has a credit point rating and 1.0 EFTSU = 48 credit points (cp); this represents a full study load for one year. The majority of postgraduate subjects in Engineering are rated at 6cp, so full-time attendance typically involves four subjects per semester. The fee schedule shows, for each course, the fee per EFTSU, per credit point, and for the course overall. Fees for individual subjects are pro rata with their credit point ratings.

As a guide, typical semester fees in 2001 for both full-time and part-time attendance were calculated on a schedule fee of $200 per credit point of study undertaken. Certain specialist courses carry higher fee rates.

Students may be able to claim payment of course fees as a tax deduction, and should contact the Australian Taxation Office to discuss their specific situation.

Fee-paying overseas applicants

Students from countries outside Australia are able to enrol in full-time postgraduate programs on a fee-paying basis. Fees for courses offered to fee-paying overseas students in 2002 will be in the order of A$15,000 per annum, depending on the course. For further information on fee arrangements for overseas students, contact the International Programs Office.

Scholarships

Postgraduate Equity Scholarships

The University offers a limited number of Postgraduate Equity Scholarships each year to students enrolled in postgraduate fee paying courses. A Postgraduate Equity Scholarship allows the student to complete an entire course as a HECS payer with a choice of up-front, partial up-front or deferred payment options. Students must complete the 'Application for Equity Scholarship' form available from the UTS Student Info & Admin Centre, or the Faculty of Engineering. Note also that exemption is from the course fee only, not from student service fees.

Scholarships/support places

A limited number of scholarships/support places are available to support full-time study in Master's by research and Doctoral programs.

There are two types of support available:

1. **Research Training Scheme Place (RTSP)** Most research higher degree students receive an RTSP whereby there is a waiver of course fees (student service fees must still be paid). The numbers of RTSPs vary from semester to semester. They are allocated competitively if there are more applicants than places available.
2. **Scholarships with Stipend (APA, UTS Doctoral and R L Werner scholarships)** These scholarships are only offered once a year for commencement in Autumn semester (they are not offered mid-year).

Applications open 1 August and close 31 October each year. Scholarships with Stipend provide periodical payments (Stipend) to the student and a waiver of course fees (student service fees must still be paid).

For more information refer to the UTS Graduate School website:

www.gradschool.uts.edu.au

Advanced standing

Advanced standing is granted in accordance with the University rules described in the *UTS: Calendar 2002*. Exemptions from subjects may be granted on the basis of the successful recent completion of equivalent postgraduate level subjects, 'challenge' or recognition of prior learning.

Exemptions from subjects are not normally granted for subjects completed as part of another award completed in the Faculty of Engineering **at the same level**.

Applications for advanced standing on the basis of postgraduate subjects can be made at any time on the standard UTS Subject Exemption form and submitted to the Undergraduate and Postgraduate Office, together with supporting documentation including relevant subject syllabi.

Advice is given at enrolment upon request, but approval cannot be guaranteed at that time. Students are advised to seek advanced standing advice prior to enrolment if possible.

Attendance

The Academic Year of the University for 2002 is divided into two main semesters:

- Autumn: 4 March – 14 June
- Spring: 29 July – 8 November

All courses have their major intake in March, at the beginning of the academic year. However, mid-year entrance is possible in all courses and places are available in the second semester beginning in July. Potential mid-year applicants should contact the Undergraduate and Postgraduate Office in April for initial advice.

Research candidates may commence their studies at any time during the year.

Attendance patterns and academic credit

Attendance patterns for postgraduate coursework degrees in any year vary with the choice of subjects; normally, full-time or part-time attendance can be offered. Most subjects are offered in the evening. In some cases, however, it is necessary for part-time students to attend the University one afternoon a week or for blocks of attendance at other times.

Class attendance requirements vary with the courses. For many subjects, attendance during one semester at a weekly two or three-hour session is the standard requirement. Where appropriate, postgraduate subjects are also

offered on a block attendance or intensive short course basis or in distance mode.

Subjects offered in a block mode require attendance at the University for a block of full-day study (usually one-and-a-half days) on a small number of occasions (usually three) during the semester. The interval between blocks allows time for self-directed study and application work.

Subjects offered in distance mode normally require no attendance at the University except for attendance at formal examinations. For students who live outside the Sydney basin, examinations are arranged at an official centre near their home/work. Contact with lecturers is by email, fax or telephone.

Each subject, including research and project subjects not requiring regular class attendance, has a credit point rating denoting its academic value towards the award.

Course duration

PhD degrees are normally a minimum of two years' duration on a full-time basis and three years' duration on a part-time basis if the candidate holds a Master's degree by research, or three years full-time, and four years part-time for candidates with a Bachelor's degree or a Master's degree by pure coursework.

Master's degrees by research and thesis are normally a minimum of three semesters' duration on a full-time basis, or five semesters on a part-time basis. In some cases, a student with appropriate advanced study and/or relevant work experience may be permitted to complete the degree in a shorter time.

Master's degrees by coursework are normally of two or three semesters' duration on a full-time basis, or four to six semesters part-time. Some Master's degrees can be completed in one year (12 calendar months) by studying during the Summer semester (December – February). The Master of Engineering Management, the Master of Environmental Engineering Management and the Master of Engineering Studies can be completed in two semesters of full-time study.

Rules and regulations

Students are subject to the Rules prescribed by the University for the course in which they are enrolled, and to the general rules of the University which appear in the *UTS: Calendar* and online at:

www.uts.edu.au/div/publications/policies

Special note should be made of the Faculty's interpretation of the rules concerning unsatisfactory performance.

Unsatisfactory performance

A student enrolled for a coursework award who:

1. records two failures, or
2. over any period of two semesters, fails to meet any concurrent experience or other requirements prescribed for the degree, or
3. fails to meet any additional course requirements prescribed under Rule 3.2.5 or Rule 3.2.6, within the period set down at the time of admission,

will be required to show cause why registration should not be discontinued. The student must respond in writing, and the decision will be made by the relevant Committee of the Faculty of Engineering.

A student enrolled for a research degree who receives two unsatisfactory progress reports from his or her supervisors, or a PhD student who fails to satisfy the requirements of the Doctoral Assessment after a prescribed period of candidature (currently 12 months for a full-time student), will be required to show cause why registration should not be discontinued. The student must respond in writing, and the decision will be made by the relevant Committee of the Faculty of Engineering.

Leave of absence

Leave of absence is not normally granted to students who have not completed the requirements for at least one subject in their course. Leave of absence during candidature for one award is normally limited to a total period of two years. Application should be made on the appropriate Leave of Absence form.

RESEARCH DEGREES

The degrees of Doctor of Philosophy (PhD) and Master of Engineering (ME) by thesis are offered in areas of current research, through programs in the Faculty.

Doctor of Philosophy

- Course code: EP99
- Testamur title: Doctor of Philosophy
- Abbreviation: PhD
- Course fee: see note (local)
  $8,000 per semester (international)

Overview

The degree of Doctor of Philosophy (PhD) may be awarded to candidates who have completed an individual program of supervised research and submitted a thesis embodying the results of the work. The thesis must constitute a distinct contribution to knowledge, whether by original investigation or by review, criticism or design. A formal course of study or other work may also be prescribed.

The Faculty's overall policy is one of close interaction with industry and the profession, and of seeking to contribute directly to the advancement of Australian engineering practice. Consequently, research programs of an applied nature, and fundamental studies which involve a direct relationship with industry, are strongly encouraged. The greater proportion of research conducted by Faculty staff is supported by industry sources. There is a number of equally active programs of more basic research supported by granting agencies, and it is University policy to increase support from these sources.

Admission requirements

To qualify for admission to PhD candidature, applicants should hold a Bachelor of Engineering degree with Second Class Honours Division 1, or a Master of Engineering degree, from UTS or the former NSWIT; or must hold another qualification or meet other requirements deemed to be equivalent.

Note: Research degrees are offered on a sponsored, scholarship, faculty part-sponsored, or full-fee-paying basis. Students should contact the Faculty or the University Graduate School for further details. There are, however, student service fees to be paid (see Fees and costs, page 9).

Alternatively, an applicant may be permitted to register as a Master's degree student for the purpose of preparing for admission to Doctoral candidature, and may be permitted to transfer to Doctoral candidature upon satisfying prescribed requirements. Details are set out in the *UTS: Calendar 2002*.

Applicants for admission to research degree programs in Engineering should preferably have a minimum of two years' experience in employment related to the course or program they wish to undertake.

Applications

All applicants must complete an application form. The application must indicate the proposed research topic and the name of a member of academic staff with whom the topic has been discussed and who is willing to supervise the candidate's work, and should also include any evidence of ability to conduct research and to complete a substantial project.

For part-time candidature, the application must also include a statement from the applicant's employer, indicating the level of the employer's support for the application, and the time allocation of the candidate to the research project.

It is important that formal applications are lodged after the intending candidate has made suitable inquiries within the Faculty. This is necessary in order to clarify an appropriate research area and to ensure that supervision is available, together with any equipment and laboratory facilities that may be required. Applications which are not supported by an indication of the proposed research topic and the name of a prospective supervisor are not accepted.

Attendance

Doctoral degree candidature may be undertaken on a full-time or part-time basis. The work may be carried out either on University premises, at a site external to the University, or some combination of both.

Course duration

For full-time candidates, the program is normally of at least four semesters' duration for the holder of a Master's degree by research and six semesters for a holder of a Bachelor's degree or a Master's degree by coursework.

For part-time candidates, the program is normally of at least six semesters' duration

for the holder of a Master's degree by research and eight semesters for the holder of a Bachelor's degree or a Master's degree by coursework.

Assessment

For Doctoral students there is a formal assessment of their progress at the end of the first two semesters for both full-time and part-time candidates.

The Doctoral Assessment is conducted in accordance with University Rule 3.5.9.1.

The objectives of the assessment are to ensure that: the candidate has gained the prerequisite knowledge and skills to allow successful and timely completion of the proposed research program; and the candidate's progress is consistent with completion of the research program in the prescribed time and demonstrates potential to complete the work to doctoral standard. Candidates who, for any reason, are not equipped with requisites necessary to bring the proposed research program to a successful completion or have not demonstrated sufficient aptitude, are made aware of this assessment before they invest further time and money. Where it is proposed (at the candidate's instigation) that the nature or scope of the research program be changed significantly, there is continued commitment by the Faculty for provision of adequate human and physical resources, including proper supervision.

Other information

Initial inquiries regarding research areas may be made with the Associate Dean Research and Development, (+61 2) 9514 2686. Academic advice on research is also available from the members of:

Faculty Research Degrees Committee

Engineering Practice and Management

Professor Rod Belcher
Associate Dean Research and Development
CB02.5.11
telephone (+61 2) 9514 2423
fax (+61 2) 9514 2633
email rod.belcher@uts.edu.au

Civil and Structural Engineering

Professor Bijan Samali
CB02.5.11B
telephone (+61 2) 9514 2023
fax (+61 2) 9514 2633
email bijan.samali@uts.edu.au

Computer Systems Engineering

Dr Kit-Ka Fung
CB01.22.25
telephone (+61 2) 9514 2394
fax (+61 2) 9514 2435
email kkf@eng.uts.edu.au

Electrical Engineering

Associate Professor Joe Zhu
CB01.18.23
telephone (+61 2) 9514 2318
fax (+61 2) 9514 2435
email joe.zhu@uts.edu.au

Engineering Practice Management

Associate Professor Deepak Sharma
CB02.7.088
telephone (+61 2) 9514 2422
fax (+61 2) 9514 2633
email deepak.sharma@eng.uts.edu.au

Environmental Engineering

Dr Prasanthi Hagare
CB02.5.20
telephone (+61 2) 9514 1952
fax (+61 2) 9514 2633
email prasanthi.hagare@uts.edu.au

Mechanical and Manufacturing Engineering

Dr Guang Hong
CB02.6.19
telephone (+61 2) 9514 2677
fax (+61 2) 9514 2633
email guang.hong@uts.edu.au

Telecommunications Engineering

Dr Ananda Mohan Sanagavarapu
CB01.25.12A
telephone (+61 2) 9514 2447
fax (+61 2) 9514 2435
email ananda@eng.uts.edu.au

National Centre for Groundwater Management

The course code for PhDs in Groundwater Management is E055

Professor Michael Knight
CB01.17.15
telephone (+61 2) 9514 1984
fax (+61 2) 9514 1985
email groundwater.management@uts.edu.au

http://groundwater.ncgm.uts.edu.au/ncgm/

Most intending PhD candidates will be able to relate their research interest to one or more of the Faculty's existing research areas and they may contact the relevant researchers directly to discuss their application.

Inquiries about interdisciplinary topics should be directed, in the first instance, to the:

Administrative Officer, Research
Office of the Associate Dean
Research and Development
CB02.5.11
telephone (02) 9514 2686
fax (02) 9514 2633

Master of Engineering (by thesis)

- Course code: EP98
- Testamur title: Master of Engineering
- Abbreviation: ME
- Course fee: see note (local)
  $8,000 per semester (international)

Overview

The degree of Master of Engineering (by thesis) may be awarded to candidates who have completed an individual program of supervised work and submitted a thesis embodying the results. A formal course of study or other work may also be prescribed.

In keeping with the Faculty's overall policies, the accent is on applied research and development work, although basic research proposals are also welcomed and supported. Topics which involve close cooperation with industry are strongly encouraged, and a majority of current candidates are engaged in topics which are actively supported by their employers.

The degree has been established to provide practising engineers with an opportunity to pursue, in depth, the solution of an engineering problem which requires individual effort beyond the scope of a Bachelor's degree. The thesis must be a distinct contribution to knowledge in the area covered by the research. Its contents may report the results of an original investigation, review or criticise some aspect of engineering knowledge, or present an engineering design or solution involving the application of new or known techniques to an engineering problem of significance.

Note: Research degrees are offered on a sponsored, scholarship, faculty part-sponsored, or full-fee-paying basis. Students should contact the Faculty or the University Graduate School for further details. There are, however, student service fees to be paid (see Fees and costs, page 9).

Admission requirements

To qualify for admission to candidature for a Master's degree (by thesis), applicants must hold a Bachelor of Engineering degree from UTS or the former NSWIT, or another qualification deemed to be equivalent. In special circumstances, engineers who do not possess a degree or equivalent may be admitted to the program if they can provide evidence of

general and professional qualifications which will satisfy the UTS Graduate School Board that they possess the educational preparation and capacity to pursue postgraduate studies.

Applicants who do not meet the requirements for admission to candidature for Master's degree (by thesis) may be admitted as Master's qualifying students, for the purpose of preparing for candidature. Further details are given in the Rules relating to Master's Degree (by thesis) Students, set out in full in the *UTS: Calendar 2002* .

Attendance

Candidature may be on a full-time or part-time basis. The work may be carried out either using Faculty facilities, or in an industrial location.

Course duration

For full-time candidates, the program is normally of at least three semesters' duration from the time of registration as a Master's degree candidate. For part-time candidates, duration is normally at least five semesters. Candidates who are specially qualified in the relevant discipline may be allowed to complete the program in less than the minimum time.

Assessment

For Master's students there is a formal assessment of their progress at the end of the first two semesters for both full-time and part-time candidates.

The Master's assessment is conducted in accordance with University Rule 3.4.9.1.

The objectives of the assessment are to ensure that: the candidate has gained the prerequisite knowledge and skills to allow successful and timely completion of the proposed research program; and the candidate's progress is consistent with completion of the research program in the prescribed time and demonstrates potential to complete the work to a Master's standard. Candidates who, for any reason, are not equipped with requisites necessary to bring the proposed research program to a successful completion or have not demonstrated sufficient aptitude, are made aware of this assessment before they invest further time and money. Where it is proposed (at the candidate's instigation) that the nature or scope of the research program be changed significantly, there is continued commitment by the Faculty for provision of adequate human and physical resources, including proper supervision.

Other information

Initial inquiries regarding research areas may be made with the:

Administrative Officer, Research
Office of the Associate Dean
Research and Development
CB02.5.11
telephone (02) 9514 2686
fax (02) 9514 2633

Academic advice on research is also available from the members of the Research Degrees Committee (see under Doctor of Philosophy, page 92).

GROUNDWATER RESEARCH DEGREES

Doctor of Philosophy

- Course code: E055
- Testamur title: Doctor of Philosophy
- Abbreviation: PhD
- Course fee: see note (local)
  $7,750 per semester (international)

Master of Engineering

- Course code: E056
- Testamur title: Master of Engineering
- Abbreviation: ME
- Course fee: see note (local)
  $7,750 per semester (international)

For full details of these programs, refer to page 92 for the Doctor of Philosophy and page 94 for the Master of Engineering.

Further information is available from:

Professor Michael Kent
National Centre for Groundwater Management
telephone (02) 9514 1984
fax (02) 9514 1985
email groundwater.management@uts.edu.au

Note: Research degrees are offered on a sponsored, scholarship, faculty part-sponsored, or full-fee-paying basis. Students should contact the Faculty or the University Graduate School for further details. There are, however, student service fees to be paid (see Fees and costs, page 9).

SPECIALIST COURSEWORK AWARDS

Specialist courses by coursework are offered by the Faculty in several fields. Each of these courses include core subjects, that is, subjects which must be completed satisfactorily during studies for the award.

Students in any specialist course receive preference in the allocation of class places in core subjects. Students taking popular subjects through elective studies are allowed to enrol when places are available.

Master of Engineering Management

- Course code: EP85
- Testamur title: Master of Engineering Management
- Abbreviation: MEM
- Course fee: $10,560 (local)
  $8,000 per semester (international)

Overview

The Master of Engineering Management (MEM) program places a greater emphasis on the interface between technology and management than does the traditional Master of Business Administration (MBA). While the MEM program is formally administered by the Faculty of Engineering, there is close collaboration with the Faculty of Business in its presentation and development.

The MEM program provides opportunity for engineers who seek career prospects in engineering management to undertake a formal course of relevant study at the Master's degree level. The course is designed for engineers or scientists who perform, or who aspire to perform, management tasks while maintaining currency in their technical specialities.

Admission requirements

An applicant for admission to candidature for the Master of Engineering Management degree should:

1. be a graduate in engineering of the University of Technology, or
2. hold a degree or equivalent from another higher education institution in engineering or other technological/applied science field deemed to be equivalent in

standard to the Bachelor of Engineering degree at UTS, or

3. hold a Graduate Certificate or Graduate Diploma in engineering at a level of performance deemed by the Faculty Board in Engineering to be satisfactory evidence of an ability to undertake Master's candidature (typically 60 per cent average).

Applicants with second class Honours or above require no experience. Others should have two years of relevant work experience, or one year of structured industrial experience equivalent to that required for the BE degree at UTS.

Graduates from the MEM with a suitable group of electives may apply for the **MBA in Engineering Management and Policy** and complete that degree with a further eight MBA subjects. Refer below and to the Faculty of Business for further details.

Attendance

The program is structured for evening attendance, block attendance or distance mode. Extra intensive classes may be held in the university breaks. UTS subjects are generally presented in the evenings. Apart from 49004 Systems Engineering for Managers, all subjects in the course program are available in distance mode if requested.

Course duration

Most students taking two subjects per semester require two years to complete the degree.

Overseas students

The MEM course is also available to fee-paying overseas students on a full-time basis, taking one year (two semesters) to complete.

Course structure

The MEM program comprises eight subjects and may be articulated into the MBA program. The course requires 48 credit points of study.

Course program

MEM core

A minimum of 36 credit points must be completed from the following:

49003	Economic Evaluation	6cp
49001	Judgment and Decision Making	6cp
22747	Accounting for Managerial Decisions	6cp
21813	Managing People	6cp
49002	Project Management	6cp
49004	Systems Engineering for Managers	6cp
49309	Quality Planning and Analysis	6cp

MEM electives

The remaining 6–12 credit points of electives may be completed from the following:

49050	Graduate Project	12cp
	Postgraduate subjects from the Faculty of Engineering	6cp each
	Other approved postgraduate UTS subjects from the Faculties of Business, Law, and other universities	6cp each

Not less than 60 per cent of the total credit points must be completed through subjects offered by the Faculty of Engineering.

MBA (Engineering Management and Policy major)

The Faculty of Business, in cooperation with the Faculty of Engineering, offers a version of the MBA suitable for engineering managers.

This degree may be entered directly through the Faculty of Business or after completing a Faculty of Engineering MEM or Master of Engineering Studies (MEStud). With a suitable choice of subjects from the MEM or MEStud, advanced standing may be granted for up to eight subjects from the MBA.

It is structured in the following way:

Business Administration core

21718	Organisation Analysis and Design
21813	Managing People
25706	Economics for Management
22747	Accounting for Managerial Decisions
24734	Marketing Management
25742	Financial Management
21720	Employment Relations[1]
21715	Strategic Management (Capstone)
xxxxx	Elective(s)

[1] International students may undertake 21775 Comparative International Employment Relations as an alternative to this subject.

Engineering Management and Policy major

any eight of the following

49001	Judgment and Decision Making	6cp
49002	Project Management	6cp
49004	Systems Engineering for Managers	6cp
49006	Risk Management in Engineering	6cp
49012	Project Management Support Systems	6cp
49013	Managing Information Technology in Engineering	6cp
49122	Ecology and Sustainability	6cp
49309	Quality Planning and Analysis	6cp
49318	Manufacturing Systems Management	6cp

Master of Environmental Engineering Management

- Course code: EP89
- Testamur title: Master of Environmental Engineering Management
- Abbreviation: MEEM
- Course fee: $10,560 (local) $8,000 per semester (international)

Overview

The Master of Environmental Engineering Management (MEEM) is designed to enable engineers and other technical specialists to take a leadership role in the field of environmental engineering. It combines a set of key subjects that contain information on the nature of environmental problems together with engineering techniques for their solution. This is supplemented by management and policy subjects to empower the engineer, or technical specialist, to lead multidisciplinary teams working in the field of environmental engineering.

Admission requirements

Normally, a degree in engineering or other technological/applied science field is required. Candidates without a degree, but with suitable experience, may enrol in the Graduate Certificate in Environmental Engineering and Management and later transfer to the MEEM with full credit for completed subjects.

Candidates with second class Honours or above need no work experience. Otherwise two years' experience is desirable.

Attendance

The program is structured for evening attendance, block attendance or distance mode.

Course duration

Most students taking two subjects per semester require two years to complete the degree.

Overseas students

The MEEM course is also available to fee-paying overseas students on a full-time basis, taking one year to complete.

Course structure

The course requires 48 credit points of study.

Course program

Group A

	36 credit points from the following	
49121	Environmental Assessment and Planning	6cp
49122	Ecology and Sustainability	6cp
49123	Waste and Pollution Management	6cp
49124	Water Quality Management	6cp
49125	Environmental Risk Assessment	6cp
49126	Environmental Management of Land	6cp
66025	Contaminated Site Management	6cp

Group B

	12 credit points from the following	
49001	Judgment and Decision Making	6cp
49002	Project Management	6cp
49003	Economic Evaluation	6cp
49108	Local Government Law	6cp
49050	Graduate Project	12cp

Master of Engineering in Groundwater Management

- Course code: E057
- Testamur title: Master of Engineering in Groundwater Management
- Abbreviation: ME
- Course fee: HECS (local) $7,500 per semester (international)

Overview

This course is offered through the National Centre for Groundwater Management and in collaboration with the Faculty of Science.

It 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.

Admission requirements

Applicants must possess a degree in engineering from UTS or an equivalent qualification. Applicants are required to submit a curriculum vitae.

Attendance

The course is structured on a block attendance pattern and laboratory work during Autumn semester and project work during Spring semester.

The course is also available in distance mode which has an additional on-campus component.

Course duration

The course is offered on a one-year, full-time, or two-year, part-time basis.

Course program

Semester 1 – Autumn

49550	Computing for Groundwater Specialists	0cp
49551	Surface Hydrology and Groundwater	6cp
49555	Groundwater Modelling	6cp
66014	Hydrogeology	6cp
66015	Hydrogeochemistry	6cp
xxxxx	Elective 1	6cp
xxxxx	Elective 2	6cp

Semester 2 – Spring

44152	Groundwater Engineering Project (M) (F/T)	24cp
44156	Groundwater Engineering Project (M) (P/T)	12cp

Electives

66018	Groundwater Geophysics	6cp
66025	Contaminated Site Management	6cp
xxxxx	Other approved subject	6cp

Graduate Diploma in Engineering in Groundwater Management

- Course code: E061
- Testamur title: Graduate Diploma in Engineering in Groundwater Management
- Abbreviation: GradDipE
- Course fee: HECS (local)
  $6,250 per semester (international)

Overview

This course is designed for students working in the area of groundwater resource management.

Admission requirements

Applicants should possess a degree in engineering from UTS or hold equivalent qualifications. Applicants with other qualifications relevant to groundwater resource development may be accepted for admission, subject to approval by the Faculty Board.

Attendance

The course requires attendance in a pattern similar to the Master of Engineering in Groundwater Management. However, the project work of the Spring semester is shorter and must be completed by the end of the teaching semester.

This course is also available in block or distance mode and has a similar on-campus component to the Master's course.

Course duration

The course is offered on a one-year, full-time or two-year, part-time basis.

Course program

Semester 1 – Autumn

49550	Computing for Groundwater Specialists	0cp
49551	Surface Hydrology and Groundwater	6cp
49555	Groundwater Modelling	6cp
66014	Hydrogeology	6cp
66015	Hydrogeochemistry	6cp
xxxxx	Elective 1	6cp
xxxxx	Elective 2	6cp

Semester 2 – Spring

44153	Groundwater Engineering Project (GD) (F/T)	12cp
44157	Groundwater Engineering Project (GD) (P/T)	6cp

Electives

66018	Groundwater Geophysics	6cp
66025	Contaminated Site Management	6cp
xxxxx	Other approved subject	6cp

Graduate Certificate in Environmental Engineering Management

- Course code: EP54
- Testamur title: Graduate Certificate in Environmental Engineering Management
- Abbreviation: none
- Course fee: $5,280 (local) $8,000 per semester (international)

Overview

Environmental engineering and management is high on the political agenda. It also has a high professional priority. The Code of Ethics of the Institution of Engineers, Australia reminds its members that their responsibility '... for the welfare, health and safety of the community shall at all times come before their responsibility to the profession, to sectional or private interest or to other Engineers'. This responsibility applies equally to scientists, town planners and other professionals working in this field. They have a compelling duty to ensure that the adverse effects of development on the total environment are minimised.

This course of four subjects deals with the broad aspects of environmental management relevant to practising professionals in engineering science, planning, architecture, law, surveying, health and building. Completing the course develops a background and competence in environmental management.

More specifically, it develops an awareness of understanding the human impact on the environment with respect to waste minimisation and water quality management. It develops professional skills required to work as part of an integrated team responsible for environmental planning and management.

Admission requirements

The normal educational qualification for admission is a Bachelor's degree in engineering, science, design, architecture, building, surveying or planning. Equivalent qualifications are considered on their merits.

Provisional admission for graduates from disciplines other than those above is available provided their education contained an adequate introduction to mathematics and physical sciences.

Attendance

The block attendance pattern of study currently consists of three sessions per semester. Each session involves three days of full-day attendance. To complete two subjects in a semester, three days of full-day attendance is required at each session. To complete one subject in a semester, one-and-a-half days of attendance at each session is required. Subjects may also be taken in distance mode.

Course duration

The normal attendance pattern, based on two subjects per semester, requires a minimum of two semesters to complete the course.

Course program

Semester 1 – Autumn		
49123	Waste and Pollution Management	6cp
49124	Water Quality Management	6cp
Semester 2 – Spring		
49121	Environmental Assessment and Planning	6cp
49122	Ecology and Sustainability	6cp

Articulation and progression

Work undertaken under this Graduate Certificate enrolment may be credited towards a Master's degree provided the requirements of the Master's degree are met in full, in terms of subject coverage and project weighting. However, completion of the requirements for the Graduate Certificate in Environmental Engineering and Management does not guarantee admission to Master's candidature.

Graduate Certificate in Engineering Management

- Course code: EP57
- Testamur title: Graduate Certificate in Engineering Management
- Abbreviation: none
- Course fee: $5,280 (local) $8,000 per semester (international)

Overview

Many working engineers and technologists do not have the time to commit to a full Master's course. However, the demand for management knowledge amongst engineers is increasing. The Graduate Certificate in Engineering Management is designed to provide a four-subject package of management knowledge which can be tailored by the student to fit their immediate needs. All the subjects are taken from the Master of Engineering Management (MEM) and may be credited towards the MEM on successful admission to that program.

Admission requirements

An applicant for admission to candidature for a Graduate Certificate in the Faculty of Engineering should:

1. be a graduate in engineering of UTS, or
2. hold a degree or equivalent from another higher education institution in engineering or other technological/applied science field deemed to be equivalent in standard to the Bachelor of Engineering at UTS, or
3. for those applicants without formal qualifications, produce such other evidence of general and professional qualifications sufficient to show that the applicant possesses the educational preparation and capacity to pursue graduate studies.

Applicants should have two years of relevant work experience, or one year of structured industrial experience equivalent to that required for the Bachelor of Engineering degree at UTS.

Applicants are also required to submit a covering letter indicating why they wish to undertake the course and a detailed curriculum vitae.

Attendance

Subjects may be taken in the evening or by distance mode.

Course duration

The course can be completed in one semester of full-time study or two semesters of part-time study.

Overseas students

The Graduate Certificate in Engineering Management is available to fee-paying overseas students on a full-time basis, taking one semester to complete.

Course structure

The Graduate Certificate is completed with 24 credit points of study. A minimum of 18 credit points comes from the core of the Master of Engineering Management and the remainder from the core or electives.

COURSEWORK AWARDS – GENERAL

A range of coursework programs is available through the Faculty, leading to the general awards of Master of Engineering (by coursework), Master of Engineering Studies and Graduate Certificate in Engineering.

Master of Engineering (by coursework)

- Course code: EP81
- Testamur title: Master of Engineering
- Abbreviation: ME
- Course fee: $15,400 (local)
  $8,000 per semester (international)

Overview

The course provides opportunity at Master's level for professionally qualified engineers, including recent graduates, to extend in depth and breadth the knowledge and skills gained from their undergraduate studies.

Each program must be designed to enhance technological knowledge pertaining to one or more fields of engineering. The completion of subjects and project work at advanced level is central to this requirement.

The course offers program flexibility combined with opportunities for articulation from a sub-Master's (i.e. Graduate Certificate) to a Master's level award.

Admission requirements

An applicant for admission to candidature for the Master of Engineering degree shall either:

1. be a graduate in engineering of UTS, or
2. hold a degree or equivalent from another higher education institution deemed to be equivalent to the Bachelor of Engineering degree at UTS, or
3. hold a Graduate Certificate or Graduate Diploma in Engineering at a level of performance deemed by the Faculty Board in Engineering to be satisfactory evidence of an ability to undertake Master's candidature (typically 60 per cent average).

Applicants should have two years of relevant work experience, or one year of structured industrial experience equivalent to that required for the Bachelor of Engineering degree at UTS.

Applications for admission by internal transfer of candidature from a Graduate Certificate may be considered following completion of subjects totalling at least 18 credit points at a level of performance deemed by the Faculty Board in Engineering to be satisfactory evidence of an ability to undertake Master's candidature (typically 60 per cent average).

Attendance

Attendance may be on a full-time or part-time basis. Classes are usually held in the evenings, in block and/or distance mode.

Course duration

Programs may be completed on a full-time basis in three academic semesters, or in 12 calendar months by studying during the summer months (December to February). Completion on a part-time basis requires two to three years.

Assessment

The award of the degree is ungraded.

In existing UTS subjects, assessment procedures are as already established or as modified by the appropriate authority from time to time.

Emphasis is placed where appropriate on self-directed experiential learning and criterion-referenced assessment in the development and review of the Faculty's postgraduate subjects.

Supervision

Responsibility for supervision of the Graduate Project for the degree rests with the Director, Postgraduate Coursework Programs.

The Graduate Project must be supervised by a principal supervisor who is a member or adjunct member of staff of the Faculty of Engineering of UTS. Industry-based projects are strongly encouraged, particularly for part-time candidates with employer sponsorship, and require formal co-supervisory arrangements.

Candidates and supervisors of project work are expected to follow principles and practices consistent with the University's Code of Practice for Master's Research Students and Supervisors, and described in the Postgraduate Project Guide Notes available from the Undergraduate and Postgraduate Office.

Course structure

A candidate for the degree shall complete coursework subjects and a major individual project, totalling 60 credit points.

The program of study for each candidate shall have regard to the purpose and coherence of subject selection and the integration of course and project work. Within this framework, the Faculty Board in Engineering may from time to time introduce program majors that require students to complete a number of prescribed subjects with or without opportunity for electives. In these cases, the area of program concentration is recognised on the candidate's academic record. A major is granted if four subjects (24 credit points) are completed within a particular Postgraduate Program major as described in this handbook, together with an approved Graduate Project in the major of 18–30 credit points.

Subjects selected are drawn from those offered by the Faculty of Engineering of UTS, other faculties of UTS, other faculties of engineering (including The University of Sydney, the University of New South Wales and the University of Western Sydney), and other institutions approved by the Academic Board. Not less than 60 per cent of total credit points must be completed through subjects offered, and/or a Graduate Project supervised, by the Faculty of Engineering of UTS. The Graduate Project must be supervised by a principal supervisor who is a member or adjunct member of academic staff of the Faculty of Engineering of UTS.

Subjects are generally from among those designated as postgraduate. Undergraduate subjects may be included only where they were not included in the course leading to a candidate's primary qualification and where they can be shown to represent material relevant to career development. Undergraduate subjects may not in any event total more than 12 credit points.

Credit

Subjects taken through any faculty of UTS shall be credited towards the degree at the credit point values established for them by the University.

The credit point weighting for the Graduate Project lies within the range of 18–30 credit points.

The following provisions are additional to the University's normal advanced standing provisions:

- credit to be granted for subjects taken through providers other than UTS are determined by the Faculty Board in Engineering
- postgraduate subjects offered by the Faculty of Engineering of The University of Sydney, the University of New South Wales and the University of Western Sydney, or other universities by arrangement, may be credited towards the degree to a maximum value of 18 credit points.

Course program

The Faculty offers program majors in specialised fields relating to its research activities. These may change from time to time in number or available areas of study.

Programs are available in fields relating to each of the Faculty's main discipline areas and its associated teaching Centres (Centre for Local Government Education and Research, National Centre for Groundwater Management and the Australian Graduate School of Engineering Innovation); and in other inter- or intra-faculty fields through the Faculty of Engineering. Advice on available program majors in any year may be obtained initially on inquiry to the Faculty of Engineering, through the Undergraduate and Postgraduate Office.

Subject availability

Subjects offered by the Faculty of Engineering available to Master of Engineering candidates, and examples of program majors, appear in this handbook. Attention should be paid to the prerequisite requirements of particular subjects. Subjects offered by other faculties of UTS are published in the respective faculty handbooks. Inquiries with respect to these, and to subjects offered by other institutions, may be directed in the first instance to the Undergraduate and Postgraduate Office in the Faculty of Engineering.

Program selection

Each candidate's program of study shall be determined in consultation with an academic adviser and shall require the approval of the Director, Postgraduate Coursework Programs, or other person designated by the Faculty Board in Engineering. Approval shall include arrangements for the supervision of project work.

Each individual program must comprise a coherent selection of subjects and project work of demonstrable relevance to the aims of the course set out above.

The Director, Postgraduate Coursework Programs – or a candidate's academic adviser – will consult with other faculties to identify subjects offered by them that may be relevant to an individual program. Approval to take subjects offered by other universities, within the limits established above, is normally granted in circumstances where an equivalent subject is not available through UTS.

Prior to undertaking the Graduate Project, each candidate is required to submit a comprehensive project definition, as a basis from which the objectives and scope of the work is agreed, together with the credit point value to be given to the project.

Master of Engineering Studies

- Course code: EP88
- Testamur title: Master of Engineering Studies
- Abbreviation: MEStud
- Course fee: $10,560 (local)
  $8,000 per semester (international)

Master of Engineering Studies (Honours)

- Course code: EP91
- Testamur title: Master of Engineering Studies (Honours)
- Abbreviation: MEStud(Hons)
- Course fee: $15,860 (local)
  $8,000 per semester (international)

Overview

The Master of Engineering Studies (MEStud) provides an opportunity for recently graduated engineers to pursue further studies in their chosen field of endeavour. The degree is structured in such a way that a student may choose a program of study that will deepen the body of knowledge acquired in the first degree as well as expand knowledge boundaries into policy and engineering management areas. The program of study chosen by the student is usually framed within a Postgraduate Program major and supervised by an experienced academic in that field. However, students also have the option of not electing a major.

The Master of Engineering Studies (Honours) (MEStud(Hons)) is an extension, in the form of a research project, of the program of studies chosen by students. Students who perform well in the coursework program are permitted to transfer into the MEStud(Hons) where they are given the opportunity to complete a research project in their major.

Admission requirements

An undergraduate degree in engineering or other technological/applied science field or a Graduate Certificate in engineering is required for entry to the course.

Course duration

The MEStud requires two semesters of full-time study or four semesters of part-time

study. Those students who wish to take Honours require at least one further semester to complete the degree.

Course structure

Master of Engineering Studies

Students must complete eight postgraduate subjects (48 credit points) offered by the Faculty of Engineering to qualify for the award of Master of Engineering Studies.

Group A

	a minimum of 18 credit points must be completed from the following	
49013	Managing Information Technology in Engineering	6cp
49001	Judgment and Decision Making	6cp
49306	Quality and Operations Management Systems	6cp
49016	Technology and Innovation Management	6cp

Group B

	Five postgraduate subjects from the Faculty of Engineering	6cp each

Majors

Students normally nominate a major at enrolment which requires the completion of at least four subjects within a particular Postgraduate Program major (see page 108). Indicated compulsory major subjects must be completed. Any special topics listed in the program major are not available in the MEStud. To obtain the Software and Information Systems Engineering major students must complete eight subjects (48 credit points) from the Software and Information Systems Engineering Program major list. Group A subjects do not apply to this major.

The major is noted on the academic transcript.

Master of Engineering Studies (Honours)

On completion of the requirements of the MEStud at Credit level or above, a student may transfer to the MEStud(Hons). In addition to the 48 credit points at Credit level the candidate is required to complete a 24 credit point research project over a period of a least one semester.

Postgraduate Program majors

Postgraduate Program majors available within the Faculty of Engineering in 2002 are listed below:

- Computer Control Engineering
- Energy Planning and Policy
- Engineering Management
- Environmental Engineering and Management
- Groundwater Management
- Information Systems Engineering
- Local Government Engineering
- Manufacturing Engineering and Management
- Software Engineering
- Software and Information Systems Engineering
- Structural Engineering
- Telecommunications Engineering
- Telecommunications Networks
- Water Engineering.

Each of these Postgraduate Program majors is managed by an academic designated by the Director, Postgraduate Coursework Programs, who advises the student on assumed prior knowledge and a suitable combination of postgraduate subjects. Where a student transfers to the MEStud(Hons), that student is normally required to complete the Research Project using the body of knowledge contained in the chosen Postgraduate Program major.

Graduate Certificate in Engineering

- Course code: EP51
- Testamur title: Graduate Certificate in Engineering
- Abbreviation: none
- Course fee: $5,280 (local) $8,000 per semester (international)

Course aims

The objective of this course is to provide practising professional engineers or technologists with an opportunity to extend their engineering knowledge beyond the subject areas covered in their first qualification, and/or to update their knowledge and skills in line with recent advances in engineering, technology and business practice; and to provide graduates in cognate disciplines with the opportunity to undertake formal study in appropriate areas of engineering.

The course may also be of value to immigrant engineers, already professionally qualified in their countries of origin, who are seeking orientation to Australian conditions and practice.

Admission requirements

An applicant for admission to candidature for a Graduate Certificate in the Faculty of Engineering should:

1. be a graduate in engineering of UTS, or
2. hold a degree or equivalent from another higher education institution deemed to be equivalent to the Bachelor of Engineering degree at UTS, or
3. for those applicants without formal qualifications, produce such other evidence of general and professional qualifications sufficient to show that the applicant possesses the educational preparation and capacity to pursue graduate studies.

Attendance

Attendance may be on a full-time or part-time basis. Classes are usually held in the evenings, in block and/or distance mode.

Course duration

The Graduate Certificate requires completion of subjects totalling 24 credit points and may be taken on a one-semester, full-time, or a two-semester, part-time basis.

Course structure

Students design their own program to suit individual needs. Program details are determined prior to enrolment, in consultation with, and with the approval of, an academic adviser designated by the Director, Postgraduate Coursework Programs.

The program of study for each candidate shall have regard to the purpose and coherence of subject selection. Within this framework, the Faculty Board in Engineering, on advice from the Undergraduate and Postgraduate Office, may from time to time introduce program majors that require students to complete a number of prescribed subjects with or without opportunity for electives. In these cases, the area of program major is recognised on the candidate's academic record. A major is granted if three subjects (18 credit points) are completed within a particular Postgraduate Program major as described on page 108.

At least 60 per cent of the content of any individual program shall consist of subjects offered by the Faculty of Engineering.

Undergraduate subjects may be included only where they were not included in the course leading to a candidate's primary qualification and where they can be shown to represent material relevant to career development. They may not in any event total more than 60 per cent of the content of any individual program, as determined by the credit points awarded on completion of each subject.

Subject selection should be clearly related to a professional theme involving either an expansion of knowledge beyond the areas covered in the student's first degree, or an advance in skills resulting from developments in engineering and associated technologies and management practices.

Articulation and progression

Work undertaken under Graduate Certificate enrolment may be credited towards a Master's degree provided the requirements of the Master's degree are met in full.

Completion of the requirements for the Graduate Certificate in Engineering does not guarantee admission to Master's candidature. Eligibility for consideration may be subject to the attainment of a certain level of performance – typically, a weighted average mark in completed subjects of at least 60 per cent over 18 credit points.

POSTGRADUATE PROGRAM MAJORS

Postgraduate majors are available in Master of Engineering (ME), Master of Engineering Studies (MEStud) and Graduate Certificates.

The Faculty of Engineering offers an extensive range of programs by research and/or coursework through its award and non-award courses. A selection of these designated as 2002 program majors are described below. Information on other specialist research areas can be obtained from individual members of academic staff (see section titled Staff list on page 228).

Program majors have been developed to match the needs of engineers and other professionals. They provide opportunities for advanced studies and professional development in engineering and cross-disciplinary areas between engineering and other disciplines. All postgraduate program majors are differentiated by their focus, structure, presentation, attendance flexibility, assessment practices and multiple entry/completion options.

Students are entitled to have the name of the major listed in the degree transcript (not the testamur), if they have completed the following:

- ME (by coursework): A minimum of four subjects (24 credit points) must be completed within the particular postgraduate program major as described below, together with an approved Graduate Project in the major of between 18 and 30 credit points. Indicated major compulsory major subjects must be completed.
- MEStud: A minimum of four subjects (24 credit points) must be completed within the particular postgraduate program major as described below. Indicated compulsory major subjects must be completed. Any special topics listed in the program major are not available in the MEStud. To obtain the Software and Information Systems Engineering major students must complete eight subjects (48 credit points) from the Software and Information Systems Engineering program major list. MEStud Group A subjects do not apply to this major.
- Graduate Certificate: A minimum of three subjects (18 credit points) must be completed within the particular postgraduate program major as described below. Indicated compulsory major subjects must be completed.

Postgraduate program majors reflect current research strengths and interests in the Faculty of Engineering, and change with time. It is expected that all of the postgraduate program majors listed below will be offered in 2002. However, the availability of individual subjects in any year is influenced by student demand, arrangements with visiting lecturers, scheduling within the University, and policies on class sizes.

If, in the opinion of the Director of Postgraduate Coursework Programs, a student does not have the required prerequisite knowledge to successfully undertake and complete a major, then the student may be required to undertake one or two preparatory undergraduate subjects.

Postgraduate majors

Computer Control Engineering

Available ME, MEStud and Graduate Certificate

49261	Biomedical Instrumentation[1]	6cp
49275	Neural Networks and Fuzzy Logic[1]	6cp
49211	Software Engineering Principles	6cp
49212	Object-oriented Languages	6cp
49214	UNIX and C	6cp
49324	Instrumentation and Condition Monitoring	6cp

[1] Subject compulsory for major.

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Energy Planning and Policy

Available ME, MEStud and Graduate Certificate

49021	Evaluation of Infrastructure Investments	6cp
49024	Energy Modelling	6cp
49026	Electricity Sector Planning and Restructuring	6cp
49029	Environmental Policy for Energy Systems	6cp
49706	Regulatory Economics	6cp
	the following subjects are offered subject to demand	
49022	Energy Resources and Technology	6cp
49023	Energy and Environmental Economics	6cp

49025	Methods for Energy Analysis	6cp
49027	Energy Demand Analysis and Forecasting	6cp
49028	Policy and Planning of Energy Conservation	6cp

Academic inquiries

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Engineering Management

Available ME only

Note: Specialist programs in engineering management are available as a Master of Engineering Management (see page 96) and as a Graduate Certificate in Engineering Management (see page 102).

49001	Judgment and Decision Making	6cp
49002	Project Management	6cp
49003	Economic Evaluation	6cp
49006	Risk Management in Engineering	6cp
49012	Project Management Support Systems	6cp
49016	Technology and Innovation Management	6cp
49306	Quality and Operations Management Systems	6cp
49309	Quality Planning and Analysis	6cp
49318	Manufacturing Systems Management	6cp

Academic inquiries

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Environmental Engineering and Management

Available ME only

Note: Specialist programs in environmental engineering management are available as a Master of Environmental Engineering Management (see page 98) and as a Graduate Certificate in Environmental Engineering Management (see page 101).

49121	Environmental Assessment and Planning	6cp
49122	Ecology and Sustainability	6cp
49123	Waste and Pollution Management	6cp
49124	Water Quality Management	6cp
49125	Environmental Risk Assessment	6cp
49126	Environmental Management of Land	6cp
49127	On-site Water and Wastewater Treatment	6cp

Academic inquiries

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Groundwater Management

Available ME, MEStud and Graduate Certificate

49550	Computing for Groundwater Specialists	6cp
49551	Surface Hydrology and Groundwater	6cp
49555	Groundwater Modelling	6cp
66014	Hydrogeology	6cp
66015	Hydrogeochemistry	6cp
66018	Groundwater Geophysics	6cp

Academic inquiries

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Information Systems Engineering

Available ME and Graduate Certificate

49002	Project Management	6cp
49013	Managing Information Technology in Engineering	6cp
49209	Advanced Web Technology	6cp
49210	Website Design and Management	6cp

Academic inquiries

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Local Government Engineering

Available ME, MEStud and Graduate Certificate

49102	Traffic and Transportation	6cp
49104	Asset Maintenance Management	6cp
49105	Water Supply and Wastewater Management	6cp
49106	Road Engineering Practice	6cp
49107	Stormwater Drainage Design	6cp
49108	Local Government Law	6cp
49121	Environmental Assessment and Planning	6cp

Academic inquiries

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Manufacturing Engineering and Management

Available ME, MEStud and Graduate Certificate

49002	Project Management	6cp
49307	Internal Combustion Engines and Environmental Issues	6cp
49312	Advanced Flow Modelling	6cp
49316	Materials Handling	6cp
49318	Manufacturing Systems Management	6cp
49321	Energy Conversion	6cp
49322	Airconditioning	6cp
49323	Vibration Analysis: Theory and Applications	6cp
49324	Instrumentation and Condition Monitoring	6cp
49325	Computer-aided Mechanical Design	6cp

Academic inquiries

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Software Engineering

Available ME, MEStud and Graduate Certificate

49211	Software Engineering Principles[1]	6cp
49002	Project Management	6cp
49212	Object-oriented Languages	6cp
49214	UNIX and C	6cp
49239	Software Systems Middleware	6cp
49275	Neural Networks and Fuzzy Logic	6cp
49247	Software Engineering Foundation 2[2]	6cp

[1] Subject compulsory for major.
[2] Program Coordinator's agreement required prior to enrolment.

Academic inquiries

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Software and Information Systems Engineering

Available ME, MEStud and Graduate Certificate

49211	Software Engineering Principles[1]	6cp
49002	Project Management	6cp
49013	Managing Information Technology in Engineering	6cp
49209	Advanced Web Technology	6cp
49210	Website Design and Management	6cp
49212	Object-oriented Languages	6cp
49214	UNIX and C	6cp
49239	Software Systems Middleware	6cp
49275	Neural Networks and Fuzzy Logic	6cp
49247	Software Engineering Foundation 2[2]	6cp

[1] Subject compulsory for major.
[2] Program Coordinator's agreement required prior to enrolment.

Academic inquiries

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Structural Engineering

Available ME, MEStud and Graduate Certificate

49047	Finite Element Analysis	6cp
49131	Bridge Design	6cp
49132	Stability of Structures	6cp
49133	Steel and Composite Design	6cp
49134	Structural Dynamics and Earthquake Engineering	6cp
49136	Timber in Engineering Design	6cp
49150	Prestressed Concrete Design	6cp
49152	Damage and Repair of Concrete Structures	6cp

Academic inquiries

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Telecommunications Engineering

Available ME, MEStud and Graduate Certificate

49205	Transmission Systems[1]	6cp
49215	Telecommunications Industry Management[1]	6cp
49201	Integrated Services Networks	6cp
49202	Communication Protocols	6cp
49219	Emerging Internetworking Protocols	6cp
49238	Telecommunications Network Management	6cp

[1] Subject compulsory for major.

Special topics

The following special topic subjects are available only in the Telecommunications Engineering major. They are limited to small numbers of students (five or less) and are typically taught once every three semesters, dependent on the availability of the lecturer.

49207	Advanced Concepts in Microwave and Mobile Communications	6cp
49218	Asynchronous Transfer Mode (ATM) Technology	6cp
49220	Real-time Signal Processing in Telecommunications	6cp
49221	Coding and Coded Modulation	6cp
49222	Advanced Digital Modulation Techniques	6cp
49223	Satellite Communication Systems	6cp
49224	Simulation of Digital Communication Systems	6cp
49226	Modem/Codec Design	6cp

Academic inquiries

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Telecommunication Networks

Available ME, MEStud and Graduate Certificate

49202	Communication Protocols[1]	6cp
49238	Telecommunications Network Management[1]	6cp
49201	Integrated Services Networks	6cp
49209	Advanced Web Technology	6cp
49211	Software Engineering Principles	6cp
49215	Telecommunications Industry Management	6cp
49219	Emerging Internetworking Protocols	6cp
49239	Software Systems Middleware	6cp
49249	Telecommunications Engineering Foundation 2[2]	6cp

[1] Subject compulsory for major.
[2] Program Coordinator's agreement required prior to enrolment.

Special topics

The following special topic subjects are available only in the Telecommunications Networks major. They are limited to small numbers of students (five or less) and are typically taught once every three semesters, dependent on the availability of the lecturer.

49204	Advanced Teletraffic Engineering	6cp
49218	Asynchronous Transfer Mode (ATM) Technology	6cp

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Water Engineering

Available ME, MEStud and Graduate Certificate

49107	Stormwater Drainage Design	6cp
49111	Coastal Engineering	6cp
49113	Urban Stormwater Pollution Management	6cp
49124	Water Quality Management	6cp
49551	Surface Hydrology and Groundwater	6cp

Academic inquiries

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ENGLISH LANGUAGE STUDY SKILLS ASSISTANCE CENTRE

The English Languages Study Skills Assistance (ELSSA) Centre enhances teaching and learning at UTS through a focus on academic language development, which involves reading, writing, listening, speaking, critical thinking and cultural knowledge.

The Centre does this by:

- collaborating with faculties to integrate the development of students' academic language in their areas of study
- teaching custom-designed programs to meet the specific requirements and changing needs of undergraduate and postgraduate UTS students and staff
- fostering interest in, and knowledge of, language and learning through research, intellectual contributions and staff development, and
- valuing quality, diversity, internationalisation and flexibility as the Centre serves the wider academic and professional communities.

In addition to a wide range of free academic language development services available to UTS students who complete undergraduate and postgraduate degrees in English, the ELSSA Centre also offers the following award courses, programs and elective subjects.

UNDERGRADUATE PROGRAMS FOR INTERNATIONAL STUDENTS

Advanced Diploma in Australian Language and Culture

- UTS course code: HA30
- Testamur title: Advanced Diploma in Australian Language and Culture
- Abbreviation: none
- Course fee: $6,000 (local) $9,000 (international)

The Advanced Diploma in Australian Language and Culture (ADALC) has been designed jointly by the ELSSA Centre and the Institute for International Studies for international students – either as a study-abroad year in their current degree (fee-paying), or as part of a university-to-university exchange agreement, or as a stand-alone program.

It can be taken at either undergraduate or postgraduate level and allows students to enrol in subjects about Australian society and culture while tailoring a program to their own interests and level of English language competence.

Students will audit classes in their area of study as an integral part of the ADALC.

The Advanced Diploma is aimed at two types of students:

- exchange and Study Abroad students who wish to complete the ADALC and return to their country, or
- international students who do not meet the UTS language entry requirements and who need to develop their academic literacy skills to enable them to enrol in undergraduate courses at UTS.

International students graduating from the the ADALC meet the UTS language entry requirements and, provided they meet academic entry requirements into faculties, are eligible to study at UTS after completing the ADALC.

Admission requirements

Students must have reached an English language competence level of 5.0 (IELTS) or TOEFL 510 (computer 180). Students with an IELTS of 6.0 or TOEFL of 550 are exempt from Semester 1.

Course duration

The Advanced Diploma is normally a two-semester program.

Course structure

This program is a 48-credit-point course, comprising six subjects.

Course program

Semester 1

59304	English for Academic Purposes 1	8cp
59306	Researching Australia 1 – Ethnography	8cp
59308	Australian Society and Culture 1	8cp

Semester 2

59305	English for Academic Purposes 2	8cp
59307	Researching Australia – Researching Students	8cp
59309	Australian Society and Culture 2	8cp

Other information

Contact the English Language Study Skills Assistance (ELSSA) Centre for more information on this program.

Australian English Language and Culture Program

- UTS course code: n/a
- Testamur title: n/a – Students receive a Statement of Completion
- Abbreviation: n/a
- Course fee: $9,000 (international)[1]

The Australian English Language and Culture Program is aimed at study-abroad or exchange students who are not able to enrol in the Advanced Diploma in Australian Language and Culture.

This program enables international students from language backgrounds other than English to develop their English language skills through the study of aspects of contemporary Australian society and culture. Through both class activities and excursions, it introduces students to a range of intercultural issues and provides them with opportunities to interact with native speakers in order to develop the cultural understanding, skills, knowledge and confidence required to use English and participate actively in a variety of settings.

The program focuses particularly on oral skills and includes some participation in mainstream University classes. Students complete a major project using ethnographic research techniques.

Admission requirements

Students whose language level is below IELTS 5.0 or TOEFL 510 (computer 180).

Course duration

This program is completed over two semesters.

Course structure

This program consists of two full-time subjects, comprising 24 credit points each.

Course program

Semester 1

59314	Australian English Language and Culture 1	24cp

[1] This program is not offered to local students.

Semester 2

59315	Australian English Language and Culture 2	24cp

Other information

Contact the English Language Study Skills Assistance (ELSSA) Centre for more information on this program.

ELECTIVE SUBJECTS

The ELSSA Centre offers five elective subjects aimed specifically at students from language backgrounds other than English. Some of these subjects may be completed during semester or, in intensive mode during the February or July vacation periods.

Semester 1 or 2

59316	Essay Writing	4cp
59317	Report Writing	4cp
59318	Seminar Presentation	4cp
59319	Communication for Employment	4cp
59320	English for Business	6cp

POSTGRADUATE PROGRAM

Graduate Certificate in English for Academic Purposes

- UTS course code: HA80
- Testamur title: Graduate Certificate in English for Academic Purposes
- Abbreviation: none
- Course fee: $3,500 (local) $5,100 (international)

The Graduate Certificate in English for Academic Purposes (GCEAP) is aimed at international postgraduate research students who do not meet the UTS English language requirement but who meet all other academic requirements to commence studies at UTS at postgraduate research level.

Participation in the program is only possible for students who have already enrolled in a postgraduate research degree program elsewhere at UTS. Enrolment in the GCEAP is an integral part of the enrolment in a postgraduate research degree and emphasises the developmental approach of an integrated program.

Admission requirements

Applicants must:

- be international students
- be eligible to enrol in a postgraduate research degree at UTS, and
- have an IELTS score of 5.5 to 6.0 (minimum of 5.5 in writing) or TOEFL score of 530–550 (computer 197–213) or equivalent.

Other postgraduate students who meet the UTS language entry requirements and who feel they need to develop their language skills would also be eligible to attend the program.

Course duration

The first two subjects of the GCEAP are offered in the intensive pre-sessional mode (eight weeks before semester) and the final subject is offered concurrent with the first semester of students' enrolment in their research degree.

Course structure

In addition to being enrolled in a postgraduate research degree at UTS, students must complete the three compulsory subjects of the GCEAP (totalling 24 credit points).

Course program

59310	Postgraduate Study in Australia	8cp
59311	Academic English for Postgraduate Study	8cp
59312	Postgraduate Academic Writing in Context	8cp

Other information

Contact the English Language Study Skills Assistance (ELSSA) Centre for more information on this program.

SUBJECT DESCRIPTIONS

59304

English for Academic Purposes 1

8cp; prerequisite(s): IELTS score 5.0 (students with an IELTS of 6.0 and above are exempt from this subject)
(only for undergraduate international, exchange or Study Abroad students)

This is the first of two subjects specifically for international students. The aim of these subjects is to ensure that students' language and study skills have developed sufficiently to enable them to successfully participate in classes alongside other UTS students.

The subjects focus on developing the language and learning skills required for tertiary study in Australia. They integrate the four macro-skills – reading, writing, listening and speaking – into a thematic approach which looks at a variety of contemporary issues in Australian culture and society. These issues are linked to subjects which may be studied in subsequent years at UTS. Students take a critical/analytical approach to understanding and producing written and spoken texts appropriate for an Australian tertiary context.

59305

English for Academic Purposes 2

8cp; prerequisite(s): IELTS score 6.0 or 59304 English for Academic Purposes 1
(only for undergraduate international, exchange or Study Abroad students)

This is the second of two subjects specifically for international students. The aim of these subjects is to ensure that students' language and study skills have developed sufficiently to enable them to successfully participate in classes alongside other UTS students.

The subjects focus on developing the language and learning skills required for tertiary study in Australia. They integrate the four macro-skills – reading, writing, listening and speaking – into a thematic approach which looks at a variety of contemporary issues in Australian culture and society. These issues are linked to subjects which may be studied in subsequent years at UTS. Students take a critical/analytical approach to understanding and producing written and spoken texts appropriate for an Australian tertiary context.

59306

Researching Australia 1 – Ethnography

8cp; prerequisite(s): IELTS score 5.0
(only for undergraduate international, exchange or Study Abroad students)

This is the first of two subjects specifically for international students in the Advanced Diploma in Australian Language and Culture. The aim of these subjects is to introduce students to a range of intercultural issues and to investigate the cultural norms of Australian society through the application of specific research methods. At this level, students use ethnographic techniques to investigate aspects of contemporary Australian experience.

59307

Researching Australia 2 – Researching for Study

8cp; prerequisite(s): IELTS score 6.0 or 59306 Researching Australia 1 – Ethnography
(only for undergraduate international, exchange or Study Abroad students)

This is the second of two subjects specifically for international students in the Advanced Diploma in Australian Language and Culture. The aim of these subjects is to introduce students to a range of intercultural issues and to investigate the cultural norms of Australian society through the application of specific research methods. At this level, students use questionnaire and interview techniques to investigate aspects of contemporary student life and present their research both orally and in written report form.

59308

Australian Society and Culture 1

8cp; prerequisite(s): IELTS score 5.0
(only for undergraduate international, exchange or Study Abroad students)

This is the first of two subjects specifically for international students in the Advanced Diploma in Australian Language and Culture. In these subjects students are introduced to several aspects of Australian society and culture: the indigenous experience; aspects of rural and urban Australia; the history of migration; and the development of multiculturalism. Students explore these aspects through film, documentaries, literature, music, art, sport events, etc. Visits to cultural institutions as well as presentations and guest lectures from experts are key features of these subjects.

59309

Australian Society and Culture 2

8cp; prerequisite(s): IELTS score 6.0 or 59308 Australian Society and Culture 1
(only for undergraduate international, exchange or Study Abroad students)

This is the second of two subjects specifically for international students in the Advanced Diploma in Australian Language and Culture. In these subjects students are introduced to several aspects of Australian society and culture: the indigenous experience; aspects of rural and urban Australia; the history of migration; and the development of multiculturalism. Students explore these aspects through film, documentaries, literature, music, art, sport events, etc. Visits to cultural institutions as well as presentations and guest lectures from experts are key features of these subjects.

59310

Postgraduate Study in Australia

8cp; prerequisite(s): IELTS score 5.5 (minimum of 5.5 in writing); corequisite(s): enrolled in a postgraduate research degree at UTS
(only for postgraduate international students)

This is the first of three compulsory subjects in the Graduate Certificate in English for Academic Purposes (GCEAP) specifically for international students enrolled in a postgraduate research degree at UTS. The aim of this intensive subject is to provide students with a foundation in academic literacy and oracy skills required to start postgraduate studies at UTS.

This subject focuses on developing the language and learning skills required for tertiary study in an Australian university. It integrates the four macro-skills – reading, writing, listening and speaking – into a thematic approach which looks at a variety of contemporary issues in Australian culture and society. The subject also provides students with an understanding of studying at an Australian university and living in Australia.

59311

Academic English for Postgraduate Study

8cp; prerequisite(s): 59310 Postgraduate Study in Australia or equivalent; corequisite(s): enrolled in a postgraduate research degree at UTS
(only for postgraduate international students)

This is the second of three compulsory subjects in the Graduate Certificate in English for Academic Purposes (GCEAP) specifically for international students enrolled in a postgraduate research degree at UTS. The aim of this intensive subject is to provide students with academic literacy and oracy skills required to be effective postgraduate students.

This subject focuses on developing the academic written and spoken language skills required for postgraduate study in the students' disciplines. These academic skills are developed in the context of students' areas of study and in conjunction with staff from faculties across UTS. Students take a critical/analytical approach to understanding and producing written and spoken texts appropriate for the Australian context. The subject focuses in particular on critical reading skills, paraphrasing and summarising, selecting, evaluating and using a variety of sources of information, developing written arguments, presenting seminars, etc. In this subject, texts are selected and assessment prepared jointly by academic literacy experts and postgraduate coordinators and supervisors in students' faculties.

59312

Postgraduate Academic Writing in Context

8cp; prerequisite(s): 59311 Academic English for Postgraduate Study or equivalent; corequisite(s): enrolled in a postgraduate research degree at UTS
(only for postgraduate international students)

This is the final of three compulsory subjects in the Graduate Certificate in English for Academic Purposes (GCEAP) specifically aimed at international students enrolled in a postgraduate research degree at UTS. The aim of this subject is to provide students with ongoing integrated academic literacy and oracy support during the first semester of their postgraduate studies at UTS.

This subject focuses on consolidating postgraduate international students' academic literacy and oracy skills while they complete the first semester of postgraduate studies at UTS. The subject focuses on advanced skills in reading, text drafting and editing, the development of critical writing skills and the preparation of postgraduate assignments or research documents (articles, conference papers, etc.).

59314

Australian English Language and Culture 1

24cp; 20hpw

This subject enables international students from language backgrounds other than English to develop their English language skills through the study of aspects of contemporary Australian society and culture. Through both class activities and excursions, it introduces students to a range of intercultural issues and provides them with opportunities to interact with native speakers in order to develop the cultural understanding, skills, knowledge and confidence required to use English and participate actively in a variety of settings. The subject focuses particularly on oral skills and includes some participation in mainstream University classes. Students complete a major project using ethnographic research techniques.

59315

Australian English Language and Culture 2

24cp; 20hpw; prerequisite(s): 59314 Australian English Language and Culture 1 or equivalent

This subject continues the language skill development of 59314 Australian English Language and Culture 1 and extends student participation in mainstream University classes. Students complete a number of field projects on topics relating to their own interests or study areas. Lecturers coordinate student progression through these projects through individual and group meetings, presentations by guest speakers, excursions and readings.

59316

Essay Writing

4cp; over 10 weeks

This elective is one of five subjects offered by the ELSSA Centre and it is aimed at non-English-speaking-background students who need to develop their essay-writing skills. It focuses on the critical analysis of topics relevant to different academic areas of study, the development of essay outlines and the final preparation of essays.

59317

Report Writing

4cp; over 10 weeks

This elective is one of five subjects offered by the ELSSA Centre and it is aimed at non-English-speaking-background students who need to develop their report-writing skills. It focuses on the analysis of topics relevant to different academic areas of study, the development of report plans and the final preparation of reports.

59318

Seminar Presentation

4cp; over 10 weeks

This elective is one of five subjects offered by the ELSSA Centre and it is aimed at non-English-speaking-background students who need to develop their seminar presentation skills. It focuses on the analysis of topics relevant to different academic areas of study and the development of seminar presentation skills.

59319

Communication for Employment

4cp; over 10 weeks

This elective is one of five subjects offered by the ELSSA Centre and it is aimed at non-English-speaking-background students who need to develop their employment-seeking skills. It focuses on the analysis of recruitment advertisements relevant to different academic areas of study, and the development of writing and speaking skills required for gaining employment. It also covers work-related communication skills.

59320

English for Business

6cp; over 10 weeks

This elective is one of five subjects offered by the ELSSA Centre and it is aimed at non-English-speaking-background business students who need to develop their written and spoken communication skills. It focuses on the critical analysis of topics relevant to business study, the development of essay outlines, report outlines, seminar structures and the final preparation of an essay, a report and a seminar.

SUBJECT DESCRIPTIONS

44152

Groundwater Engineering Project (M) (F/T)

24cp; availability: Groundwater Management courses only
Postgraduate
Subject Coordinator: Professor M J Knight, National Centre for Groundwater Management

The objective of subjects 44152, 44153, 44156, 44157 is to provide candidates with the opportunity to research specific groundwater engineering, resource, environmental or contamination problems. Projects should reflect the knowledge and experience obtained throughout the coursework section of the course, and should demonstrate initiative, creativity and practical problem solving. The depth and extent of the research varies with the level of the degree, i.e. a Master's project is more in-depth and critical than a Graduate Diploma project. Each project is a substantial study that must be completed to a high professional standard. It must, however, be realistic with due regard to the time, supervision and facilities available. Each student is required at commencement of the project to write a short (two page) research plan which addresses the following issues: introduction; statement of the problem; importance of the project; research objectives; methods; expected results; timetable (milestones, dates). The research plan is submitted to the Subject Coordinator for endorsement or revision. At the conclusion of the project, three bound copies of a comprehensive report are submitted. In special circumstances, with the agreement of the project supervisor, alternative modes of project reporting might be acceptable (e.g. conference papers).

44153

Groundwater Engineering Project (GD) (F/T)

12cp; availability: Groundwater Management courses only
Postgraduate
Subject Coordinator: Professor M J Knight, National Centre for Groundwater Management

For subject description, refer to 44152 Groundwater Engineering Project (M) (F/T).

44156

Groundwater Engineering Project (M) (P/T)

12cp; availability: Groundwater Management courses only
Postgraduate
Subject Coordinator: Professor M J Knight, National Centre for Groundwater Management

For subject description, refer to 44152 Groundwater Engineering Project (M) (F/T).

44157

Groundwater Engineering Project (GD) (P/T)

6cp; availability: Groundwater Management courses only
Postgraduate
Subject Coordinator: Professor M J Knight, National Centre for Groundwater Management

For subject description, refer to 44152 Groundwater Engineering Project (M) (F/T).

48006

Capstone Project (6cp)

6cp; prerequisite(s): 48260 Engineering Management; corequisite(s): 48140 Review of Engineering Practice 2 or 48160 Professional Review; 48270 Technology Assessment
Undergraduate
Subject Coordinator: David Eager

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 the opportunity to demonstrate professional competencies and capabilities; and to provide scope to demonstrate initiative and creativity, and take pride in achievement.

Each student is required to undertake a substantial engineering project, normally during their final year of study, and to prepare a formal report describing the work performed and the resulting conclusions and recommendations. The work is planned and carried out under the supervision of a member of academic staff. Both the work and the report must meet professional engineering standards. The project may be in any area of engineering. Students may choose a topic relating to their experience in engineering practice, or an area of interest which they wish to study in detail. Typical projects might take any of the following forms: literature review – a study of the available literature and a state-of-the-art appraisal of an area of engineering; design – the complete design of a substantial engineering artefact or system; experimental investigation – a comprehensive laboratory investigation or testing program; research and development – original research of a fundamental or applied nature, or development of a new application of a particular technology; computer-based analysis – development or use of computer software to study the behaviour of an engineering solution; project management – planning and management of a substantial engineering project, normally in a workplace, business or community context; combining technical and management skills; impact analysis, planning, system design – study and analysis of an engineering solution in its economic, social and environmental context, integrating the engineering dimension with cross-disciplinary interfaces, and optimising overall system design, normally interactive with other professions.

48012

Capstone Project (12cp)

12cp; prerequisite(s): 48260 Engineering Management; corequisite(s): 48140 Review of Engineering Practice 2 or 48160 Professional Review; 48270 Technology Assessment
Undergraduate
Subject Coordinators: Gerry Ring and David Eager

Refer to the subject description for 48006 Capstone Project. The difference between the 6cp and 12cp versions of the Capstone Project is that a student is expected to invest at least 150 hours in the former, and 300 hours in the latter.

48016

Capstone Project – Part A

6cp; prerequisite(s): 48260 Engineering Management; corequisite(s): 48140 Review of Engineering Practice 2 or 48160 Professional Review; 48270 Technology Assessment
Undergraduate
Subject Coordinator: David Eager

Refer to the subject description for 48006 and 48012 Capstone Project. This subject is intended for students who wish to undertake a 12cp Capstone Project over two semesters. Such students enrol in this subject (48016) in the first semester and 48026 Capstone Project – Part B in the second semester.

48026

Capstone Project – Part B

6cp; prerequisite(s): 48016 Capstone Project – Part A
Undergraduate
Subject Coordinator: David Eager

Refer to the subject description for 48006 Capstone Project. This subject is intended for students who wish to undertake a 12cp Capstone Project over two semesters. Such students enrol in the subject 48016 in the first semester and this subject (48026) in the second.

48071

Numerical Methods

6cp
Undergraduate

This subject builds on students' knowledge of mathematics from the TAFE Diploma. It assumes a knowledge of introductory calculus. It provides students with an understanding and use of numerical methods in the engineering environment. It lays the foundations to enable students to confidently use numerical techniques in subsequent subjects and the work environment.

Topics include: applications of sequences and series; linear algebra; matrices, vectors and determinants; applications of matrices and vectors; vector algebra in 2-space and 3-space; introduction to vector calculus and applications; curve fitting using least squares methods for polynomials, log-linear and log-log relationships; engineering applications of differential equations (first and second order); numerical methods in linear algebra and in the solution of differential equations; graph theory and optimisation; use of the Simplex method; introduction to combinatorial optimisation; probability and statistics

including probability theory, permutations and combinations, probability distributions, binomial, Poisson and normal distributions; sampling, confidence intervals and hypothesis testing.

Assessment: assignments 20 per cent; mid-semester examination 30 per cent; final examination 50 per cent.

48110

Engineering Experience 1

0cp; prerequisite(s): 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
Undergraduate

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 gain this level of experience early in their academic program. One semester prior to undertaking the experience students must enrol in the subject 48121 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 so that they can gain a wide range of skills and abilities.

Each student's experience is unique. 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 fields of practice subjects and specifically through Engineering Practice Review 1.

48120

Review of Engineering Practice 1

6cp (exemption process)
ENGINEERING PRACTICE
Undergraduate

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 is a substitute for the two new 3-credit-point 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.

This subject is also relevant for new students starting the engineering degree at UTS with significant work experience. These students may apply for an exemption. By completing this subject, students accelerate their progress in the DipEngPrac.

48121

Engineering Practice Preview 1

3cp
ENGINEERING PRACTICE
Undergraduate

Engineering Practice Preview 1 helps initiate students to the engineering workplace by guiding them through the employment process, developing the communication and documentation skills appropriate to engineering practice, showing them how to learn through experience, exploring the nature and culture of the workplace, introducing ethical and social issues, and helping them to plan for their own personal and professional development.

Students negotiate their learning options from a range of compulsory and optional topics including: ethics and social responsibility, industrial relations, occupational health and safety, and the culture of engineering.

Assessment tasks are negotiated from a variety of compulsory and optional assignments, many of which can be incorporated into the student's portfolio. Some tasks include: personal résumé, job application letters, employment interviewing, learning style assessment, learning contracts, ethics case study, and industrial relations case study. Assessment is essentially formative to assist students in achieving an acceptable level. However, students are not able to undertake Engineering Experience 1 until they have passed all the compulsory components of Engineering Practice Preview 1.

48122

Engineering Practice Review 1

3cp; prerequisite(s): 48110 Engineering Practice 1
ENGINEERING PRACTICE
Undergraduate

Engineering Practice Review 1 guides students through a process of thoughtful reflection and review of their engineering practice. Workplace issues are examined and students are assisted in developing appropriate professional strategies. Students identify the technical and professional advancement that has occurred as a consequence of their experience, and integrate these new ideas with their existing knowledge frameworks. This learning is documented for peer and professional review.

Since each student's work experience is unique, all students benefit from sharing and discussing their experiences. However, this subject assists all students to receive a firm grounding in the fundamentals of engineering workplace practice, including: the nature and culture of the engineering workplace, the employment process, ethics and social responsibility, communication and documentation, the application of engineering method, occupational health and safety, industrial relations, and personal and professional development.

Assessment tasks include: evaluation of the learning contract, report on workplace experience, group review, logbook and portfolio.

48130

Engineering Experience 2

0cp; prerequisite(s): 48141 Engineering Practice Preview 2
ENGINEERING PRACTICE
Undergraduate

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 are advanced in their academic studies and 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 48141 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.

Each student's experience is unique. 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 fields of practice subjects and specifically through Engineering Practice Review 2.

48140

Review of Engineering Practice 2

6cp; prerequisite(s): 48120 Review of Engineering Practice 1 plus an additional 24 weeks of engineering practice at a professional level
ENGINEERING PRACTICE
Undergraduate

This is a transition subject that 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.

48141

Engineering Practice Preview 2

3cp; prerequisite(s): 48122 Engineering Practice Review 1
Undergraduate

Engineering Practice Preview 2 helps students to develop as professional engineers by refining employment-related processes, developing the communication and documentation skills appropriate to professional engineering practice, exploring issues of organisational management and commercial practice, examining ethical and social issues, applying theory in practice and developing strategies for continuing professional development.

Students negotiate their learning options from a range of compulsory and optional topics including: the nature and culture of professional engineering, the professional employment process, engineering in a global social context, organisational behaviour, management and commercial practice, industrial relations and human resource issues, communication and documentation, leadership and teamwork,

occupational health and safety, ethics and social responsibility, experiential learning and knowledge creation, and personal and professional development. In addition they consider the development of professional competencies as required by the Institution of Employers, Australia.

Assessment tasks are negotiated from a variety of compulsory and optional assignments, many of which can be incorporated into the student's portfolio. Some tasks include: professional résumé, employment and assessment interviewing, learning contracts, ethics case study, industrial relations case study, occupational health and safety case study. Assessment is formative to assist students in achieving an acceptable level. However, students are not able to undertake Engineering Experience 2 until they have passed all the compulsory components of Engineering Practice Preview 2.

48142

Engineering Practice Review 2

3cp; prerequisite(s): 48130 Engineering Experience 2
Undergraduate

Engineering Practice Review 2 helps students to develop as professional engineers by reflecting on their workplace practice and documenting their learning for peer and professional review.

Since each student's work experience is unique, all students benefit from sharing and discussing their experiences. However, this subject assists all students to appreciate the dimensions of professional engineering workplace practice, including: engineering in a global environment, organisational behaviour, commercial practice, industrial relations and human resource issues, ethics and social responsibility, communication and documentation, the extension and application of engineering knowledge, occupational health and safety, industrial relations, and personal and professional development and recognition.

Assessment tasks include: evaluation of the learning contract, report on workplace experience and career episodes, group review, logbook, and portfolio.

48210

Engineering for Sustainability

6cp
CORE
Undergraduate
Subject Coordinator: Dr Keiko Yasukawa

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 choose one of several module groups based around broad engineering-related themes.

Within these modules, students examine 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 are 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.

48221

Informatics VB

6cp
CORE
Undergraduate
Subject Coordinator: Austin Mack

This subject has the same objectives as 48222 Informatics C but uses the language Visual Basic as the vehicle for developing student knowledge and understanding.

48222

Informatics C

6cp
CORE
Undergraduate
Subject Coordinator: Martin Evans

The aim of Informatics C is to develop skills in computing and an awareness of the associated ethical issues within the context of the Engineering profession. The four broad learning objectives of the subject are to:

1. develop skills in computer programming in order to gain a better understanding of how a computer operates
2. develop skills in problem solving where the solution is suitable for a computer
3. develop an awareness of the ethical issues associated with computing, and
4. develop skills in using informatics' tools.

Topics include: C programming; pseudocode; problem solving; algorithm design; personal and professional ethics; library awareness; personal software process; time management; operating systems; the Internet; and engineering tools.

48230

Engineering Communication

6cp; prerequisite(s): 48210 Engineering for Sustainability
CORE
Undergraduate
Subject Coordinator: Helen McGregor

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

6cp; prerequisite(s): 48210 Engineering for Sustainability; 48221/2 Informatics; 33230 Mathematical Modelling 2
CORE
Undergraduate
Subject Coordinators: Tim Aubrey and Keiko Yasukawa

In this subject, students engage in ideas of how, as engineers, they have a responsibility to make appropriate analysis of different types of risk scenarios, how risk is perceived and assessed by different groups of people, and what constitutes 'management' of risks. In order to engage in these ideas, students need and learn various theories, techniques, and experiences as they progress through the subject.

Upon conclusion of this subject, students are expected to demonstrate:

- a critical appreciation 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'
- awareness of contexts in which experts, including professional engineers, manipulate problems involving risk and uncertainty
- experience in formulating and undertaking a modelling exercise, and a critical appreciation of the uncertainties and subjectivities inherent in modelling, and
- the ability to select and apply appropriate statistical tools, to acquire additional statistical competencies, and to evaluate their strengths and limitations.

48250

Engineering Economics and Finance

6cp; prerequisite(s): 48110 Engineering Practice 1; 48240 Uncertainties and Risks in Engineering
CORE
Undergraduate
Subject Coordinator: Gary Marks

The objectives of this subject are for students to be able to use their knowledge 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 the place engineers occupy in the economic environment; the terms, philosophies and mechanics of economic documentation as they may be seen by engineers in their professional context; and the financial, economic, environmental and social issues confronting engineers in technological project management and costing.

48260

Engineering Management

6cp; prerequisite(s): 48122 Engineering Practice Review 1 or 48120 Review of Engineering Practice 1; 48240 Uncertainties and Risks in Engineering
CORE
Undergraduate
Subject Coordinator: Ravindra Bagia

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

6cp; prerequisite(s): 48240 Uncertainties and Risks in Engineering
CORE
Undergraduate
Subject Coordinator: Paul Bryce

The objective of this subject is to provide students with an understanding of technology as a context-based process, and to gain an appreciation of how it has been specifically constructed within the engineering culture.

Students develop an appreciation of the two-way influences between technology and society. This allows students to review and critique paradigms and tools for assessing technology; 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.

The subject provides case studies for student exercises in assessment in, for example, forecasting, policy, assessment, venture capital or innovation assessment, or consultancy advice to researchers, government or corporate managers.

48310

Introduction to Civil Engineering

6cp
Fields of Practice: Civil Engineering Program
Undergraduate

The objectives of this subject are: to ensure a general understanding of the role of the civil engineer in the provision of basic infrastructure necessary to support the development and maintenance of urban and rural settlement; to provide a sound foundation for further education in the processes of design, construction, operation and maintenance of community infrastructure; to provide an understanding of the need to consider the demands and expectations of the community, while having due regard for both the developed and fragile natural environment; to ensure an understanding of the need to develop the necessary individual, and multidisciplinary skills in civil engineering project analysis and development; and to develop effective verbal and written communication skills.

Lecture content includes: civil engineering and the environment, phases of civil engineering work, drawings and specifications, loads and deflection, uses and behaviour of construction material (concrete and steel), building dynamics, soils and civil engineering, soil retention structures, roads and traffic engineering, water engineering.

Field work and associated design exercise: two sessions (3 hours' duration each) of basic surveying and levelling in the field, followed by one three-hour session of design work involving catchment area calculation, stormwater run-off estimation, longitudinal section plotting, and pipe gradient design using basic formulae. This segment serves as an introduction to surveying, hydrology and urban stormwater management subjects.

Seminar presentation: two sessions of (2 hours duration each) for presentation of a short discussion paper on a civil engineering topic of individual choice. Use of audiovisual aids is encouraged.

Laboratory sessions: two sessions of 1.5 hours duration involving demonstration of water engineering and building dynamics.

Projects – Discovery: two formal sessions of 3 hours duration and supplementary work in group format to develop experimentation and understanding of the engineering process.

Site visit: all students must attend an all-day site visit of a civil engineering project or operational facility, to gain an appreciation of the workplace. Practising civil engineers and other professionals accompany the students in outlining the necessary skills required to design and construct an engineering project or operational facility. Site visits may include inspection of the following facilities after construction: water treatment plant, wastewater treatment plant, water storage dam and associated power station. Site visits may also include the following during construction: arterial road (freeway/motorway), road bridge, transportation facility (light rail), commercial or industrial building, coastal engineering structure (coal loader or harbour structure).

48320

Surveying

6cp
Fields of Practice: Civil Engineering Program
Undergraduate

The objectives of this subject are to enable students to: become competent in the theory and practice of basic surveying skills; be able to use basic surveying equipment such as levels and theodolites and perform the calculations and reductions of observations associated with such equipment; be aware of the likely errors that may occur during observations and of methods to eliminate, or minimise such errors; be competent in making distance measurements accurately over short distances using tapes and wires and be aware of the advantages of modern developments in this field such as Electronic Distance-measuring Equipment; be able to perform a simple traverse and associated calculations to find the misclose and proportional accuracy, and the bearing and distance of one missing line; understand and be able to perform relevant calculations for the engineering applications of surveying (horizontal curves, vertical curves, and areas and volumes); and be aware of field techniques used to enable preparation of a detail and contour plan. The stadia method is discussed in class and is used as a data-gathering tool in a practical exercise.

The applications of modern computer programs to reduce data for and the plotting of detail and contour plans are introduced. Services of professional surveyors are explained, as are engineering situations where surveyors must be engaged.

Topics include: use of equipment such as levels, theodolites and tapes and wires; calculations related to this equipment, as well as traversing, horizontal curve setting out, design of vertical curves, areas and volumes and stadia and contouring; modern developments in surveying; and the role of the professional surveyor.

48321

Statics

6cp; corequisite(s): 33130 Mathematical Modelling 1; 68037 Physical Modelling
FIELDS OF PRACTICE: CIVIL ENGINEERING PROGRAM
Undergraduate

The subject aims to assist students to acquire fundamental understanding of equilibrium concepts commonly used in analysis and design of engineered structures. It also aims to develop their skills to analyse simple structures such as beams and trusses subjected to various loading and support conditions. On completion of this subject, students should be able to apply equilibrium conditions as tools to analyse simple structures, and have developed an appreciation of design in civil engineering. The principles developed in this subject form the basis of structural analysis and design.

48330

Soil Behaviour

6cp; corequisite(s): 48331 Mechanics of Solids
FIELDS OF PRACTICE: CIVIL ENGINEERING PROGRAM
Undergraduate

The objective of this subject is to give a broad-based introduction to the geosciences and a more rigorous introduction to soil as an engineering material. The subject concludes with a detailed study of the problem of soil settlement behaviour. At the completion of the subject students should: be familiar with the natural processes occurring on the surface of the earth; be able to communicate with geologists, earth scientists and others involved in studying the ground; understand the fundamentals of the behaviour of soil as an engineering material; be aware of those aspects of soil behaviour which have a significant environmental impact; be able to solve a range of soil-related problems especially those involving water flow and soil settlement; have a solid basis for further formal study and self-study in the geotechnical area.

Topics include: introduction to soil engineering – typical problems, the engineer's role; geological fundamentals – classification, composition and structure of rock, engineering properties; geomorphology – soil formation, landforms; nature of soil – particulate nature, classification, clay mineralogy; introduction to soil mechanics – overview, state of vertical stress, effective stress; water in soil – groundwater, seepage and permeability; soil environmental impacts – problems, environmental behavioural aspects and properties; settlement of soils – settlement theory, consolidation testing, stresses under loaded areas, 1D settlement estimation, elastic deformations, rate of settlement.

48331

Mechanics of Solids

6cp; prerequisite(s): 48321 Statics or 48620 Fundamentals of Mechanical Engineering
FIELDS OF PRACTICE: CIVIL ENGINEERING PROGRAM
Undergraduate

The objectives of this subject are to enable students to: acquire fundamental understanding of the behaviour of structural components commonly used in engineered structures and machines; develop skills to help them model and analyse the behaviour of structural and machine components subjected to various loading and support conditions based on principles of equilibrium and material constitutional relationships.

Content includes: pure bending of beams – flexural stress and strain, calculation of beam loads; shear flow and shear stresses in beams – distribution of shear stresses in beam sections, forces and stresses in shear connectors; composite beams – composite short columns; slope and deflection of simple beams; column buckling – Euler's equation, end conditions and effective length, combined axial and bending stresses for short columns; torsion of circular shafts, thin-walled closed sections and solid rectangular sections; transformation of plane stresses – Mohr's circle of plane stresses, principal stresses and planes; inelastic bending – stress resultants, yield moment and ultimate moment capacity of elastoplastic sections, elastic and plastic section modulus, plastic hinges; product of inertia, principal axes and principal moments of inertia; unsymmetric bending; combined stresses due to axial force, shear force, bending

moments and twisting moment; shear centre; transformation of plane strains – measurement of strains, strain rosette, relationship between elastic modulus, shear modulus and Poisson's ratio.

48340

Construction

6cp; prerequisite(s): 48310 Introduction to Civil Engineering
FIELDS OF PRACTICE: CIVIL ENGINEERING PROGRAM
Undergraduate

The objective of this subject is to give a broad based introduction to the construction industry and to emphasise the technical and managerial skills needed by engineering professionals working in this area. On completing the subject the student should have a well developed awareness of the equipment, processes and methodology associated with construction work; be able to estimate productivity of earthmoving equipment using cycle time data and correctly balance fleets of machinery; have a basic understanding of preliminary and detailed cost estimating; be able to identify many of the day-to-day problems encountered on construction sites; and be able to participate actively in planning construction projects and solving construction problems.

Topics include initial site establishment; earthmoving grading and compaction equipment; shoring of excavations, underpinning; foundation work pumps and groundwater control; compressors and air tools; formwork and falsework concrete construction equipment performance, the repetitive cycle of operations and fleet operation; project planning preliminary and detailed estimates and bid considerations.

48349

Structural Analysis

6cp; prerequisite(s): 33230 Mathematical Modelling 2; 48331 Mechanics of Solids
FIELDS OF PRACTICE: CIVIL ENGINEERING PROGRAM
Undergraduate

This subject covers methods and concepts which are fundamental to the analysis of structural frameworks. Students learn to analyse indeterminate structures using both direct force-based methods as well as iterative methods such as moment distribution. Students also learn how to establish and apply structural loads that are typical in building design and how to use influence lines to find maximum load effects. An introduction to nonlinear analysis of structures is also given to prepare students for understanding the limit-states design concepts, which they encounter in other structural design subjects.

48350

Environmental and Sanitation Engineering

6cp; prerequisite(s): 60101 Chemistry and Materials Science
FIELDS OF PRACTICE: CIVIL ENGINEERING PROGRAM
Undergraduate

This subject introduces civil engineering students to basic environmental concepts and the environmental consequences of typical engineering activities. It applies material learnt in 48210 Engineering for Sustainability and 60101 Chemistry and Materials Science to real-life situations encountered during planning, designing and implementing civil engineering projects. The subject helps students: develop an awareness of environmental issues; understand the implication of certain processes such as construction within a natural system and to become familiar with both preventive and management strategies to minimise air, water, soil and noise pollution; become familiar with the main aspects of environmental legislation; and understand concepts and design of water pollution control mechanisms.

Main topics are: environmental issues and their importance; pollution due to man-made activities, their types and their effect on natural ecosystems; an introduction to local and global environmental problems; environmental legislation and the importance of conducting environmental impact assessment; problems of waste generation and principles of landfill management; generation and management of toxic wastes; contaminated sites and their remediation; concepts of water pollution control; design of water and wastewater treatment works; and project case studies emphasising environmental issues.

48352

Construction Materials

6cp; prerequisite(s): 60101 Chemistry and Materials Science
FIELDS OF PRACTICE: CIVIL ENGINEERING PROGRAM
Undergraduate

Civil engineering is carried out by professionals who design, construct, maintain, inspect and manage public works projects. The common materials used in civil engineering applications or in construction are timber, concrete, bitumen, masonry and reinforcing and structural steel. It is essential for civil

engineers to have the basic understanding of these construction materials, in relation to their production, properties, testing and application. The main objectives of this subject are to help students acquire the fundamental knowledge on the production, physical and engineering properties of the construction materials; understand the effects of environments on the properties and performance of these materials; become familiar with the relevant Australian and other specifications and standards, in relation to the requirements and testing methods and interpretation of test results; improve analytical and communication skills by presenting the test report; select the material in relation to the specified requirements; and develop the awareness of the use of waste materials for construction.

Subject content is designed to meet the objectives in relation to the following construction materials: steel, timber, bituminous materials, concrete, and masonry. Topics include: requirements, selection and standards of construction materials; steel – production, forms, grades, mechanical properties and testing; bituminous materials and mixtures – production, properties and testing; timber – classification, grading, properties and testing; timber products – plywood and glulam; cement and other binders – production, types, composition, properties and testing; waste materials for construction – fly ash, recycled concrete, slag, and others; aggregate – classification, properties and testing; admixtures – types and effects on concrete properties; concrete – uses, mix design, properties and testing of fresh and hardened concrete; masonry units, mortar, grout and plaster; environmental degradation of construction materials including fire attack.

48359

Structural Design 1

6cp; prerequisite(s): 48349 Structural Analysis
FIELDS OF PRACTICE: CIVIL ENGINEERING PROGRAM
Undergraduate

All engineers who wish to practise as civil engineers in Australia must have a competent knowledge of structural design to the relevant current Australian Standards, and a competent knowledge of structural analysis to allow the design to be done. Structural analysis is an integral part of the structural design process because it allows engineers to model the behaviour of structures under load and to determine the design actions induced by the applied loads. The prior structural subjects that students have completed have introduced them to statics, solid mechanics, simple aspects of the (structural) design process, the structural behaviours of materials (in the corequisite subject) and methods of structural analysis. Structural design then builds on the prior fundamental knowledge of material properties and structural analysis and allows the engineer to design a safe and economical structure complying with the requirements of the relevant Australian Standards, based on his or her knowledge of and experience in structural behaviour.

Students learn about the structural behaviour and become competent in the structural design of reinforced concrete elements (beams, slabs and columns) and of timber elements (beams, columns, tension members, beam-columns and bolted and nailed connections) in accordance with the relevant Australian Standards. The competence gained in structural analysis assists students in gaining experience and competence in the structural design of these structural components.

Topics include: reinforced concrete – introduction to reinforced concrete behaviour, uncracked and cracked section analyses, linear elastic and ultimate behaviour in beams, serviceability of beams and ultimate strength design for moment and shear in beams, one-way, two-way and flat slab analysis and design, punching shear, column design (stocky and slender) and reinforcement detailing; timber – introduction to timber behaviour, material properties and supply, design of tendion and compression members, design for moment, shear, bearing and deflection in beams, design for combined actions, design of nailed and bolted Type 1 connections and durability-based design.

Assessment: assignments worth 25 per cent, mid-semester exam worth 35 per cent, short answer quiz worth 5 per cent and an exam worth 35 per cent.

48360

Geotechnical Engineering

6cp; prerequisite(s): 48330 Soil Behaviour; 48340 Construction
FIELDS OF PRACTICE: CIVIL ENGINEERING PROGRAM
Undergraduate

The aim of this subject is to develop students' technical competence in the analysis of soil masses and of their influence on structures associated with the soil. The analysis of footings, retaining walls and soil slopes are

examples. By completing this subject, students should be able to: understand the concept of failure in soil and apply it to the analysis of soil masses; critically appraise a problem in order to decide which particular analysis should be used; identify the limitations of their analyses and carry out appropriate solution validation; be responsible for the analysis component of a design team; study the relevant literature and learn to apply new, or more complex, methods of analysis; carry out fieldwork in association with subsurface investigations.

Topics include: shear strength theory – Mohr Coulomb failure law; site investigation – planning, fieldwork, techniques; shallow foundations – types, bearing capacity theories, retaining structures; earth pressure theories – Rankine and Coulomb, analysis of gravity walls, cantilever walls, braced excavations; deep foundations – types, load carrying capacity, settlement, group behaviour, lateral loading; slope stability – failure mechanisms, infinite slopes, rotational failure, remedial measures; soil improvement – compaction, soil stabilisation, dewatering, preloading.

48362

Hydraulics and Hydrology

6cp; prerequisite(s): 48641 Fluid Mechanics
FIELDS OF PRACTICE: CIVIL ENGINEERING PROGRAM
Undergraduate

The objective of this subject is to give students a knowledge of open channel hydraulics and hydrology, leading to understanding of the scientific foundations and basic principles of these fields, and the ability to apply hydraulic and hydrological methods to engineering applications in an integrated way. Knowledge of fluid mechanics is consolidated and problem-solving skills in dealing with water engineering tasks are acquired.

Topics include: open channel hydraulics – types of flow (e.g. steady, uniform), friction equations, rapidly-varied flow, continuity, energy and momentum conservation, gradually varied flow, water surface profiles, software packages, hydraulic structures (channel appurtenances, culverts, bridge waterways); hydrology – the hydrological cycle, water balances, meteorology and climatology, data collection, statistics, hydrological models, design rainfalls, rainfall-runoff processes, flood estimation models and procedures, software packages, yield analysis, groundwater, environmental hydrology; and integration of hydraulics and hydrology case studies.

48369

Structural Design 2

6cp; corequisite(s): 48359 Structural Design 1
FIELDS OF PRACTICE: CIVIL ENGINEERING PROGRAM
Undergraduate

All engineers who wish to practise as civil engineers in Australia must have a competent knowledge of structural design to the relevant current Australian Standards, and a competent knowledge of structural analysis to allow the design to be done. Structural analysis is an integral part of the structural design process because it allows engineers to model the behaviour of structures under load and to determine the design actions induced by the applied loads. The prior structural subjects that students have completed have introduced them to statics, solid mechanics, methods of structural analysis, the structural behaviour of materials and structural design of reinforced concrete and timber elements. Structural design then builds on the prior fundamental knowledge of material properties and structural analysis and allows the engineer to design a safe and economical structure complying with the requirements of the relevant Australian Standards, based on his or her knowledge of and experience in structural behaviour.

Students learn about the structural behaviour and become competent in the structural design of steel elements (tension and compression members, beams, beam-columns and bolted and welded in-plane connections), reinforced concrete pad footings and cantilevered retaining walls and of prestressed concrete flexural elements in accordance with the relevant Australian Standards. The competence gained in structural analysis assists students in gaining experience and competence in the structural design of these structural components.

Topics include: structural steel – material properties, tension and compression members, in-plane effective lengths, beam design (section moment capacity, lateral-torsional buckling, shear, web crippling, web buckling and three-plate girders, beam-columns, bolted and welded in-plane connections, fracture and fatigue behaviour and design; reinforced concrete – isolated pad footings and cantilevered retaining walls; prestressed concrete – introduction to prestressed concrete behaviour, load-balancing and equivalent load techniques, uncracked and cracked section analyses, linear elastic and ultimate behaviour in beams, serviceability of beams

and ultimate strength design for moment and shear in beams, strength at transfer and end block reinforcement.

48370

Transport in the Environment

6cp; prerequisite(s): 33230 Mathematical Modelling 2
FIELDS OF PRACTICE: CIVIL ENGINEERING PROGRAM
Undergraduate

The objectives of this subject are to enable students to understand: the relationship between transport and land use; the basic concepts of transportation relating to modelling and design; and the relationship between urban form, energy use and sustainability. Students also learn to design feasible transport schemes using a variety of modes and to evaluate transportation projects in terms of their capacity, cost, environmental impact and equity.

Topics include: land-use transportation interaction; the transportation planning system; environmental impact of transport and issues in ecologically sustainable transport; design principles used in public transport; transport economics, privately funded infrastructure and freight issues; the geometric design, pavement design and the capacity of roads; the needs of pedestrians and cyclists and the overall road safety issue.

48389

Computer Modelling and Design

6cp; prerequisite(s): 48359 Structural Design 1; successful completion of 144cp
FIELDS OF PRACTICE: CIVIL ENGINEERING PROGRAM, CIVIL AND ENVIRONMENTAL ENGINEERING PROGRAM
Undergraduate

This subject combines computer modelling and civil engineering design for senior engineering students. Students learn basic concepts necessary to develop and apply computer models to prepare a complete structural engineering design. Building on subjects they have completed earlier, students learn to integrate their engineering knowledge to design a multistorey building or an industrial enclosure. They are guided by a team of academic staff through a wide range of fundamental design aspects covering the design of foundation and structural elements, design loads, water drainage and the preparation of design drawings.

48401

Aerospace Operations 1

6cp
Undergraduate

This is the first subject in the Aerospace Operations major and provides an overview of aerospace operations in the aviation industry. Aerospace operations are not seen as unique but as a particular example of a transport system which operates in a commercial, economic and regulatory environment.

Topics include defining the Aerospace industry; what is meant by aerospace operations; historical evolution of air transport with trends in transport aircraft design; fuels; supersonic transport; travel away from Earth; energy and materials as key factors; aspects of management and business practice; introduction to strategic planning applied at the company and national levels in the context of technological change.

Assessment: seminar presentation worth 25 per cent; literature review worth 30 per cent; major reports worth 30 per cent; class participation worth 15 per cent.

48402

Aerospace Operations 2

6cp; prerequisite(s): 48401 Aerospace Operations 1
Undergraduate

This subject provides students with skills and understanding in various aspects of flight and ground operations. This is the second subject in the Aerospace Operations major. In this subject students are given the opportunity to analyse system and aircraft performance, and to plan aerospace operations. These activities are central to the overall objectives of the course, and facilitate understanding required of professionals in the industry.

Assessment: seminar presentation worth 25 per cent; literature review worth 30 per cent; major reports worth 30 per cent; class participation worth 15 per cent.

48403

Aerospace Operations 3

6cp; prerequisite(s): 48402 Aerospace Operations 2
Undergraduate

This subject provides students with a global view of aerospace operations, and allows them to contribute to aerospace operations through integration of material covered throughout the course. The subject considers aerospace as an integral part of the total transport

system; aviation law and regulations; systems engineering theory, applied to aerospace operations. This subject also integrates material from other elements of the course to give an overview of aerospace operations. Aerospace operations are not seen as unique but as a particular example of a transport system which operates in a commercial, economic and regulatory environment.

Assessment: seminar presentation worth 25 per cent; literature review worth 30 per cent; major reports worth 30 per cent; class participation worth 15 per cent.

48404

Aerospace Maintenance and Management

6cp; prerequisite(s): 48403 Aerospace Operations 3; corequisite(s): 48070 Engineering Material
Undergraduate

This subject provides students with a global view of aerospace operations, and allows them to contribute to aerospace operations through integration of material covered throughout the course. The subject considers aerospace as an integral part of the total transport system; aviation law and regulations; systems engineering theory, applied to aerospace operations. This subject integrates material from other elements of the course to give an overview of aerospace operations. Aerospace operations are not seen as unique but as a particular example of a transport system which operates in a commercial, economic and regulatory environment. This subject provides the student with an understanding of the philosophies and practices of operational maintenance in the aerospace industry. This subject provides a bridge between line maintenance activities, with which students are familiar, and the management of the total operation.

Topics covered include factors influencing maintenance performance, maintenance philosophies and procedures, contracting out, maintenance costs, life cycle costing, maintenance engineering overview, maintenance performance measures, configuration control, maintenance inventory management, ISO 9000 series standards.

Assessment: seminar presentation worth 25 per cent; literature review worth 30 per cent; major reports worth 30 per cent; class participation worth 15 per cent.

48405

Design Awareness for the Aero Industry

6cp; prerequisite(s): 48070 Engineering Material; 48404 Aerospace Maintenance and Management; corequisite(s): 48075 Engineering Management
Undergraduate

This subject provides students with an understanding and appreciation of the design process in general, with particular reference to the aerospace industry. This subject is the second in the technology strand of the course. It builds on the materials subject and provides insight into the technology management subjects that follow. Engineering technologists are primarily concerned with the management of technology. The students must however be aware of the design process and the constraints and compromises involved, and this subject should give them that awareness.

Topics covered include the principles of design; design philosophies; design practice; concurrent engineering; design for maintainability; aircraft design philosophies and implications, including basic aircraft strength and systems analysis; materials applications; and the basic mechanics of flight.

Assessment: seminar presentation worth 25 per cent; literature review worth 30 per cent; major reports worth 30 per cent; class participation worth 15 per cent.

48430

Software Development

6cp; prerequisite(s): 48222 Informatics C
Fields of Practice: Computer Systems Engineering Program
Undergraduate

The objectives of this subject are to: develop in students an understanding of the concepts of object-oriented software construction, together with an ability to apply these concepts to build well-engineering software programs; and to build teamwork proficiency and negotiating skills in the software development process.

Topics include: introduction to the software development life cycle and the incremental development process; introduction to software paradigms and detailed consideration of the purpose and underlying principles of the object-oriented paradigm; introduction to concepts of development methodologies and detailed coverage of one specific methodology (including analysis, design and implementation aspects of this methodology); a subset of the United Modelling Language (UML)

notation; principles and procedures for software testing, vertification, validation and debugging; approaches to algorithm design and problem solving; preconditions and post-conditions in design and programming; and software coding.

Students would have developed fundamental programming skills in the prerequisite subject 48222 Informatics C. In order to further develop their programming skills and to understand the distinctions between different programming paradigms, students are required to develop an understanding of the Java programming language. Students will meet the subject objectives through various assessments, including a team project where they will develop a software system from a set of requirements using the object-oriented design methodology covered in the subject, and produce an operational system programmed in Java.

48440

Software Engineering

6cp; prerequisite(s): 48430 Software Development
Fields of Practice: Computer Systems Engineering Program
Undergraduate

The objectives of this subject are to: develop in students a critical understanding of issues related to the engineering of large complex software systems; to bring students to the point where they are fluent in the objectives of software engineering; and to ensure that they are competent in techniques to realise software systems utilising appropriate software engineering approaches, tools, and techniques. Students learn how to develop a set of requirements, apply rigorous software analysis, and to design, code and test their work. On completion of the subject students are competent to engineer moderately complex software systems, as members of a software development team.

Topics include: software engineering concepts, including software projects, planning, management, processes, methodologies, etc.; software requirements engineering; formal methods for software engineering; adaptation of software development methodologies to suit specific projects; validation and verification; software estimation and costing; configuration management; software project planning, budgeting, quality assurance (including walkthroughs and reviews, etc.); software development CASE tools. The subject uses a problem-based learning approach with students working in small teams. A set of lectures is combined with workshops where students apply the techniques introduced.

Assessment is based on a series of mastery and advanced assessment tasks.

48441

Introductory Digital Systems

6cp; prerequisite(s): 48520 Electronics; 48430 Software Development
Fields of Practice: Computer Systems Engineering Program
Undergraduate

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.

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 buses, as well as different types of input and output devices; interrupts; 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.

48450

Operating Systems

6cp; prerequisite(s): 48440 Software Engineering; 48441 Introductory Digital Systems
Fields of Practice: Computer Systems Engineering Program
Undergraduate

The objectives of this subject are that students should: be familiar with the Unix operating system at the POSIX definition level; know how to develop C applications to run on a POSIX standard operating system; know the basic principles of the design and implementation of a centralised POSIX defined operating system; know how the centralised

operating system functionality can be expanded into a distributed operating system; know the basic principles of hard real-time application programming (rate monotonic and deadline monotonic to be examined in depth); and know how to apply the hard real-time principles to existing hard real-time operating systems employing the POSIX standard (as a minimum).

Topics include: the use of the Unix operating system and other POSIX defined operating systems as tools for developing real-time control applications; advanced control application-based C programming; real-time principles and concurrent programming techniques; distributed operating systems employing distributed memory management, process management, file systems, and I/O; and client/server programming, typically using Windows NT. Rate monotonic and deadline monotonic analysis will be examined as a method of providing hard real-time application verification.

48451

Advanced Digital Systems

6cp; prerequisite(s): 48441 Introductory Digital Systems
Fields of Practice: Computer Systems Engineering Program
Undergraduate

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, and investigate advanced computing architectures. The subject has two major components: (i) analysis/design, and (ii) 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 48441 Introductory Digital Systems introduced in the earlier fields of practice subject.

Topics include: digital design process, functional design, implementation technologies, advanced computer architectures, and memory and I/O systems. It emphasises computer-aided design, including the use of VHDL specification, simulation and programmable VLSI implementation technologies.

48470

Computer Systems Analysis

6cp; prerequisite(s): 48440 Software Engineering; 48451 Advanced Digital Systems
Fields of Practice: Computer Systems Engineering Program
Undergraduate

The objectives of this subject are that students learn how to: perform a thorough analysis of the various options for implementing a complex computer system; write a detailed, unambiguous systems requirements specification; acquire new analytical skills; and apply software engineering principles learnt earlier in the course.

This subject does not have set topics or material to be taught in the usual way. It is up to the students to work out what they need to learn in order to solve the problem. Skills that are likely to be gained include using formal specification languages; computer performance analysis; reliability analysis; risk analysis; architecture development; assessment of ethical and social issues; verification and validation; mathematical techniques for robotics; and user interface analysis.

48475

Software Systems Analysis

6cp; prerequisite(s): 48440 Software Engineering
Fields of Practice: Computer Systems Engineering Program
Undergraduate

The aim of this subject is to draw together information from a range of earlier subjects so the performance and design alternatives of a large technical software system can be analysed. The student should gain an understanding of the interaction of the various hardware and software components in the system and the effects on performance, as well as the functionality, cost, data access, reliability, resilience and social acceptability of various alternative architectures.

The overall method of the course is problem based. At the start of semester, students are given an English language requirement specification for a manufacturing system. They work in teams to develop a detailed system specification by developing several architectural options and then analysing these options from the viewpoint of performance and functionality. Students select the best option and then analyse this option further, with the aim of developing a detailed functional specification.

During the course, students can request lectures on architectural analysis, queuing theory models, discrete event simulation, and other topics.

48480

Computer Systems Design

6cp; prerequisite(s): 48470 Computer Systems Analysis
FIELDS OF PRACTICE: COMPUTER SYSTEMS ENGINEERING PROGRAM
Undergraduate

The objective is to enable students to design and implement complex computer systems as members of a large group (of 12 or more persons). Students should be able to identify several design solutions that meet the system requirements specification as developed in 48470 Computer Systems Analysis, and assess each on the basis of functionality, performance and cost. They learn to write clear, concise documentation of their decisions and the system implementation, and gain the discipline necessary to be effective team members, through an understanding of the essentials of team organisation and how to be productive in a group project.

This is a Capstone subject that brings together the technical and systems engineering themes of the course. It emphasises the need for management as well as technical skills that are essential in the development of new systems. The subject develops attributes such as system abstraction, goal achievement within time and resource constraints, advanced interpersonal communication skills, and the ability to contribute to effective team documentation.

48485

Software Systems Design

6cp; prerequisite(s): 48475 Software Systems Analysis
FIELDS OF PRACTICE: COMPUTER SYSTEMS ENGINEERING PROGRAM
Undergraduate

The aim of this subject is to allow students to take the functional specification developed in 48475 Software Systems Analysis, and use it to design and develop the system. In this way students learn to develop a large software system, by actually completing and testing the system. They learn first hand the difficulties that can be caused if the design and implementation are carried out with a lack of rigour.

The overall method of the course is problem based. At the start of semester the students are given a functional specification for a complex network-based system. They work in teams to develop a detailed design. The students then verify the design, implement the various modules, integrate the modules, and test the final system.

During the course, the students can request lectures on aspects of design, coding, testing, and documentation.

48510

Introduction to Electrical Engineering

6cp
FIELDS OF PRACTICE: ELECTRICAL ENGINEERING PROGRAM
Undergraduate

The major objective of this subject is to give early stage students some understanding of the scope and methods of electrical engineering. This includes the engineering process, the technologies involved, the approach to problem solving, and the skills and tools used.

The subject material is organised around two modules. In Module 1, 'The Basics', basic electrical concepts such as voltage, current, resistance, power, DC and AC are introduced; supply and utilisation of domestic electricity is explored; and the functions of components commonly found in a linear DC power supply are covered. The practical aspects of this module include learning how to use basic equipment such as a multimeter and CRO, learning some simple 'tinkering' skills, and building and testing a DC power supply.

In Module 2, 'Applications in Electrical Engineering', the focus is on a typical application, a PC-based data acquisition system. The functions of the basic components of this system are presented, as well as the assembly and testing of a PC data acquisition kit. Fundamentals of digital electronics are also presented in this module. Finally, students are engaged in a design process where they combine a number of key theoretical concepts and practical skills to complete a project.

48520

Electronics

6cp; prerequisite(s): 48510 Introduction to Electrical Engineering; 33130 Mathematical Modelling 1 or 33132 Mathematical Modelling 1 (two semester model); Offered jointly by the Faculty of Science and the Faculty of Engineering. Students may choose this subject or 68314 Electronics to suit their timetable.
FIELDS OF PRACTICE: ELECTRICAL ENGINEERING PROGRAM
Undergraduate

The main objective of this subject is to familiarise students with common electronic devices and their applications. By the end of the subject, students should have acquired reasonable proficiency in the analysis of basic electronic circuits and be able to build and test circuits in the laboratory. Particular emphasis is placed on the practical, hands-on aspect of electronics to provide a solid foundation of working knowledge for all of the basic electronic devices and common electronic circuits. Laboratory work is a significant proportion of in-class delivery so as to make students proficient in circuit construction, testing, troubleshooting and to give them a sound knowledge of the use of test instruments. Another objective is to show that practical electronic applications are relevant to other engineering and technical disciplines and may often be placed within a wider social or commercial context.

Topics covered in the subject include:

- Theoretical material – basic concepts; DC circuits; AC circuits; semiconductors; semiconductor devices; power supply; BJT transistor amplifier; field effect transistor; frequency response of amplifiers; opto-electronics; introduction to digital electronics; and operational amplifiers.
- Practical material – device labelling (resistor colour codes, etc.); basics of electrical measurements, understanding of instrument accuracy, source loading; CRO, multimeter, function generator and other lab instruments; power supply fundamentals, floating outputs and earth; circuit construction and systematic layout from circuit diagrams, and deriving a circuit diagram from a physical circuit; fault finding.

48530

Circuit Analysis

6cp; prerequisite(s): 48520 Electronics
FIELDS OF PRACTICE: ELECTRICAL ENGINEERING PROGRAM
Undergraduate

In previous subjects students have been introduced to the analysis and application of electrical devices and systems. In this subject these skills are developed to the point of virtuosity, as students acquire proficiency in the rigorous analysis of real-world models. By a process of: (i) theoretical investigation, (ii) experiment design, (iii) experimental testing, and (iv) reflection, students 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 is concomitant. The subject also provides a perspective on the historical development of this area and on present and future trends.

In most weeks students participate in a three-hour small group teaching session with up to an additional three hours laboratory or in-field activities. Assessment consists of individual and group work tasks with weekly quizzes and a final exam.

Topics covered are: 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 nonlinear, response to an arbitrary input using convolution, dominant pole approximation, practical system identification techniques.

48531

Electromechanical Systems

6cp; prerequisite(s): 48510 Introduction to Electrical Engineering; 33230 Mathematical Modelling 2

FIELDS OF PRACTICE: ELECTRICAL ENGINEERING PROGRAM Undergraduate

The objectives of this subject are to familiarise students with the fundamental laws of electromagnetism, magnetic and electrostatic field concepts, basic ac circuit analysis, and the interchange of electric and magnetic energy. By the end of the subject students will be able to model a selection of electromechanical systems and understand their applications.

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). The laboratory skills to be acquired are:

Know

- Laws – Faraday, Ampere, Gauss, Coulomb, Lorentz
- Magnetic fields – B, H, M, permeability, flux, energy
- Magnetic circuits – permeance, reluctance, mmf, flux, inductance, energy, field plots, calculation of permeance from flux lines
- Electrostatic fields – E, D, P, permittivity, flux, energy
- Electrostatic circuits – capacitance, potential, flux, energy, field plots, calculation of capacitance from flux lines, calculation of E in series circuit
- AC circuits – phasor notation, 3-phase system, S, P, Q, pf, rms value
- Force/torque – rate of change of energy (co-energy)
- Moving circuit models – voltage equations, emf
- Mechanical models – mass, inertia, Newton 2
- Solution of coupled equations – state equations, numerical method
- Conservation of energy – input/output/losses

Familiar

- Soft magnetic materials – domains, nonlinear, hysteresis, saturation, co-energy, eddy currents
- Hard magnetic materials – coercivity, ferrite and rare earth magnets, Br, Hc, model
- Dielectric materials – polarisation, dissipation factor, partial discharge, breakdown voltage
- Transformer – construction, applications, ideal model, non-ideal T model, capacitance
- Capacitor – construction, applications, lumped and distributed models, inductance and losses
- Inductor – construction, lumped and distributed models, capacitance and losses
- Singly excited electromechanical systems – solenoid, relay, moving iron meter, variable reluctance stepping motor, brushless DC switched reluctance motor, electrostatic motor
- Doubly excited electromechanical systems – voice coil motor (loudspeaker, disc drive), permanent magnet moving coil meter, two coil meter (wattmeter), permanent magnet stepping motor, brushless dc permanent magnet motor
- Power electronics – unipolar and bipolar circuits, 3-phase inverter
- Motor characteristics – models, emf vs. speed, force/torque vs speed, current vs. torque, efficiency (losses)

Aware (exposure technologies)

- Other electromagnetic machines – homopolar dc motor, synchronous motor, AC generator, induction motor, brushed dc motor, linear motor, watthour meter
- Electrostatic machines – Van der Graaf, Whimshurst, water drop
- Control – motor speed and position control requirements
- Electromechanical energy conversion applications – e.g. disc drive, printer, CD player, washing machine, robot, CNC machine, servo motor, electric car, electric train, rolling mill, power station, airconditioning fan, sewerage pump, water pump, wind generator, speedometer

Laboratory skills

- Electrical safety
- Experiment design – experiments to learn new things, experiments to check theories, experiments to validate designs
- Measurement of voltage, current, power and frequency
- Measurement of resistance, inductance and capacitance

- Measurement of mass and inertia
- Measurement of magnetic field (B, H, flux)
- Measurement of electric field (E)
- Measurement of torque
- Flux plots
- Development of models and calculated parameters and performance
- Transformer open and short circuit tests
- Variable reluctance stepping motor torque/current/angle and step response
- Permanent magnet stepping motor torque/current/angle, step response
- Brushless DC permanent magnet motor speed/current/efficiency vs. torque
- Electronic control of stepping and brushless DC motors
- Three phase AC generator performance
- Model and design verification by comparison of calculated and measured parameters and performance

48540

Signals and Systems

6cp; prerequisite(s): 48221/2 Informatics; 33230 Mathematical Modelling 2
Fields of Practice: Electrical Engineering Program
Undergraduate

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 modelling; 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 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 is used for lecture-type resource sessions, tutorials, laboratories and project work. There is 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 are then used as case studies in signals and system behaviour. The laboratory component culminates in a substantial group project that requires a formal written and oral presentation.

48541

Signals and Systems (Telecommunications)

6cp; prerequisite(s): 48221/2 Informatics; 33230 Mathematical Modelling 2; 48530 Circuit Analysis
Fields of Practice: Electrical Engineering Program
Undergraduate

This subject has the same syllabus as 48540 but is taught in the Telecommunications context.

48550

Electrical Energy Technology

6cp; prerequisite(s): 48531 Electromechanical Systems; 48530 Circuit Analysis; 68038 Advanced Mathematics and Physics
Fields of Practice: Electrical Engineering Program
Undergraduate

The objective of this subject is to reinforce and extend knowledge of electromechanical systems and circuit analysis into the components and philosophy of typical power systems (generators, transformers, transmission lines, induction and synchronous motors, protection) by a deeper study of 3-phase systems, ac machines, and power system design principles.

Technical and theoretical content is expected to be acquired by students to the levels of 'know' (essential), 'familiar' (can solve problems if required) and 'aware' (have read/seen), and the laboratory skills to be acquired, are shown below. The topics are linked by application to a small power system, on which assignments and laboratory work are based.

Know

- 3-phase circuit theory – balanced network, star/delta, pu system
- Component non-ideal models and performance – transmission line, 1-phase and 3-phase transformer, dc and ac machines (dc, induction, synchronous as motor and generator)
- System control and design principles – energy storage, cogeneration, renewable generation, remote and grid-connected systems, and pollution control

Familiar

- 3-phase circuit theory – symmetrical components, unbalanced network, fault calculations, motor starting, generator short circuit
- Component models and performance – CT, VT, circuit breaker, cables
- System control and design principles – voltage selection, AC vs. DC, system losses and efficiency

Aware (exposure technologies)

- Component models and performance – d, q transformation
- System control and design principles – P, Q, tie lines, state estimation, tap setting, economic load despatch, load flow, FACTS, SVC, harmonics
- Principles of protection – overcurrent, unit, distance, earth
- Power system applications – electric train, rolling mill, power station, air conditioning fan, sewerage or water pump, wind generator, 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

48551

Advanced Electronics

6cp; prerequisite(s): 48530 Circuit Analysis
Fields of Practice: Electrical Engineering Program
Undergraduate

This subject draws on, and brings together, the knowledge and skills developed in earlier subjects such as Electronics and Circuit Analysis, and teaches students to analyse, understand and design complex electronic circuits and systems. Particular emphasis is placed on developing the ability to model real-life devices, to understand their imperfections and limitations. The principal goal of this subject is to give all students – whether destined to become circuit designers, or engineers who simply use electronics – the tools necessary to make intelligent choices in the design of modern electronic circuits and systems. By completing this subject students should be able to: understand the operation and characteristics of BJTs, and MOSFETs in integrated circuits; understand the internal structure of typical IC Op Amps and the operation of its basic building blocks; understand the character and sources of non-idealities in IC Op Amps; select an appropriate device type for specific application; understand the frequency-domain behaviour of circuits and systems; understand the feedback principle and use it to advantage in circuit and system design; be familiar with other analogue circuits like oscillators, converters, multipliers, etc.; use computer simulation to analyse and design circuits and systems; be familiar with basic techniques used in CAD of electronic circuits and systems.

Topics include: review of basic BJT, MOSFET and Op Amp circuits; computer-aided design (tools and principles); differential and multistage amplifiers; non-ideal characteristics of Op Amps; output stages and power amplifiers; review of different Op Amp types; frequency response of linear circuits and systems; feedback principles and applications; signal generation and waveform shaping; other analogue circuits (data converters, multipliers, etc.); noise in integrated circuits; and grounding, coupling and decoupling techniques.

48560

Analogue and Digital Control

6cp; prerequisite(s): 48540 Signals and Systems
Fields of Practice: Electrical Engineering Program
Undergraduate

The objective of this subject is to enable students to model with validation control systems, to analyse, design, and implement both analogue and digital controllers so that the controlled systems conform with given specifications. Emphasis is placed on laboratory work, the theoretical content of the subject being only that required to produce successful designs. Students are required to work on reduced scale models of actual industrial processes. The equipment is based upon experience gained with authentic control applications and is suitably modified for student use. Students follow the usual sequence adopted in industry, i.e. they start with the calibration of transducers and actuators leading on to dynamic response testing, physical modelling, model verification and finally to controller design, implementation, and testing.

Topics include: linear and nonlinear modelling of control systems using Newton's rules, analogous networks or Lagragian techniques; linearisation and development of linear, time-invariant transfer functions; development of lead-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

6cp; prerequisite(s): 48530 Circuit Analysis
Fields of Practice: Electrical Engineering Program
Undergraduate

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

6cp; prerequisite(s): 48540 Signals and Systems; 48441 Introductory Digital Systems
Fields of Practice: Electrical Engineering Program
Undergraduate

By the end of this subject students should be able to: analyse, design, build and test: data acquisition and distribution systems (DADS), measurement systems, and 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, and data conversion devices and systems; interface DADS to computers, plant and installations; and write, test and embed control and programming software for DADS interfacing.

Material to be taught and learnt includes: 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; and data integrity.

48610

Introduction to Mechanical Engineering

6cp
FIELDS OF PRACTICE: MECHANICAL ENGINEERING PROGRAM
Undergraduate

The objectives of this subject are to give students a clear idea of where mechanical engineering fits in the profession and in society; and of the career options open to mechanical engineers and the sorts of problems that mechanical engineering addresses. Students learn how mechanical engineering is conducted in the 'real world'; become aware of the engineering method and systematic approaches to the design process; learn to perform and explain simple mechanics problems and to perform the required calculations. They also learn to graphically represent objects by sketching, using drawing instruments and/or computer methods using standard representation techniques such as orthographic projection; gain an understanding of different materials, making selections based on fundamental material properties and required uses; and become aware of issues associated with moving and rotation machinery – such as lubrication/vibration/noise.

Topics include: introduction to the mechanical engineering profession; design and the engineering method; system-oriented approaches to design and problem solving; introductory mechanics; sketching, drawing, and representation techniques; introduction to and awareness of various aspects of mechanical engineering, e.g. materials; manufacturing; thermodynamics and heat transfer; electromechanical devices; rotating machinery; lubrication and wear.

48620

Fundamentals of Mechanical Engineering

6cp; prerequisite(s): 48610 Introduction to Mechanical Engineering; 68039 Physical Modelling (two semester mode) or 68037 Physical Modelling; 33130 Mathematical Modelling 1 or 33132 Mathematical Modelling 1 (two semester mode)
FIELDS OF PRACTICE: MECHANICAL ENGINEERING PROGRAM
Undergraduate

The objectives of this subject are to build on the engineering science fundamentals that were introduced in 48610 Introduction to Mechanical Engineering and which are required for later subjects, and to sharpen the focus on the university experience emphasised in early stage subjects. Students should gain an understanding of the approach to learning required of university study; Newtonian mechanics, which is one of the fundamental sciences underlying engineering practice; the modelling concept, as applied to Newtonian mechanics; the idea of particle mechanics and its limitations; basic engineering concepts such as equilibrium, force and acceleration, work, energy and power, impulse and momentum, and the relationships between them; and the idea that acceleration may result from a change in direction as well as change in magnitude of velocity.

Topics include: drawing and understanding the use and purpose of free body diagrams, frames and machines; stress resultants; kinematics and dynamics of plane motion; work, energy and power; linear impulse and momentum; conservation of momentum, impact; centroids and centres of mass; and area moments of inertia.

48621

Manufacturing Engineering

6cp; prerequisite(s): 48610 Introduction to Mechanical Engineering
FIELDS OF PRACTICE: MECHANICAL ENGINEERING PROGRAM
Undergraduate

The objectives of this subject are to: explain and provide examples of manufacturing processes listed in the material to be taught; identify and describe the manufacturing process by which different metal, wood, plastic and ceramic objects are made; demonstrate improved technical writing skills by completion of specified laboratory reports and site visit reports; demonstrate basic problem-solving skills relating to manufacturing and production.

Students learn the processes and materials available, as well as a competent and practical approach to evaluating, selecting and recognising the connections between the materials/processes and engineering design.

48640

Machine Dynamics

6cp; prerequisite(s): 48620 Fundamentals of Mechanical Engineering
FIELDS OF PRACTICE: MECHANICAL ENGINEERING PROGRAM
Undergraduate

The objectives of this subject are to give students an understanding of the kinematics and dynamics of rigid bodies in general planar motion, which is typically encountered in design and analysis of mechanical systems, and an elementary understanding of the vibration of mechanical systems, in particular, the dynamic behaviour of single-degree-of-

freedom mechanical systems with various damping and applied forces. Students should be able to: model problems in rigid body planar and spatial kinematics; and rigid body planar dynamics; understand energy methods in contrast to direct applications of Newton's second law of motion for setting up a model; understand the physics of a problem formulated from a real mechanical system; appreciate the role of vibration in machines and structures in the engineering world; understand the procedures required to evaluate a vibration problem; and analyse the dynamic response of single-degree-of-freedom mechanical systems.

The subject also covers: the concept of a rigid body, full nomenclature used in kinematics, two-body velocity equations, velocity pole and velocity diagrams of planar motion; two-body acceleration equations and acceleration diagram; three-body velocity equations and acceleration equations including Coriolis acceleration term; angular velocity acceleration equations including three-dimensional problems; F=ma applied to a rigid-body-dynamics, significance of 'centre of mass', the 'moment' relationship (M=Ia, etc.); angular momentum, conservation of angular momentum (general case, centre of mass moving, no 'fixed' point); linear and angular impulse problems; energy methods for general planar motion; elementary principles of vibration theory, free vibration of undamped single-degree-of-freedom system; free decay vibration of damped single-degree-of-freedom system; and the forced vibration of single-degree-of-freedom system.

48641

Fluid Mechanics

6cp; corequisite(s): 33230 Mathematical Modelling 2; 48331 Mechanics of Solids
FIELDS OF PRACTICE: MECHANICAL ENGINEERING PROGRAM
Undergraduate

The objectives of this subject are to enable students to: understand key concepts and fundamental principles, together with the assumptions made in their development, pertaining to fluid behaviour, both in static and flowing conditions; deal effectively with practical engineering situations, including the analysis and design of engineering systems and devices involving fluid flow; appreciate possible applications; and engage in further specialised study or research.

Topics include: fluid properties and statics; conservation laws of mass, momentum and energy; dimensional analysis and similitude; flow in pipes; external flow – lift and drag; potential flow; boundary layers; flow measurements; and environmental hydraulics.

48642

Strength of Engineering Materials

6cp; prerequisite(s): 60101 Chemistry and Materials Science; 48331 Mechanics of Solids
FIELDS OF PRACTICE: MECHANICAL ENGINEERING PROGRAM
Undergraduate

This subject draws on, and brings together, the knowledge and skills developed in earlier subjects such as 48620 Fundamentals of Mechanical Engineering, 60101 Chemistry and Materials Science, and 48331 Mechanics of Solids. It also prepares students for the more dedicated design subjects to come and exposes them to practical aspects of mechanical engineering design. The objectives are that students should be able to: understand, describe and use the methodology of modelling material properties and behaviour; understand and describe the fundamental differences in the behaviour of different types of materials; understand and describe how and why things fail; realise the importance of material selection in engineering design; predict, or design to avoid, failure given the material, environment and loading conditions; use analytical skills in stress analysis and knowledge of material properties in mechanical design.

Topics include: the use of stress analysis and material properties in materials selection and mechanical design; stress analysis – revise concept of normal and shear stress; combined stress; structures and m/c components; impact; material behaviour – time dependent material properties; strength; failure modes – theories, criteria for static failure (e.g. Tresca, von Mises, Mohr, etc.), plastic collapse (axial, bending and limit analysis), buckling and warping, fracture, creep, fatigue, and fracture-mechanism maps.

48650

Mechanical and Manufacturing Design

6cp; prerequisite(s): 48640 Machine Dynamics; 48621 Manufacturing Engineering; 48210 Engineering for Sustainability; 48642 Strength of Engineering Materials; 48510 Introduction to Electrical Engineering
FIELDS OF PRACTICE: MECHANICAL ENGINEERING PROGRAM
Undergraduate

Engineering design is the activity in which the engineering sciences are put to practical purposes. This subject traces the engineering design process from identification of need, through methodology and analysis, documentation and information, to discussion of common machine elements and engineering materials. Students should gain an understanding of: the linkages between engineering science and engineering practice; some methodologies and techniques of engineering design; the documentation and communication of design; the use of standards in engineering and engineering design; and the use, properties and purpose of commonly used machine elements and materials.

Topics include: design methodology; modelling, optimisation and simulation; machine elements; computer-aided design; materials and processes in design; and using standards, codes and handbooks.

48651

Thermodynamics

6cp; prerequisite(s): 48641 Fluid Mechanics; 68039 Physical Modelling (two semester mode) or 68037 Physical Modelling; 48620 Fundamentals of Mechanical Engineering
FIELDS OF PRACTICE: MECHANICAL ENGINEERING PROGRAM
Undergraduate

The objectives of this subject are to: develop a fundamental understanding of applied thermodynamics in an engineering perspective; use thermodynamics effectively in the practice of engineering; lay the groundwork for subsequent studies in the fields related to energy systems; and increase an awareness and emphasis on energy resources and environmental issues.

Topics include: thermodynamic properties of pure substances; compressible flow; work and heat; the first law of thermodynamics; applications to closed systems; applications to open systems; the second law of thermodynamics; irreversibility; entropy; vapor power cycles; Rankine cycle and steam engines; refrigeration cycle; air standard power cycles; Brayton cycle and gas turbine engines; Otto cycle and spark ignition engines; diesel cycle and compression ignition engines.

48660

Dynamics and Control

6cp; prerequisite(s): 48640 Machine Dynamics
FIELDS OF PRACTICE: MECHANICAL ENGINEERING PROGRAM
Undergraduate

The objectives of this subject are to: have an understanding of the behaviour of linear (or approximately linear) dynamic systems that are typically encountered in the practice of mechanical engineering and process engineering; and gain an understanding of how such systems can be controlled, or have their dynamics altered, so as to achieve desired outcomes.

Topics include: modelling of dynamic systems governed by linear ordinary differential equations of arbitrary order; transient response, frequency response, damped oscillations, neutral stability, instability; investigation of commonly occurring nonlinearities and the simulation of them; application of above concepts to analysis of multi-degree of freedom vibrating systems; application of above concepts to the control of dynamic systems by negative feedback; the design of controllers using integral, proportional and derivative actions; data sampling and computer-based control.

48661

Energy Applications

6cp; prerequisite(s): 48641 Fluid Mechanics; 48651 Thermodynamics
FIELDS OF PRACTICE: MECHANICAL ENGINEERING PROGRAM
Undergraduate

The objectives of this subject are to: understand key concepts and fundamental principles, together with the assumptions made in their development, underlying the operation of various energy-transfer machines, particularly turbomachines; deal effectively with practical engineering situations involving such machines, including their selection, application, performance prediction and design; follow the technical literature and engage in further in-depth study or research.

Topics include: fundamentals of heat transfer; fundamental principles of turbomachines; similitude in turbomachines; flow in cascades; cavitation in pumps; centrifugal pumps, fans and compressors; axial-flow pumps, fans and compressors; radial-flow turbines; and axial-flow turbines.

48662

Mechanical Applications

6cp; prerequisite(s): 48642 Strength of Engineering Materials; 48640 Machine Dynamics
FIELDS OF PRACTICE: MECHANICAL ENGINEERING PROGRAM
Undergraduate

The objectives of this subject are to teach students to: apply some of the basic concepts of rigid and deformable body mechanics learnt in previous subjects, and the more advanced concepts developed in this subject, to various mechanical applications; understand the interdependence of motion, forces, vibration and stress in mechanical applications; see how computer methods can complement a good understanding of the underlying theory when solving problems related to the previous point; and develop an aptitude in multiple approach problem solving.

Specific subject content varies from semester to semester as it reflects student needs and interests and style of teacher, but is likely to include: elementary spatial kinematics and the design of unconstrained mechanisms such as constant velocity joints and guidance linkages; systems of shafts and gears geometry together with associated lubrication, vibration and stress characteristics; the application of spatial dynamics to machine component motion where appropriate; problems associated with vehicle dynamics; stress analysis and methods of solid mechanics applied to various mechanical engineering applications; and modelling and computer methods including Finite Element Analysis.

48663

Advanced Manufacturing

6cp; prerequisite(s): 48621 Manufacturing Engineering; 48650 Mechanical and Manufacturing Design
FIELDS OF PRACTICE: MECHANICAL ENGINEERING PROGRAM
Undergraduate

The objectives of this subject are to: understand the design and manufacturing processing of sheet metal products using a CAD/CAM system (flatpattern, nesting and punchpress/laser); utilise CAD/CAM software to generate and evaluate numerical control (NC) programs for the production of tooling and moulds/dies; utilise coordinate measuring machines and CAD systems to evaluate how well manufactured parts meet design criteria; demonstrate good technical writing skills by completion of specified laboratory reports; and demonstrate advanced problem-solving skills relating to manufacturing and production.

There are three CAD/CAM modules. Module 1: sheet metal operations which include flatpattern, nesting and punchpress/laser. Module 2: CAD/CAM tool path generation for milling machine operations including point-to-point machining, planar milling, surface milling, and cavity milling. Machining parameters such as spindle speeds, feed rates depth of cut and power requirements will be determined. Module 3: understanding GD&T and CMM operations to evaluate manufactured part for quality.

48670

Engineering Design

6cp; prerequisite: All of Stage 5
FIELDS OF PRACTICE: MECHANICAL ENGINEERING PROGRAM
Undergraduate

Engineering design is the activity in which the engineering sciences are put to practical purposes. Engineering Design is the second of two design subjects in the mechanical engineering fields of practice. This subject extends the previous subject in two directions.

1. The identification of need is broadened to encompass engineering ethics, risk, health and safety, sustainability and the environmental impact of engineering design.
2. A second complementary strand extends the design activity addressed in the earlier subject to systems, processes and machines.

The objectives of this subject are to give students an understanding of: the linkages between engineering science and engineering practice; the methodology of engineering design; the documentation and communication of design; the use of standards in engineering and engineering design; the use and purpose of commonly used machine elements and materials; engineering systems design; and the wider context of design, including ethics in design and design for sustainability.

Topics include: engineering system design; design methodology; materials and manufacturing processes in design; human factors in design and thermofluid design.

48720

Introduction to Telecommunications Engineering

6cp
FIELDS OF PRACTICE: TELECOMMUNICATIONS ENGINEERING PROGRAM
Undergraduate

The objectives of this subject are: to introduce students to the basic concepts and terminology used in telecommunications engineering; to give them basic, up-to-date, 'hands-on', technical skills to assist in finding employment in the field as part of the degree program; to familiarise them with the telecommunications degree program and the rationale behind its structure; and to introduce them to staff involved in telecommunications engineering so that they are aware of current research activities in the field.

Topics include the following: telephony – the public switched telephone network, mobile telephone networks; computer communications – modems, host computers[1] (PCs, and workstations), networks[1], the Internet[1], mobile communications; broadcast systems – radio and television, satellite and cable TV; integrated networks – ISDN and ATM.

[1] These topics are covered in more depth.

48730

Authentication and System Security

6cp; prerequisite(s): 48720 Introduction to Telecommunications Engineering; 48740 Communication Networks; 33230 Mathematical Modelling 2; 48210 Engineering for Sustainability
FIELDS OF PRACTICE: TELECOMMUNICATIONS ENGINEERING PROGRAM
Undergraduate

This subject has been designed as the second subject in the Telecommunications major of the Engineering undergraduate program. It addresses the issue of network security. The subject is also suitable as an elective for students in other majors such as Computer Systems Engineering and Software Engineering seeking an introductory subject in network security.

The technical content of the subject covers conventional and public key cryptography, message integrity schemes, authentication protocols using Kerberos and X509 certificates, network security standards at the application, transport and network layer, protection of network resources through policies, intrusion detection, firewalls, and protective software.

The technical content is contextualised in a major project in which students in small groups play the role of security consultants engaged by a hypothetical organisation to make recommendations on some aspect of the security of its network. The project involves determination of stakeholder requirements and ultimately the development of a conceptual design.

Three engineering themes permeate the subject. They are introduced and continually highlighted during the student's sequence of learning experiences in the subject. The first theme is the need for a systems perspective in engineering. The second related theme is the notion of engineering as a process of solving constrained optimisation problems. The third theme is that of the need for engineers to take responsibility for their own professional development, in this subject with specific reference to the development of effective teamwork, information retrieval and project management skills.

48740

Communications Networks

6cp; prerequisite(s): 48430 Software Development
FIELDS OF PRACTICE: TELECOMMUNICATIONS ENGINEERING PROGRAM
Undergraduate

On completion of this subject students are able to appreciate the principles, design approaches, standards and new digital networks in the field of telecommunications networks. The first half of this subject concentrates on a number of basic principles that appear in this field and examine and evaluate alternative approaches to meeting specific requirements. Students acquire a reasonable understanding of current standards and their role in relation to future developments. Telecommunication networks are increasingly using broadband technologies to expand their functionality. As a result, telecommunication engineers are required to design and maintain these networks. The latter part of this subject concentrates on both narrowband and broadband switching technologies, network design concepts and performance measures associated with integrated services networks.

Topics include: data communications; data transmission, transmission media, data encoding, line coding; data communication interface; data link control, multiplexing; Wide Area Networks; circuit switching, packet switching, frame relay, ATM; Local Area Networks; LAN systems, bridges; communications architecture and protocols;

protocols and architecture, Internetworking, Internet protocol, transport protocols; network security, distributed applications, ISDN and broadband ISDN.

48750

Network Planning and Management

6cp; prerequisite(s): 33230 Mathematical Modelling 2; 48740 Communication Networks
Fields of Practice: Telecommunications Engineering Program
Undergraduate

The objectives of this subject are for students to develop competencies needed for the planning and management of networks, particularly in the areas of traffic source modelling, performance analysis, dimensioning, simulation, and management.

Students acquire a solid foundation in: modelling of traffic, including bursty sources; dimensioning of fixed networks (primary, alternate, and final route trunking and switching facilities); mobile networks (GSM and CDMA); frame relay networks; performance analysis of networks based on queuing theory; circuit switching networks; packet switching networks; ATM networks; Local Area Networks (LANs); computer networks; design of common transmission, switching, and service facilities based on a performance/cost analysis aimed at optimising the usage of network resources; simulation tools, particularly Sigma, to model and analyse the performance of networks; network management based on the interplay principle between commercial and technical aspects of designing the network, utilising the technical tools learned above while meeting budget and resource constraints.

Topics include:

Part 1

Traffic Source Modelling (CBR, bursty VBR) – point processes with applications to source traffic modelling; Markov chain theory; other stochastic processes: autoregressive; autoregressive moving average; fluid traffic.

Part 2

Network design, planning, and dimensioning – introduction to teletraffic engineering; basics of traffic system design; traffic models for loss and delay systems; designing alternate routing networks; additional applications: traffic analysis in digital telephony; dimensioning of incoming and outgoing lines to/from PABX; dimensioning principles of mobile networks; GSM dimensioning; CDMA dimensioning; dimensioning principles of frame relay networks.

Part 3

Performance analysis and management of networks – continuous time queuing theory; network of queues. Additional applications include: performance analysis of medium access control protocols; computer communications networks; statistical multiplexing. Advanced applications include: traffic management in ATM; teletraffic considerations in PCs; and network Management principles.

Part 4

Network simulation and modelling validation – overview of discrete event system modelling; tutorial on SIGMA. Selected topics include: single queue, single server model; single queue, multi-server model; multi-queue, multi-server model; single queue with different arrival patterns; server with service breaks; events with priorities; cancellation of events; entering of new events to the system; system performance evaluations; and individual service utilisation.

48770

Signal Processing

6cp; prerequisite(s): 48540 Signals and Systems
Fields of Practice: Telecommunications Engineering Program
Undergraduate

The objectives of this subject are to enable students to: develop insight into the discrete implementation of signal theory; develop engineering judgment in analysing signal processing problems; become familiar with practical techniques for implementing signal processing algorithms.

Topics include: A/D and D/A conversion; processing with discrete signals and systems; system implementation and convolution; Fourier transforms and discrete Fourier transforms of discrete time signals and systems; Z-transforms; implementation of FIR filters; implementation of IIR filters; finite precision effects; introductory spectral analysis; and decimation and interpolation.

48771

Communication Theory

6cp; prerequisite(s): 48540 Signals and Systems
FIELDS OF PRACTICE: TELECOMMUNICATIONS ENGINEERING PROGRAM
Undergraduate

By completing this subject, students should be able to formulate their own answers to the following questions: What are the bandwidth and channel resources required for a digital communications system? What are the system elements and the performance of analogue communication systems? How is the digital modulation type chosen in system design? How is a channel code type chosen in system design? What is the bit error rate performance of various digital modulation types? How is a link budget used in system design? How are carrier, clock, and frame synchronisation achieved? How can systems be designed for multiple access communications?

Topics include: random processes and power spectral density; introduction to digital transmission; review of applicable mathematical concepts; the MAP detector; the maximum likelihood detector; digital modulation techniques; bit error rate performance; link design and the link budget; channel bandwidth requirements; multiple access techniques; synchronisation techniques; channel coding.

48780

Mobile Communications

6cp; prerequisite(s): 48540 Signals and Systems; 48720 Introduction to Telecommunications Engineering
FIELDS OF PRACTICE: TELECOMMUNICATIONS ENGINEERING PROGRAM
Undergraduate

The objectives of this subject are to develop students' awareness of: the basic conceptual foundations in the science of electrical communications and its implications and uses for telecommunication and wireless applications; the origin of the various tools and formulae applied to circuit analysis, electrical, electronic and telecommunications design; the conceptual difference between lumped-element and distributed circuit behaviour; the role of electromagnetic wave propagation in explaining 'action at a distance' concepts involved in many real-life telecommunication engineering applications; the mathematical tools applied in the spatial modelling of electromagnetic waves; the interrelationships between different fundamental quantities and concepts, and the application of these concepts to solve practical problems; and the mathematical concepts required for modelling, analysis and design of telecommunication systems.

Topics include: models for action-at-a-distance-after-a-time-delay – the consequent development of a formalism placing results of familiar (restricted) models of electric and magnetic effects into an overarching framework. In this module, spatial vector operators will be introduced and their physical meanings explained. Maxwell's equations will be developed within the framework, and general electrodynamic and power/signal transport conceptions placed within a realistic model that is relatively robust in the face of new technologies and applications not yet envisaged.

Application to unbounded waves – unbounded medium as a communication channel; wave equations and wave functions, (briefly exposed in the subject Physical Modelling), behaviour in conducting and dielectric media, power flow/power loss and its material origin.

Application to bounded devices – boundary conditions, behaviour as a combination of discrete modes, standing and travelling waves. Static fields are introduced as special cases of dynamic fields. The subject introduces polarisation, wave propagation through multiple conducting and dielectric regions, reflection, refraction, Snell's laws, critical angle, brewster angle and diffraction, discusses TEM, TE and TM waves, phase and group velocities and dispersion, propagation characteristics of microwaves with reference to mobile communications.

Application to guided waves – introduces the concepts of guided-wave propagation using field model, metallic and dielectric guiding structures, hybrid modes and optical fibres. Students look at the fundamental dispersion and attenuation limits applicable to an optical communication channel; make a comparison with analogous but different mechanisms applying to copper signal lines, transmission lines, microwave and radio systems of communication. The subject includes the study of system budgeting in optical links, and some overview of future trends of application of the optical spectrum in telecommunications and computing and signal transduction.

Application to transmission lines (particular to communications applications) – introduces the transmission line as the major example of distributed network pertinent to electrical communication engineers, analyses the

behaviour of the transmission line in the time-domain and frequency domain, interrelates circuit and field concepts, discusses impedance, reflection, transmission and standing wave concepts, introduces impedance matching and Smith chart, discusses the use of transmission line sections for realising distributed reactive circuit elements and resonators. Introduces transmission line as a communication channel. Students undertake laboratory experiments on microstripline and coaxial line passive devices.

Application to antennas and radiation – introduces electromagnetic interference, discusses antenna as a transducer, and antenna characteristics, analyses monopole, dipole, slot and loop antennas, discusses design issues of printed antennas, introduces array antennas – binomial and chebyshev array synthesis and discusses the design of base station antennas. Derive link equation and discuss fixed and mobile communication link design fundamentals.

48820

Introduction to Environmental Engineering

6cp

FIELDS OF PRACTICE: ENVIRONMENTAL ENGINEERING PROGRAM

Undergraduate

The objectives of this subject are: to introduce students to key concepts of environmental science and engineering, and to the social, legislative and political context of the work of environmental engineers; to develop their understanding of the consequences of humans interacting with their environment; to enable them to answer questions such as: What is pollution? and What skills are needed for the responsible practice of environmental engineering?

The following material is examined and integrated:

- the work of environmental engineers – local and global environmental problems and their implications for engineers; the emergence of environmental engineering as a separate discipline; issues addressed by engineers who regard themselves as environmental engineers in Australia; career paths; interactions between environmental engineers and other professions, occupations and groups; community attitudes towards engineers and the social and professional implications of these attitudes for their work; the IEAust Code of Ethics and policies on the environment, heritage and sustainability; journals and other sources of information on environmental engineering; an introduction to environmental management systems and auditing
- the social environment – the social construction of 'environment'; environmental ethics; an introduction to environmentalism, especially in Australia; aims and strategies of Australian non-governmental environmental organisations and community action groups
- the political and legislative environment – how environmental policy and decisions are made; the nature of environmental disputes, and their resolution; environmental legislation and environmental planning
- the natural environment – the atmosphere, hydrosphere and geosphere; the science of the atmosphere and hydrosphere; the concept of biogeochemical cycles in the context of environmental engineering; an introduction to climate, geomorphology, and soil and vegetation associations; methods used to monitor the environment, and geographical information systems
- consequences of humans interacting with their environment – the environmental impacts of poorly planned urbanisation, industrialisation, and other forms of development; the sources, causes, and effects of air, noise, water and soil pollution; an introduction to the mitigation and abatement of these impacts.

48840

Water Supply and Wastewater Engineering

6cp; prerequisite(s): 60101 Chemistry and Materials Science; 48820 Introduction to Environmental Engineering

FIELDS OF PRACTICE: ENVIRONMENTAL ENGINEERING PROGRAM

Undergraduate

This subject provides Civil and Environmental Engineering students with a detailed knowledge of: (i) water pollution control objectives, (ii) the design of potable water and sewage treatment processes and sewerage and water reticulation systems, and (iii) the technologies used in the upgrading of water and wastewater treatment plants and in water reuse.

At the completion of this subject, students understand: public health and environmental objectives in water supply and wastewater disposal; the design concepts for drinking

water and sewage treatment plants; sewerage systems and water reticulation systems; and new technologies developed to meet the new water quality and water re-use objectives.

Topics include: sewerage systems and water supply systems – water quality and quantity; description and design concepts for sewerage systems; design concepts for reticulation systems; sewage treatment – water pollution, statutory requirements; primary treatment; biological/ secondary processes; tertiary treatment; potable water treatment – flocculation, sedimentation, filtration, ion-adsorption, disinfection; new water quality standards for specific pollutants and technologies used for upgrading on water treatment processes; quality requirements for water recycling and water re-use technologies; cases studies on water reclamation projects, small community and large potable water treatment plants; laboratory sessions to determine flocculation, sedimentation, and filtration performance.

48850

Environmental Planning and Law

6cp; prerequisite(s): 48820 Introduction to Environmental Engineering

FIELDS OF PRACTICE: ENVIRONMENTAL ENGINEERING PROGRAM Undergraduate

The objectives of this subject are: to introduce key environmental law relating to water, waste, energy and land use issues; to give a sound understanding of the history of planning with particular emphasis being placed on the NSW experience; to develop awareness of planning legislation in NSW and the need to engineer within the constraints of that legislation; to provide knowledge of the planning process and constraints on land use planning; to develop skills to identify and deal with legal problems confronting engineers in industry; to develop the capacity to communicate in both written and verbal form when dealing with legal matters relating to the environment and land use planning; and to equip students with the skills necessary to deal with legal issues in the absence of detailed lecture material. This helps students to know when to ask questions or seek professional legal advice and to introduce them to the operation of the Land and Environment Court of NSW.

Students cover the following topics:

- environmental law – the operation of the Environment Protection Authority of NSW, water and waste legislation (*Clean Waters Act* and *Waste Minimisation Act*), air and noise legislation (*Clean Air Act* and *Noise Control Act*), miscellaneous environmental legislation addressing pollution issues (*Independent Pricing and Regulatory Tribunal Act, Sydney Water Corporatisation Act*), and selected court decisions relating to pollution and land use issues (*Environmental Offences and Penalties Act*)
- environmental planning – evolution of human settlement, NSW environmental planning legislation, urban planning and sustainability, planning the neighbourhood, environmental studies, environmental impact assessment in NSW, traffic noise in the urban environment, project control and the environment, and the operation of the Land and Environment Court of NSW.

Tutorial sessions are scheduled twice a week to discuss environmental law and planning issues using case studies.

Students have to present a 10-minute discussion paper on an environmental issue of an engineering nature, which assists in developing verbal communication skills and audio-visual equipment usage skills, as well as developing interdisciplinary teamwork skills.

48860

Pollution Control and Waste Management

6cp; prerequisite(s): 48840 Water Supply and Wastewater Engineering or 48350 Environmental and Sanitation Engineering

FIELDS OF PRACTICE: ENVIRONMENTAL ENGINEERING PROGRAM Undergraduate

The main objective of this subject is to provide the opportunity to understand the principles of pollution control and waste management in modern society. The subject develops an understanding of air and noise pollution control technologies, as well as better product or process design to mitigate the problems of air and noise pollution both in the automobile industry and other manufacturing industries. It also begins to tackle the problems of solid and hazardous waste minimisation, generation, treatment and disposal.

Topics include: solid waste characterisation, generation and composition analysis, development of optimum collection routing networks, transfer stations, design, operation and maintenance of sanitary landfills, and related social and environmental issues; hazardous waste generation, regulatory process, process information, toxicology, design of treatment and stabilisation methodologies, methods of

disposal and related environmental issues, community perspective and education; soil contamination, chemical, biological and thermal remediation methodologies, site characterisation, planning, monitoring, containment and case studies; air pollutants and their types, sources, generation, measurements and estimations. Other topics include: control of the generation of specific air pollutants from the manufacturing and automobile industries; an overview of indoor air pollution and its control; environmental regulation and air quality standards; noise pollution sources; the effect of noise on people; noise measurements; traffic noise predictions; and noise control and related regulation.

49001

Judgment and Decision Making

6cp; 3hpw/distance mode
All courses (core for MEM)
Postgraduate
Subject Coordinator: Associate Professor J V Parkin

This subject develops understanding of rational decision aids in the light of modern descriptive theories of judgment, choice and decision in organisations. The methods of management science, decision analysis and judgment analysis are presented, and models of individual, group and strategic decision making are critically assessed.

Assessment: two assignments worth 30 per cent each; one quiz worth 40 per cent.

49002

Project Management

6cp; 3hpw/distance mode
All courses (core for MEM)
Postgraduate
Subject Coordinators: R Bagia and D Eager

This subject provides a sound knowledge of project management principles, techniques and practice associated with the various stages of a project lifestyle. The emphasis is an interdisciplinary one of relevance to all fields of engineering. The subject includes consideration of the management, financial and contractual responsibilities of project and engineering managers and organisations involved in projects.

Assessment: assignments worth 20 per cent; group project and presentation (face-to-face students) worth 40 per cent; project report (distance mode students) worth 20 per cent; workbook and journal (distance mode students) worth 20 per cent; and final examination worth 40 per cent.

49003

Economic Evaluation

6cp; 3hpw/distance mode
All courses (core for MEM)
Postgraduate
Subject Coordinator: Associate Professor D Sharma

This subject deals with the application of economic concepts to engineering decision making. Main topics include: macroeconomic issues and policies; microeconomic market theory; theory of the firm; project evaluation and cost-benefit analysis; intangibles and risk.

Assessment: three assignments worth 40 per cent; two quizzes worth 60 per cent.

49004

Systems Engineering for Managers

6cp; 3hpw; prerequisite(s): 49001 Judgment and Decision Making; corequisite(s): 49002 Project Management
All courses (core for MEM)
Postgraduate
Subject Coordinator: Professor W R Belcher

The underlying process of problem solving through engineering projects is interpreted as a unifying discipline. Drawing on contemporary scholarship and best practice, the philosophy, concepts, techniques and tools of this systems engineering process are examined in the context of engineering management, and their domain of applicability explored. The subject provides extensive opportunity for individual and group encounter with the challenges of the systems approach, and is illustrated by case studies presented by guest lecturers.

Assessment: mastery test (confirming understanding of concepts) worth 20 per cent; group assignment (relating to case studies) worth 30 per cent; individual project (including seminar) worth 50 per cent.

49006

Risk Management in Engineering

6cp; 3hpw; prerequisite: suitable undergraduate subject
All courses
Postgraduate
Subject Coordinator: J Irish

This subject develops capability to identify, assess, ameliorate and limit risk in the management and practice of engineering through the application of the concepts and tools of risk engineering. On completion, students are also able to identify the main hazards in an engineering project and to

design an appropriate risk management strategy. Topics supported by case studies include: semantics of risk and hazard; risk as a social construct; principles of risk management; steps in risk engineering; integration with engineering process; risk perception, risk communication, and the acceptability of risks; statutory provisions in NSW relating to some engineering risks; legal principles relating to engineering risks (contract, liability, etc.); checklists and scoping for risk identification and assessment; design criteria and code provisions for various risks; comparing risks; quantified and qualitative risk assessment methods; risk assessment in emergencies; financial tools in the management of engineering risks.

Assessment: four assignments worth 25 per cent each.

49012

Project Management Support Systems

6cp; block attendance and Internet support; prerequisite: some experience in industry on participating in an engineering project. It is desirable that students either complete or are concurrently studying 49002 Project Management
All courses
Postgraduate
Subject Coordinator: Associate Professor T Anderson

The aim of this subject is to develop the skills for planning and controlling projects. Students also learn how to use computer tools to construct a project plan of a real project and control a simulated project. Students learn to understand how models for project management have been developed and which models are appropriate in different contexts. The model includes the waterfall model, the incremental development model and the spiral model. Models for risk assessment and financial planning aspects of projects are also covered. Students learn to understand and apply terms such as work breakdown structure, network planning, PERT, GANTT charts, cash flow and cost/schedule control systems criteria to their project.

Assessment: developing and presenting a project plan worth 40 per cent; simulating a project worth 10 per cent; auditing a project worth 10 per cent; preparation and participation in workshop worth 20 per cent; subject portfolio worth 10 per cent; and computer-mediated conference participation worth 10 per cent.

49013

Managing Information Technology in Engineering

6cp; block attendance and Internet support; prerequisite: an introductory course on computing; students should already have some skills such as being able to use a word processor, spreadsheet, email and a web browser
All courses
Postgraduate
Subject Coordinator: Dr J Madadnia

The aim of this subject is to explore the influence of information technology (IT) on organisations and management and in particular engineering management. Students critically examine both past and recent IT innovations. Issues in information technology extend into groupware, computer-aided logistic support, decisions support systems, tools for systems engineering and communications technology including the Internet. Students use a computer-mediated conferencing tool on the Internet to participate in group project work either on or off campus. Most of the support material such as lectures is on the Internet.

Assessment: development of IT policy and selection criteria for the IT Manager worth 30 per cent; library research group project worth 30 per cent; participating and reflection on using computer mediating conferencing tools worth 20 per cent; and debate worth 20 per cent.

49016

Technology and Innovation Management

6cp; 3hpw
Subject Coordinator: C P Killen

The goal of technology and innovation management is to effectively manage the invention, design, development, production, transfer, and use of technology within an organisation. This subject brings together knowledge from engineering and management disciplines. Emphasis is placed on the importance of managing the performance of the entire product and process development cycle. Topics include: technological change management, assessment and evaluation of technology, technology policy development, and new product and process development. Within this framework, specific technology management tools and techniques are evaluated and applied. These include quality function deployment, design for manufacture, concurrent engineering and robust design methods.

Assessment: Individual case study analysis worth 10 per cent; group presentation/case analysis worth 10 per cent; individual design tool assignment worth 20 per cent; group project/case study and investigation and development worth 30 per cent; and examination (all objectives) worth 30 per cent.

49017

Graduate Project (30cp in one semester)

49018

Graduate Project (30cp in two semester)

49019

Graduate Project (30cp in three semester)

The subject description for 49017-19 Graduate Project is the same as that provided for 49050-76 Graduate Project.

49021

Evaluation of Infrastructure Investments

6cp; three modules, each two days; prerequisite(s): introductory course in Probability and Statistics or equivalent
Postgraduate
Subject Coordinator: Associate Professor D Sharma

The subject develops capability to appraise, analyse and evaluate energy investments within a multidisciplinary framework. Topics include: the context and rationale of project evaluation; characteristics of energy project investments; concepts and methods of financial and economic evaluation of energy investments; issues in cost–benefit evaluation; treatment of risk, intangibles, and externalities; environmental considerations in project evaluation; multi-attribute evaluation frameworks; case studies. Emphasis is placed on achieving depth and balance in all aspects of the evaluation process, with topical case studies providing an application focus.

Assessment: assignments worth 40 per cent; quizzes worth 50 per cent; contribution to class discussions worth 10 per cent.

49022

Energy Resources and Technology

6cp; block attendance
Postgraduate
Subject Coordinator: Associate Professor D Sharma

Topics covered in this subject include: energy resources and reserves; concepts and principles of resource assessment; regional, national and international resource requirements and availability; resource technology evaluation; and the economic and environmental impacts of resource use.

Assessment: assignments worth 40 per cent; quizzes worth 60 per cent.

49023

Energy and Environmental Economics

6cp; three modules, each two days; prerequisite(s): introductory course in Microeconomics or equivalent; corequisite(s): 49021 Evaluation of Infrastructure Investments
Postgraduate
Subject Coordinator: Associate Professor D Sharma

Topics include: energy–economy–environment interactions; the micro model (demand, supply and markets); short-run and long-run energy pricing; shadow pricing of energy; the economics of non-renewable and renewable energy resources; intemporal allocation of resources; the economics of the environment;

economic and non-economic principles for environmental valuation. Emphasis is placed on achieving depth and balance in all aspects of the valuation principles, with topical case studies providing an application focus.

Assessment: assignments worth 40 per cent; quizzes worth 50 per cent; participation worth 10 per cent.

49024

Energy Modelling

6cp; three modules, each two days; prerequisite(s): 49023 Energy and Environmental Economics; 49021 Evaluation of Infrastructure Investments (recommended)
Postgraduate
Subject Coordinator: Associate Professor D Sharma

This subject covers: models and modelling; macroeconomic settings of energy-economy modelling; energy balances; energy input-output analysis; energy aggregating; energy system modelling, energy demand modelling; modelling of energy economy interactions.

Assessment: assignments worth 40 per cent; quizzes worth 50 per cent; contribution to class discussions worth 10 per cent.

49025

Methods for Energy Analysis

3cp; 3hpw
Postgraduate
Subject Coordinator: Associate Professor D Sharma

This subject covers: probability concepts; sampling and estimation; regression analysis; statistical tests; analysis of variance; simultaneous equations; time series methods; econometric models and applications; introduction to statistical packages.

Assessment: assignments worth 60 per cent; examinations worth 40 per cent.

49026

Electricity Sector Planning and Restructuring

6cp; three modules, each two days; prerequisite(s): 49021 Evaluation of Infrastructure Investments; 49023 Energy and Environmental Economics (recommended)
Postgraduate
Subject Coordinator: Associate Professor D Sharma

Topics covered in this subject include: nature of electricity planning; economic and technological dimensions of power systems; generation planning and production costing; integrated resource planning; electricity sector restructuring – rationale, models and frameworks; electricity sector privatisation; electricity sector productivity; electricity markets; selected topics on issues relating to the environment, institutional structures, renewable resources, regulation, etc. Emphasis is placed on all aspects of electricity sector planning, restructuring and policy, with topical case studies providing an application focus.

Assessment: assignments worth 40 per cent; quizzes worth 50 per cent; contribution to class discussions worth 10 per cent.

49027

Energy Demand Analysis and Forecasting

6cp; block attendance; prerequisite(s): 49023 Energy and Environmental Economics or equivalent; 49024 Energy Modelling or equivalent
Postgraduate
Subject Coordinator: Associate Professor D Sharma

This subject looks at the theoretical and analytical concepts and tools used for the understanding of energy demand generation and evolution in relation to socioeconomic development. Students learn methods and models of energy demand projections and explore the various considerations which must be made in the design, implementation and monitoring of an energy demand management policy.

Assessment: assignments worth 40 per cent; quizzes worth 60 per cent.

49028

Policy and Planning of Energy Conservation

6cp; block attendance; prerequisite(s): 49021 Evaluation of Infrastructure Investments or equivalent; 49023 Energy and Environmental Economics or equivalent
Postgraduate
Subject Coordinator: Associate Professor D Sharma

This subject introduces students to the rationale and context for energy conservation planning and policy; historical perspective of energy conservation; public and private sector interventions and mechanisms for rationalising the design of energy conservation policies; examples and case studies of energy conservation programs at national, sectoral and enterprise levels in developing and industrialised countries; and decision methods for program design.

Assessment: assignments worth 40 per cent; quizzes worth 60 per cent.

49029

Environmental Policy for Energy Systems

6cp; block attendance; prerequisite(s): 49021 Evaluation of Infrastructure Investments; corequisite(s): 49023 Energy and Environmental Economics; 49024 Energy Modelling (recommended)
Postgraduate
Subject Coordinator: Associate Professor D Sharma

This subject introduces students to: policy context; energy resource system analysis; approaches to environmental impact assessment; analysis of pollution effects and control technologies; risk analysis of energy systems; costs and benefits of environmental management; and institutional and regulatory issues.

Assessment: assignments worth 40 per cent; quizzes worth 60 per cent.

49032

Sustainable Technological Development

6cp; 3hpw or block attendance
All courses
Postgraduate
Subject Coordinator: Associate Professor P Bryce

This subject examines the application of sustainable development objectives to project definition and design requirements, in the context of renewable energy projects in the developing world. The context provides a practical format to explore the more general issues of client and community participation in engineering decision making. The emerging energy technologies, particularly renewable, are discussed and compared with an application context.

Assessment: major project design study worth 50 per cent; minor assignment worth 25 per cent; presentations and contribution to class discussions worth 25 per cent.

49036, 49037, 49038, 49039

Professional Service Project

2, 4 or 6cp; attendance pattern determined by particular project; prerequisite(s): appropriate to the agreed learning contract
All courses
Postgraduate
Subject Coordinator: B Jacobs

One key aim of this subject is to develop in students an appreciation of the service obligations and non-financial rewards associated with the award of professional status. This suite of subjects allows students to participate in one or more professional service activities and thus build students' understanding of the culture of engineering and the current debates surrounding it.

Students are required to analyse the impact of the activity on the recipient organisation and to evaluate the competence they need to be able to perform the service in a manner consistent with the Code of Ethics. In many cases students work with professionals from other non-engineering disciplines which increases their awareness of engineers' interdependence on other professions as well as enhancing their experience in managing group dynamics.

Students gain a better understanding of the role engineering plays in society and in particular the perception that the community at large has about engineering. Students are able to volunteer for professional service projects throughout their course for which they can receive a certificate.

To meet the requirements of this subject each project has associated with it a coordinator, a negotiated learning contract and a learning value as measured in professional service points (PSPs). On completion of each project, students are issued with a certificate confirming the PSPs awarded. One PSP is equivalent to a total of one hour of preparation, service and reflection/documentation. When students formally enrol in this subject they can use previously earned PSPs towards the required service work of the subject. While formally enrolled in this subject students can also be involved in further significant professional service projects. Each learning contract specifies the skill level to be reached before undertaking the project, how the training is to be provided, the task itself, and the nature and documentation of the reflection that is to take place at the end of the task.

Assessment: individual assessment requirements are agreed in the negotiated learning contract for each project. Normally assessment includes written and oral components and the demonstration of enhanced communication and service skills.

49041

Engineering Research Methodology

6cp; 3hpw; prerequisite(s): enrolment in a UTS Research program at Master's or Doctoral level
All courses
Postgraduate
Subject Coordinators: Professor W R Belcher and Professor B Samali

The subject familiarises students with a range of approaches used in engineering research, with an emphasis on approaches used in professional practice. Topics include the

advantages and limitations of different research approaches and their applicability in different engineering contexts, the recognition and protection of intellectual property, and the boundaries and interdependencies between research, development, design and innovation. Research ethics in engineering are also reviewed.

Students learn how to design research programs and to analyse and interpret data and reports. Participants solve problems creatively, access and utilise information resources, and critically evaluate research work.

Assessment is criterion-referenced and ungraded, and based on assignments requiring preparation of a research critique, a research plan, a discussion group assignment and a seminar presentation.

49047

Finite Element Analysis

6cp; 3hpw or block attendance; prerequisite(s): suitable undergraduate subjects
All courses
Postgraduate
Subject Coordinator: Dr A Saleh

This subject extends understanding of finite element analysis (FEA) techniques and their application to problems in engineering, particularly in solid and structural mechanics, and develops problem formulation and modelling skills in FEA. Topics include a review of matrix analysis methods; the derivation of element stiffness, force and field matrices; an introduction to the solution of nonlinear stability; and dynamic problems using FEA. Topics are illustrated by engineering applications. The subject requires the use of general purpose FEA programs in assignments and project work.

Assessment: assignments worth 60 per cent; project worth 20 per cent; quiz worth 20 per cent.

49050–76

Graduate Project

12cp; individual supervision over one semester; prerequisite(s): completion of all other subject requirements for the course in which the student in enrolled apart from those taken as corequisites; corequisite(s): any outstanding subject requirements for the course in which the student is enrolled – 49040 Graduate Seminar may be one of them
Postgraduate
Subject Coordinator: Associate Professor T Anderson

The project is a course requirement taken over one or two semesters or in exceptional circumstances, three. It is undertaken on an individual basis, except in special circumstances approved in advance by the Faculty Board in Engineering, and provides opportunity for the integration and application of advanced skills and knowledge gained in part through other subjects taken during the course. The depth and extent of the project varies with credit point requirements. These are set on the basis of an agreed project plan submitted by the student to the supervisor, and approved by the Director, Postgraduate Coursework Programs. The project may involve the development of new technology (hardware and/or software), the application of technology, research addressing a significant technical or engineering management issue or, in special circumstances, a critical review in the area of the student's concentration, describing key contributions in the field covered by the project work undertaken, results achieved and a discussion of their significance and implications.

Assessment is based on the preparation of a written report and, usually, a seminar presentation.

49017	Graduate Project	30cp in one semester
49018	Graduate Project	30cp in two semesters
49019	Graduate Project	30cp in three semesters
49050	Graduate Project	12cp in one semester
49051	Graduate Project	12cp in two semesters
49052	Graduate Project	18cp in one semester
49053	Graduate Project	19cp in one semester
49054	Graduate Project	20cp in one semester
49055	Graduate Project	21cp in one semester
49056	Graduate Project	22cp in one semester
49057	Graduate Project	23cp in one semester
49058	Graduate Project	24cp in one semester
49060	Graduate Project	18cp in two semesters
49061	Graduate Project	19cp in two semesters
49062	Graduate Project	20cp in two semesters
49063	Graduate Project	21cp in two semesters
49064	Graduate Project	22cp in two semesters

49065	Graduate Project	23cp in two semesters
49066	Graduate Project	24cp in two semesters
49070	Graduate Project	18cp in three semesters
49071	Graduate Project	19cp in three semesters
49072	Graduate Project	20cp in three semesters
49073	Graduate Project	21cp in three semesters
49074	Graduate Project	22cp in three semesters
49075	Graduate Project	23cp in three semesters
49076	Graduate Project	24cp in three semesters

49082, 49083, 49084, 49086

Special Course A

49092, 49093, 49094, 49096

Special Course B

2cp; normally block attendance; prerequisite(s): appropriate to the agreed learning contract
All courses
Postgraduate
Subject Coordinator: Associate Professor T Anderson

This subject offers students maximum educational opportunity to benefit from short courses and other learning experiences available through the Faculty of Engineering. Enrolment for credit is approved by the Director, Postgraduate Coursework Programs. Approval requires demonstration by the candidate to the Director of a special learning need or development opportunity consistent with the other requirements of the candidate's program.

Assessment: individual assessment requirements are agreed in a learning contract according to each individual program of study being undertaken. Normally assessment includes written and oral components and the demonstration of enhanced engineering capability in the application of principles.

49082	Special Course A	2cp
49083	Special Course A	3cp
49084	Special Course A	4cp
49086	Special Course A	6cp
49092	Special Course B	2cp
49093	Special Course B	3cp
49094	Special Course B	4cp
49096	Special Course B	6cp

49102

Traffic and Transportation

6cp; block attendance
All courses
Postgraduate
Subject Coordinator: K Halstead

The objective of this subject is to provide the student with the knowledge to implement traffic engineering principles in the local government area in accordance with current practice in NSW. The student is introduced to standards adopted by the Roads and Traffic Authority NSW and AUSTROADS. The subject provides the basic principles of transportation planning and traffic engineering, including the technical aspects and the influence of environmental and political factors.

Assessment: project worth 40 per cent; examination worth 60 per cent.

49104

Asset Maintenance Management

6cp; block attendance
All courses
Postgraduate
Subject Coordinator: K Halstead

This subject aims to enhance the skills and capacity of the local government engineer to: develop an awareness of the real cost of owning, operating and maintaining assets and services; gain an understanding of the planning, design, maintenance, and monitoring concepts and methods, with a view to optimising life cycle cost/benefits; develop knowledge of the methods for assessing and controlling potential losses and risks; and understand how these aims interact with and support the requirements of the management, logistics, reporting and accounting guidelines.

Topics include legislative and other requirements, basic maintenance strategies, maintenance support strategies, risk assessment and control, maintenance management systems.

Assessment: project worth 40 per cent; examination worth 60 per cent.

49105

Water Supply and Wastewater Management

6cp; block attendance
All courses
Postgraduate
Subject Coordinator: Professor S Vigneswaran

The objective of this subject is to concentrate on the design, operation and maintenance of municipal wastewater treatment plants, sewage systems and water supply systems. At the completion of this subject the student understands drinking water and sewage treatment plants, sewerage systems and water reticulation systems in terms of purpose, basic design concepts, operation and maintenance, identifying and quantifying major problems, operating these systems to avoid or overcome problems.

Subject content includes statutory requirements, constituents and quality of wastewaters, description, operation and control of treatment process, performance monitoring, sewerage and water reticulation systems, troubleshooting and problem solving.

Assessment: two assignments worth 30 per cent; mid-semester examination worth 25 per cent, formal final examination worth 45 per cent.

49106

Road Engineering Practice

6cp; block attendance
All courses
Postgraduate
Subject Coordinator: Dr S Beecham

The aim of this subject is to equip students with the ability to design, construct and maintain roads in accordance with current practice in NSW. This includes pavement design, as well as the geometric design of roads. The subject embraces the standards adopted by the Roads and Traffic Authority NSW, AUSTROADS and the Australian Road Research Board. Particular attention is paid to the requirements of the residential street network. Students also develop an understanding of current issues in road engineering, particularly quality assurance contracts, road safety needs of pedestrians and cyclists, and the use of innovative techniques in road construction and maintenance.

Assessment: assignments worth 40 per cent; examination worth 60 per cent.

49107

Water Quality Modelling

6cp; block attendance
All courses
Postgraduate
Subject Coordinator: Dr S Beecham

This subject aims to: refresh students in basic principles and methods of hydraulics and hydrology; familiarise them with methods of urban drainage set out in recent manuals, with an emphasis on flood protection and integration with stormwater quality enhancement; and provide an overview of rural design flood estimation, erosion protection, flood mitigation and coastal engineering.

Assessment: five assignments worth 50 per cent; final examination worth 50 per cent.

49108

Local Government Law

6cp; block attendance
All courses
Postgraduate
Subject Coordinator: K Halstead

This subject aims to provide the local government engineer with the necessary skills to operate within the legal framework of legislative requirements and procedures governing local government in NSW; appropriate knowledge of the law, to operate effectively within environmental, economic, social and physical constraints; and the knowledge and expertise to manage the environment in a practical and effective manner. It covers the history of local government in NSW, the local government engineer as a senior officer, *Local Government Act and Companion Legislation 1993, Local Government Regulations,* and the *Roads Act 1993.*

Assessment: project worth 40 per cent; examination worth 60 per cent.

49111

Coastal Engineering

6cp; 3hpw; prerequisite(s): sound knowledge of mathematics and fluid mechanics as part of a first or higher degree in Engineering or a cognate discipline
All courses
Postgraduate
Subject Coordinator: J Irish

This subject deals with engineering design and coastal structures, with particular reference to the natural behaviour of water waves and their interactions with the coastline. Topics covered include: wave generation processes and wave forecasting methods; linear and nonlinear wave theories and their limits of validity; wave characteristics in deep, intermediate and shallow water depths; wave shoaling and breaking; wave refraction and diffraction; wave scattering and radiation; full and partial standing waves; field measurements and statistical analysis of random waves, estimation of extreme waves; tides and other long period water level fluctuations; estuarine hydraulics; coastal sedimentation; coastline management; and physical and computer models.

Assessment: assignments/reports worth 60 per cent; examinations worth 40 per cent.

49113

Urban Stormwater Pollution Management

6cp; three blocks of one-and-a-half-day sessions with optional tutorials; prerequisite(s): suitable undergraduate subjects
All courses
Postgraduate
Subject Coordinator: Dr S Beecham

The subject develops an understanding of the nature of pollution processes and levels in urban situations, and of engineering systems for the reduction of pollution, particularly in receiving waters. Students consider pollution management systems in terms of social and environmental requirements, and the rationale for design and implementation of remedial measures. Through a series of assignments, students become familiar with commonly used procedures and develop an awareness of problems encountered in practice.

Assessment: continuous assessment involving six assignments.

49114

Statistical Hydrology

6cp; block attendance totalling 30 hours; prerequisite(s): completion of at least one undergraduate subject in statistics; some prior knowledge of hydrology is assumed, but may have been gained through either employment or formal education
All courses
Postgraduate
Subject Coordinator: J Irish

This subject provides students with experience in a field of hydrology with the confidence to use a range of statistical tools and with knowledge of statistical methods which can be usefully employed in hydrological practice. Such methods are presently employed in Australia in only a limited way for design flood estimation. Examples will be drawn from surface-water hydrology, including problems relating to reservoir yield, design flood estimation and continuous modelling of water resources systems.

Assessment: three assignments worth 20 per cent each; end-of-semester examination worth 40 per cent.

49121

Environmental Assessment and Planning

6cp; 3hpw
All courses (core for MEEM)
Postgraduate
Subject Coordinator: K Halstead

This subject analyses the principles of sustainable development and the expectations it places on various aspects of human interaction with the environment. Existing and proposed measures by governments are examined in the areas of environmental legislation, environmental economics and land use planning in relation to sustainable development.

Assessment: project worth 40 per cent; formal examination worth 60 per cent.

49122

Ecology and Sustainability

6cp; 3hpw
All courses (core for MEEM)
Postgraduate
Subject Coordinator: Professor S Vigneswaran

This subject covers the following topics: ecological systems and processes; basic ecological principles, bio-geochemical cycles, development of ecosystems, interaction between physical ecosystems, global environmental issues such as greenhouse effect, ozone depletion, acid rain, etc.; human impact on ecosystems – population growth, terrestrial ecosystems (forest and agriculture land), aquatic ecosystems (lake, river and ocean), biodiversity; importance of sustainable development; overview of major environmental problems, their effect and remedies; air pollution, noise pollution, water pollution, soil pollution, solid and hazardous wastes; and case studies.

Assessment: assignments worth 30 per cent; examinations worth 70 per cent.

49123

Waste and Pollution Management

6cp; 3hpw
All courses (core for MEEM)
Postgraduate
Subject Coordinator: Professor S Vigneswaran

Waste minimisation and pollution control are treated in an integrated and comprehensive manner, permitting evaluation of the benefits of waste minimisation to industry and of pollution reduction in the environment. Topics include: environmental auditing of the product life cycle; leading-edge technologies

of waste minimisation and pollution control; raw materials extraction and refinement – product development, design and manufacture, product use, product reuse/recycling, solid/hazardous wastes, liquid wastes; effective management of the product life cycle; institutional barriers to improving the technologies of waste technology and management practices adopted in domestic waste paper industry, metal plating industry, food and dairy industry, household waste, and waste recycling in buildings.

Assessment: assignments and class presentations worth 50 per cent; examinations worth 50 per cent.

49124

Water Quality Management

6cp; 3hpw
All courses (core for MEEM)
Postgraduate
Subject Coordinator: Dr S Beecham

This subject examines urban water systems including natural water bodies (streams, estuaries, groundwater), and related human infrastructure (water supply, sewerage, stormwater drainage systems) and provides an assessment of the impacts and methods of monitoring pollution in these environments in relation to water quality, natural flora and fauna, aesthetic quality and public health. It enables students to gain a general knowledge of these systems, their vulnerability to pollution and degradation, and remedial measures.

Assessment: two essays worth 20 per cent; class exercises worth 30 per cent; quiz and final examination worth 50 per cent.

49125

Environmental Risk Assessment

6cp; three blocks, each of two days
All courses
Postgraduate
Subject Coordinator: J Irish

This subject provides an introduction to methods of risk assessment for graduates working in environmental engineering, environmental auditing or environmental impact assessment. An understanding of the concepts of risk perception, risk communication, risk acceptability and the modification of risks and their application to environmental engineering, impact assessment and auditing, together with capabilities essential to environmental risk assessment, is developed.

Topics include: semantics of risk and hazard; risk as a social construct; principles of risk management; steps in risk engineering; risk perception, risk communication, and acceptability of risks; statutory provisions in NSW relating to environmental risks; legal principles relating to environmental risks (liability, etc.); checklists and scoping for impact assessment and auditing; risks to health and to ecosystems; comparing risks; quantified and qualitative risk assessment methods; discussion of some specific environmental hazards in the context of risk amelioration; risk assessment in emergencies; financial tools in the management of environmental risks; and environmental auditing procedures.

Assessment: three assignments worth 20 per cent each; examination worth 40 per cent.

49126

Environmental Management of Land

6cp; 3hpw or block attendance; prerequisite(s): suitable undergraduate subjects
All courses
Postgraduate
Subject Coordinator: Dr P Hazelton

This subject introduces students to basic concepts and principles of land resource compilation, planning and environmental management. On completion the student should be able to interpret and evaluate physical limitations and their effects on urban and semi-rural planning and development. The various stages of management of land with special needs, such as coastal areas, effluent and biosolid disposal sites and recreational and open space should be clearly understood.

Assessment: one major assignment task worth 50 per cent; one quiz worth 50 per cent.

49127

On-site Water and Wastewater Treatment

6cp; block attendance
All courses
Undergraduate
Subject Coordinator: Dr P Hagare

Due to increased urban sprawl the development of on-site water and wastewater treatment systems is becoming more commonplace in unsewered parts of Australia. This subject introduces students to the different types of on-site systems available for water supply and wastewater management for single households or small complexes of units. The subject introduces students to the different technical aspects and allows them to develop skills in

the design and operation of these systems. This subject will also look at the overall management of water from water supply to wastewater generation, treatment and reuse on-site through irrigation. One aspect of the subject is to look at the different types of systems available in Australia and understand the technology that is applied. Current environmental legislation related to on-site wastewater treatment and disposal, its strengths and shortcomings are also covered in this subject.

Assessment: two assignments worth 30 per cent, major project worth 20 per cent, and exam worth 50 per cent.

49131

Bridge Design

6cp; 3hpw; prerequisite(s): strong background in the design of civil engineering structures
All courses
Postgraduate
Subject Coordinator: Associate Professor K Crews

This subject develops competence in the area of bridge design and analysis. The subject focuses on a core study with a series of assignments requiring the design of major components of a typical bridge structure in accordance with the Australian Code for Bridge Design. Each student is also required to undertake an investigation project involving analysis and design of a selected modern bridge structure and to submit supporting documentation including calculations at the end of the investigation.

Assessment: major design project undertaken in four stages worth 90 per cent, final presentation worth 10 per cent.

49132

Stability of Structures

6cp; 3hpw; prerequisite(s): suitable undergraduate subjects
All courses
Postgraduate
Subject Coordinator: Dr A Saleh

The behaviour of slender members subjected to compression, flexure and torsion is examined in this subject. Factors which contribute to the nonlinear response of structures are analysed to develop an understanding of structural stabilising single members and slender frames. In addition, students learn how to assess the stability of practical frames using computer-based methods of analysis.

Assessment: continuous assessment worth 60 per cent; informal final examination worth 40 per cent.

49133

Steel and Composite Design

6cp; prerequisite(s): suitable undergraduate subjects
All courses
Postgraduate
Subject Coordinator: Dr S Parsanejad

This subject provides an understanding of composite beams, columns and connections and of plastically deformed steel frames. The subject develops familiarity with both Australian and overseas code provisions and their underlying concepts. The teaching strategy consists of formal and informal lectures, with student participation.

Assessment: composite beam project worth 25 per cent; plastic design projects worth 25 per cent; two quizzes worth 20 and 30 per cent each.

49134

Structural Dynamics and Earthquake Engineering

6cp; 3hpw or block attendance; prerequisite(s): suitable undergraduate subjects
All courses
Postgraduate
Subject Coordinator: Professor B Samali

This subject introduces students to the concepts and techniques of structural dynamics and their application to the design and analysis of dynamically sensitive structures, such as tall buildings, towers, chimney stacks and foot bridges. Students develop an understanding of the nature of dynamic (time varying) loads, with particular emphasis on earthquake loads; ability to assess the response of civil engineering structures to such loads, taking into account load-structure interaction; and structural design approaches satisfying both strength and serviceability requirements.

Assessment: assignments worth 50 per cent; quizzes worth 50 per cent.

49135

Wind Engineering

6cp; 3hpw or block attendance; prerequisite(s): suitable undergraduate subjects
All courses
Postgraduate
Subject Coordinator: Professor B Samali

Introduces basic concepts and fundamental principles in wind engineering and their application to structural design and analysis of structures, such as buildings, towers,

chimney stacks and bridges in accordance with strength and serviceability limit-states design criteria. On completion the student should understand the nature of wind loads acting on buildings due to along and cross-wind actions, and be able to prevent aerodynamic instabilities, such as flutter, galloping, torsional divergence and others by proper design. Wind tunnel testing techniques for determining wind-induced dynamic response of structures and cladding pressures are introduced, and the environmental effects of severe winds around buildings and other structures are studied in terms of human safety and comfort.

Assessment: assignments worth 50 per cent; two quizzes worth 25 per cent each.

49136

Timber in Engineering Design

6cp; 3hpw; prerequisite(s): suitable undergraduate subjects; competency in computer modelling
All courses
Postgraduate
Subject Coordinator: Associate Professor K Crews

This subject presents recent advances that have enhanced the role of timber as a versatile renewable resource with a wide range of applications in engineered structures. It familiarises students with the structural behaviour of timber and timber-based manufactured products to facilitate the choice of materials, design, construction and maintenance procedures to produce cost-effective, durable and aesthetically pleasing structures. Quality control and reliability issues form an important focus. Particular requirements of residential large span industrial structures (including connection design), and multi-storey buildings and bridges and the use of the limit-states version of AS1720 are addressed.

Assessment: assignments worth 40 per cent; major design project worth 60 per cent (including presentation).

49137

Railway Engineering

6cp; 3hpw
All courses
Postgraduate
Subject Coordinator: A Brady

This subject introduces students to the design, construction and maintenance concepts of railway tracks and bridges. On completion of the lecture program, the students should be able to design, independently, a branch line or a siding complex according to standards applicable to NSW. An understanding of track–train interrelationships and their effect on track structure will also be developed.

Assessment: assignments worth 50 per cent; bridge design project worth 20 per cent; quiz worth 30 per cent.

49141

Advanced Geomechanics

6cp; 3hpw
All courses
Postgraduate
Subject Coordinator: Dr G Ring

This subject consists of two separate components. The first deals with the study of rock mechanics, including the description of rock and the quantification of rock properties, sampling and testing techniques and the three-dimensional analysis of rock discontinuity. The course considers how these properties can be incorporated into the analysis and design of various structures such as underground openings, slopes and foundations. Methods of reinforcing rock masses using anchors and bolts are also treated.

The second component deals with computer applications in geomechanics. After a theoretical overview, it concentrates on the finite element and boundary element methods and provides considerable hands-on experience using PC-based software. Students are expected to solve problems of seepage, deformation associated with the nonlinear analysis of structural interaction, and stress around underground openings.

Assessment: assignments worth 50 per cent; projects worth 50 per cent.

49150

Prestressed Concrete Design

6cp; 3hpw; prerequisite(s): 48369 Structural Design 2; (for undergraduate students taking this as a structural elective); a strong understanding of reinforced concrete behaviour and design and an understanding of the fundamentals of prestressed concrete behaviour (for postgraduate students)
All courses
Postgraduate
Subject Coordinator: C Wilkinson

It is assumed that students have a knowledge of linear elastic analysis of uncracked and cracked sections, effective loads and load balancing techniques and design for ultimate moment capacity and strength at transfer. On

the basis of this assumed knowledge, analysis and design for shear and end block reinforcement in prestressed concrete beams will be covered initially, then analysis and design of tension members, compression members, continuous beams and continuous flat slabs, in accordance with the requirements of the current version of AS3600 Concrete Structures. In addition, the subject may also cover analysis and design for torsion or of bandbeam slab systems.

Assessment: assignments worth 25 per cent; quizzes worth 35 per cent; final examination worth 40 per cent.

49151

Concrete Technology and Practice

6cp; prerequisite(s): suitable undergraduate subjects
All courses
Postgraduate
Subject Coordinator: Dr R Sri Ravindrarajah

This subject develops advanced engineering knowledge and capabilities pertaining to the specification, production, properties, testing and application of concrete as a construction material. Mini individual projects focusing on topics related to the subject content will form part of the learning process.

Topics include: concrete fundamentals, concrete production and quality control, environmental concrete, deformation and cracking of concrete, testing of concrete and special concrete.

Assessment: assignments worth 15 per cent; mid-semester quiz worth 20 per cent; major report worth 25 per cent; final examination worth 40 per cent.

49152

Damage and Repair of Concrete Structures

6cp; prerequisite(s): suitable undergraduate subjects
All courses
Postgraduate
Subject Coordinator: Dr R Sri Ravindrarajah

This subject provides understanding of the mechanisms of damage in concrete structures and of the methods for in-situ assessment and repair. An individual project is an essential part of the subject. Main topics include: causes of damage; corrosion of steel in concrete; in-situ strength of concrete; non-destructive testing; repair materials selection; repair procedures and techniques; prevention, protection and maintenance of concrete structures.

Assessment: assignments worth 30 per cent; quizzes worth 30 per cent; seminar worth 10 per cent; major report worth 30 per cent.

49201

Integrated Services Networks

6cp; 3hpw; prerequisite(s): suitable undergraduate subjects
All courses
Postgraduate
Subject Coordinator: Dr R Braun

This subject covers the following topics: switching methods, CCITT recommendations, SDH, ISDN technology, ISDN signalling, broadband ISDN, ATM standards, resource sharing and multiple access (ALOHA, CS/CD, CSMA/CD, Token Bus, Token Ring, QPSX, FDDI).

Assessment: assignments worth 25 per cent; laboratory project worth 25 per cent; final examination worth 50 per cent.

49202

Communication Protocols

6cp; 3hpw; prerequisite(s): suitable undergraduate subjects
All courses
Postgraduate
Subject Coordinator: Professor R Braun

In this subject students study, at an advanced level, the concepts and protocols associated with each of the seven layers in the ISO reference model for Open Systems Interconnection (OSI) with applications examples from a wide range of network types.

Assessment: practical work worth 40 per cent; examination worth 60 per cent.

49203

Telecommunications Signal Processing

6cp; 3hpw; prerequisite(s): suitable undergraduate subjects
All courses
Postgraduate
Subject Coordinator: Professor R Braun

This course focuses on one aspect of telecommunications signal processing: source coding of images and audio. Incorporated in this main topic are: characterisation of random signals using autocorrelation function and power spectral density, optimal linear prediction of signals (including Wiener filtering), quantisation of signals using pulse coding modulation, and differential pulse code modulation, linear transforms (Discrete Fourier Transform, Discrete Cosine

Transform, Karhunen-Loeve Transform), subband coding transforms, and lossless compression. These topics are brought together with an in-depth examination of JPEG coding of images. Finally, the implementation of various other compression methods, including MPEG-2, MPEG-4, MPEG-audio, and various techniques of speech coding, is discussed.

Assessment: assessment is project based.

49204

Advanced Teletraffic Engineering

6cp; 3hpw; prerequisite(s): suitable undergraduate subjects; corequisite(s): 49201 Integrated Services Networks
All courses
Postgraduate
Subject Coordinator: Professor R Braun

The subject exposes students to the theoretical and practical aspects of modern communication network design, including teletraffic engineering and network performance modelling. The course covers an overview of relevant statistics and probability theory; traffic characterisation; traffic intensity measures; traffic data collection measurement and forecasting techniques; queuing theory; mathematical models for loss and delay in systems; modelling and analysis of circuit, packet and fast-packet switched networks. Students analyse practical examples of network dimensioning for capacity, and network performance evaluation using simulation software package (BoNES or OPNET).

On completion of the course students are able to apply an appropriate mathematical model to any communication network, to dimension the primary route and alternate route trunking and switching facilities, and to evaluate the network performance either using a mathematical approach and/or by using simulation. Case studies included in the course provide the student with capabilities to make a choice in networking solutions based on the performance/cost analysis to meet user expectations.

Assessment: four assignments worth 60 per cent; final examination worth 40 per cent.

49205

Transmission Systems

6cp; 3hpw; prerequisite(s): 49203 Telecommunications Signal Processing or equivalent
All courses
Postgraduate
Subject Coordinator: Associate Professor S Reisenfeld

The subject covers major aspects of digital transmission systems at an advanced level, including modulation, coding, synchronisation, and multiple access. Case studies of optical and satellite links demonstrate how the effects of performance degradation are incorporated into the link budget. The subject involves lectures supported by assignments and project work using laboratory facilities.

Assessment: design assignment worth 20 per cent; written examination worth 80 per cent.

49207

Advanced Concepts in Microwave and Mobile Communications

6cp; 3hpw; prerequisite(s): some knowledge of fields and waves, communication channels
availability: Telecommunications Engineering program only; special topic
Postgraduate
Subject Coordinator: Dr A Sanagavarapu

The current telecommunication infrastructure is increasingly dominated by wireless microwave transmission. Examples include mobile telephones, wireless local area networks, Local Multipoint Distribution Systems (LMDS), Ka band low earth orbit satellites, etc. This subject discusses and explores the various types of microwave propagation mechanisms, the passive and active microwave devices incorporated in mobile communications systems, satellite earth stations and receivers, and other communication equipment such as LMDS. The techniques involved in the design of novel antennas for wireless communications are also explored.

Assessment: to be announced by Subject Coordinator at first meeting.

49209

Advanced Web Technology

6cp; 3hpw; prerequisite(s): experience in usage of both PC and Unix computer systems, familiarity with email and tools such as Telnet and FTP, HTML, webpage design and Java programming
All courses
Postgraduate
Subject Coordinator: Associate Professor D Lowe

This subject aims to develop an understanding of advanced Internet, web, and related technologies, and how these technologies relate to management of large-scale information repositories. Students will develop an understanding of numerous technologies (such as Hypertext, Internet and web protocols and standards, web servers and proxies, Java and JavaScript, CGI, cookies, push/pull, metadata, SGML and XML, CORBA, security, etc.). Students develop an overview of all technologies and are provided the opportunity to develop a deep understanding of several of the technologies.

Assessment: literature review worth 20 per cent, development/research project worth 60 per cent, quiz worth 20 per cent.

49210

Website Design and Management

6cp; 3hpw; prerequisite(s): 49209 Advanced Web Technology
All courses
Postgraduate
Subject Coordinator: Associate Professor D Lowe

This subject aims to develop an understanding of how systems engineering and project management concepts can be applied in the development and management of web-based information systems. Students investigate those aspects which make hypermedia and web projects different from conventional engineering projects and how these differences can be accommodated. This includes aspects such as development methodologies, project scoping, website evaluation, project resourcing, and user requirements. The subjects also considers different types of information management systems and architectures, including concepts such as digital libraries, content-based retrieval, multimedia, e-commerce systems, etc.

Assessment: literature review worth 20 per cent, development/research project worth 60 per cent, quiz worth 20 per cent.

49211

Software Engineering Principles

6cp; 3hpw; prerequisite(s): some programming study and experience, ideally in industry
All courses
Postgraduate
Subject Coordinator: Associate Professor J Leaney

The aim of this subject is to introduce the issues and basic principles of software engineering. The objectives are to develop a framework into which more detailed material regarding specific aspects of the software engineering process, techniques, and issues can fit, including software systems, software quality, the software development process, process models, development paradigms, development methodologies, and software project management. Within the subject the principles are applied to a small real-time project (a device driver written in C). The subject assumes significant programming experience in a first degree.

Assessment: classwork, assignments, essay, examinations worth 50 per cent; major project (industry involvement where possible) worth 50 per cent.

49212

Object-oriented Languages

6cp; 3hpw; prerequisite(s): some programming study (in C) and experience
All courses
Postgraduate
Subject Coordinator: Associate Professor J Leaney

This subject introduces students to object-oriented principles in design, and helps them to gain competence in programming techniques using object-oriented languages. It covers object-oriented software development using the Ada language, and thence the C++ language. It includes coverage of OO concepts, design and implementation. The subject has a strong emphasis on the practical application of these concepts to the development of industrial software systems.

Assessment: major development project worth 50 per cent; learning contract worth 50 per cent.

49213

Human–Machine Interfaces and Software Implementation

6cp; 3hpw; prerequisite(s): some programming study and experience, ideally in industry
All courses
Postgraduate
Subject Coordinator: Associate Professor J Leaney

The subject has a strong emphasis on the practical application of software engineering concepts to the development of industrial software systems. The subject actively encourages participants to develop their understanding of practical issues in software development. This is a competency-based subject, designed to develop basic skills in software engineering via a software development project. It also presents principles, guidelines and practice in human–machine interfaces.

Assessment: HMI software design project worth 30 per cent; software development learning contract worth 70 per cent.

49214

UNIX and C

6cp; 3hpw; prerequisite(s): 48430 Software Development or equivalent programming experience
All courses
Postgraduate
Subject Coordinator: Associate Professor J Leaney

This subject develops understanding and competence in the use of UNIX as a development tool for a software engineer, and C programming in a UNIX environment. The subject encourages good programming practices through programming style and development approaches such as Abstract Data Types. UNIX is examined as an environment supporting the software development process. Technical aspects of UNIX such as shell programming, the UNIX file system, the UNIX process model, and system level programming are also covered. The subject assumes that students have had significant undergraduate programming in C or a similar language and that students are familiar with UNIX at a user level.

Assessment: three negotiated learning contracts (individual and team-based) worth 33.3 per cent each.

49215

Telecommunications Industry Management

6cp; 3hpw
All courses
Postgraduate
Subject Coordinator: Professor R Braun

The subject provides an understanding of commercial issues with particular reference to the telecommunications industry in Australia. It is the subject objective to help engineers in their working careers to participate in business discussions within larger organisations and to assume a wider managerial and organisation role. In smaller enterprises or in individual engineering projects, financial and commercial knowledge will allow engineers to gauge the economic and marketing viability of a technical undertaking. The subject covers the socioeconomic environment and commercial and managerial aspects of a telecommunications enterprise. Financial considerations of the telecommunications sector and of interconnect issues are discussed.

Assessment: based on assignments, group presentations and final open book examination.

49216

Advanced Mathematics for Telecommunications

6cp; 3hpw
All courses
Postgraduate
Subject Coordinator: Professor R Braun

This subject provides a short refresher for the fundamental theory underlying much of telecommunications. It then introduces more advanced topics specific for telecommunications applications. The subject begins with a short review of linear systems, transforms, probability, statistics, and random variables. The student is then introduced to topics such as number theory (appropriate to cryptography and security), rings and fields (appropriate to coding), and numerical simulation techniques.

Assessment: continuous assessment and final examination.

49217

Software Verification and Validation

6cp; 3hpw or block attendance; prerequisite(s): 49211 Software Engineering Principles
All courses
Postgraduate
Subject Coordinator: Associate Professor J Leaney

This subject helps students to develop an understanding of verification and validation in the context of differing international processes and life cycles, and differing methodologies (structured, object-oriented, etc.). Test planning is considered in relation to development planning and quality planning, assisting the appropriate choice of validation and verification techniques. Verification and validation are considered throughout the life cycle, involving the client wherever possible. Particular techniques include requirements validation; walkthroughs and inspections (throughout the life cycle); unit testing techniques (including algebraic proofs); target machine and host machine tests; integration and acceptance testing; and tools which can be used to support unit testing, integration testing and quality (Attol, Logiscope).

Assessment: classwork, assignments, and examinations worth 50 per cent; major project (industry involvement where possible) worth 50 per cent.

49218

Asynchronous Transfer Mode (ATM) Technology

6cp; prerequisite(s): 49201 Integrated Services Networks; 49202 Communication Protocols
availability: Telecommunications Engineering and Telecommunication Networks programs only; special topic
Postgraduate
Subject Coordinator: A Kadi

This subject introduces the student to the fundamental operation of ATM technology, and examines congestion control, LAM emulation, and wireless service provision in detail.

Assessment: to be announced by Subject Coordinator at first meeting.

49219

Emerging Internetworking Protocols

6cp; prerequisite(s): 49201 Integrated Services Networks; 49202 Communication Protocols
availability: Telecommunications Engineering program only; special topic
Postgraduate
Subject Coordinator: A Kadi

This subject examines emerging internetworking protocols in depth. Particular topics include internetworking protocol version 6, Internet control message protocol version 6, wireless networks, and mobility support.

Assessment: to be announced by Subject Coordinator at first meeting.

49220

Real-time Signal Processing in Telecommunications

6cp; prerequisite(s): 49203 Telecommunications Signal Processing availability: Telecommunications Engineering program only; special topic
Postgraduate
Subject Coordinator: A Kadi

This topic introduces the real-time implementation of adaptive filters, advanced spectral analysis techniques, speech processing, and modulation–demodulation and synchronisation. The implementation is to be done on a Texas Instrument C3x or C5x real-time DSP board.

Assessment: to be announced by Subject Coordinator at first meeting.

49221

Coding and Coded Modulation

6cp; prerequisite(s): 49205 Transmission Systems
availability: Telecommunications Engineering program only; special topic
Postgraduate
Subject Coordinator: Professor R Braun

This subject aims to refresh information theory and use it in the practical development of coding theory and coded modulation. Topics to be covered include source coding, channel coding, enthropy, channel capacity, block coding, cyclic coding and convolutional coding.

Assessment: to be announced by Subject Coordinator at first meeting.

49222

Advanced Digital Modulation Techniques

6cp; prerequisite(s): 49205 Transmission Systems
availability: Telecommunications Engineering program only; special topic
Postgraduate
Subject Coordinator: Associate Professor S Reisenfeld

This subject examines spread spectrum communications techniques for wireless office and point-to-point links. Specific topics include direct spread code division multiple access, frequency hopped code division multiple access communication systems, modulation and coding, multiple user demodulator techniques, and error correction coding techniques.

Assessment: to be announced by Subject Coordinator at first meeting.

49223

Satellite Communication Systems

6cp; prerequisite(s): 49205 Transmission Systems
availability: Telecommunications Engineering program only; special topic
Postgraduate
Subject Coordinator: Associate Professor S Reisenfeld

This subject focuses on satellite and earth station design principles including geostationary, medium earth orbit, and low earth orbit communication systems. Topics include an introduction to communication satellites, tracking, satellite system architecture, and design and performance trade-off issues.

Assessment: to be announced by Subject Coordinator at first meeting.

49224

Simulation of Digital Communication Systems

6cp; prerequisite(s): 49205 Transmission Systems
availability: Telecommunications Engineering program only; special topic
Postgraduate
Subject Coordinator: Associate Professor S Reisenfeld

This subject introduces the student to a variety of simulation techniques, performance evaluation, configuration trade-off studies, comparison to analytically derived results, simulation limitations, and required computational complexity to achieve knowledge of bit error rate performance.

Assessment: to be announced by Subject Coordinator at first meeting.

49225

Software Project Management

6cp; 3hpw or block attendance or part-time; prerequisite(s): 49211 Software Engineering Principles
All courses
Postgraduate
Subject Coordinator: Associate Professor J Leaney

This subject aims to present and develop the confidence and software project management skills required to become effective project team leaders and potential project managers. The course covers such concepts as team constitution, business aspects, technical organisations charts and cost estimates, scheduling and monitoring, and maintenance. The course proposes an analysis of existing Software Project Management tools and groupware technologies. Apart from the theoretical presentations, much time is given to participants reviewing their past experience and doing illustrative exercises.

Assessment: classwork, a learning contract, a major project worth 80 per cent; examination worth 20 per cent.

49226

Modem/Codec Design

6cp; prerequisite(s): 49205 Transmission Systems
availability: Telecommunications Engineering program only; special topic
Postgraduate
Subject Coordinator: Associate Professor S Reisenfeld

This subject focuses on the digital signal processing design and implementation of modems and error correcting and detecting codecs. Issues include sampling rate, quantisation noise, implementation techniques, optimal detection filtering, the design of carrier and clock synchronisation systems, and fast bit error rate performance estimation algorithms.

Assessment: to be announced by Subject Coordinator at first meeting.

49233

Software Requirements Specification

6cp; block attendance; prerequisite(s): 49211 Software Engineering Principles or equivalent
All courses
Postgraduate
Subject Coordinator: Associate Professor J Leaney

This subject establishes the need for software engineering, the current state of the field, and the role that the software engineering program can play in this context.

It is also a subject to develop competency in the capture of system requirements and their representation, using real-time structured analysis. The subject aims to have a strong practical focus, covering tools and methodologies and developing skills which will be immediately relevant to the applicants and their companies. The subject contains a significant component of practical project work which is aimed at reinforcing the material covered in the subject.

Assessment: analytical written assignment worth 10 per cent; software design project worth 30 per cent; software specification learning contract worth 30 per cent; software verification learning contract worth 30 per cent.

49234

Real-time Object-oriented Software Development

6cp; block attendance; prerequisite(s): substantial programming study and experience
All courses
Postgraduate
Subject Coordinator: Associate Professor J Leaney

This subject establishes students' competency in the design and implementation of real-time object-based systems. The subject covers object-oriented software development using the Ada language, including a coverage of OO methodology, tools, processes and implementation issues, focusing on those aspects specific to developing real-time software. Aspects of C++ are also covered, especially aspects related to real-time systems.

Assessment: student presentations worth 20 per cent; software design projects worth 20 per cent; four minor projects to be used during the second academic project worth 15 per cent each.

49236

Software Development Project

6cp; block attendance availability: Software Engineering major only
Postgraduate
Subject Coordinator: Associate Professor J Leaney

The major goal of this subject is to promote the development of the participants' ability to apply the knowledge and skills developed throughout the course to handling real-world software development problems. The project covers issues such as the need for an appropriate approach to developing software, applying the development process to practical problems, documentation, quality assurance, and the use of software tools. In particular the project aims to act as a Capstone module and tie the academic content of the course into a cohesive whole, as well as to enable students to experience aspects of teamwork and its implications. The project involves working together in groups of four (in varying roles) during the complete development of a software system. The project is defined in such a way that cost is not critical but deadlines are, thus encouraging effective teamwork.

Assessment: the assessment focuses on the ability to apply the material presented throughout the course to the development of practical software systems.

49237

Software Quality and Configuration

3cp; block attendance
All courses
Postgraduate
Subject Coordinator: Associate Professor J Leaney

This subject is designed to develop students' understanding of software quality issues, and develop their skills in configuration management. The quality module includes developing an ability to read a quality plan and a development plan, and to understand the role of a QA engineer and the role of the developer in contributing to quality during the development process. Also covered are issues such as QA activities and organisation. The configuration module aims to develop an understanding of, and the ability to use, the basic mechanisms of configuration management. Aspects covered include clients, activities, objects, standards, the modification process and planning methods. The module also covers the use of a typical configuration management tool.

Assessment: learning contract worth 30 per cent; report worth 30 per cent; projects worth 40 per cent.

49238

Telecommunications Network Management

6cp; prerequisite(s): 48740 Communication Networks; 48340 Construction availability: Telecommunications Engineering program only
Postgraduate
Subject Coordinator: A Kadi

This subject is designed for telecommunications engineers working with telecommunications carriers and suppliers of hardware and software infrastructure that supports the

provision of telecommunications services to clients. It will begin with an historical overview of the evolution of telecommunications networks with particular emphasis on the deregulated environment that has been the characteristic of the last decade. The role of standards making bodies to ensure interoperability will be highlighted. The bulk of the course will examine the technical details of particular standards such as SNMP, TMN and CORBA. The course will conclude with an examination of future challenges associated with the operation of very large scale distributed systems and look at current vendor solutions.

49239

Software Systems Middleware

6cp
All courses
Subject Coordinator: Associate Professor J Leaney

The title software systems middleware is derived from the essential component of an open system, namely the infrastructure, or middleware, as it has become popularly known. The most public example of middleware is the http: protocol of the world wide web. The subject develops skills in the Java middleware, Jini, and develops analysis skills of open systems via a framework for evaluating open systems.

Assessment: assignments 30 per cent, project 50 per cent, other 20 per cent.

49261

Biomedical Instrumentation

6cp; 3hpw; prerequisite(s): suitable undergraduate subjects
All courses
Postgraduate
Subject Coordinator: Professor H Nguyen

This subject covers general concepts applicable to the design of all medical instrumentation systems, the measurement of biopotentials and critical-care analyses for diagnostic purposes, and the design of biomedical devices for therapeutic purposes. The subject includes three modules covering sensors and amplifiers, vital sign monitoring for diagnostic purposes, and physiological intervention/closed-loop control.

Assessment: assignments worth 25 per cent; project work and seminar worth 50 per cent (includes 20 per cent for seminar); final examination worth 25 per cent.

49271

Computer Architecture

6cp; 3hpw; prerequisite(s): suitable undergraduate subjects
All courses
Postgraduate
Subject Coordinator: N J Carmody

The subject explores at an advanced level issues that impact upon the hardware design of modern computers. This experience enables the student to evaluate a proprietary system, develop a hardware system using standard sub-assemblies, and design system components, such as specialised processor elements, which meet an application requirement.

Assessment: final examination worth 50 per cent; laboratory assignment worth 30 per cent; other assignments worth 20 per cent.

49272

Adaptive and Multivariable Control

6cp; 3hpw; prerequisite(s): suitable undergraduate subjects
All courses
Postgraduate
Subject Coordinator: to be advised

This subject covers advanced techniques for modelling, analysis and design of systems suited to multi-variable, adaptive or optimal control. Laboratory projects are conducted on a continuous basis throughout the semester. Topics include: direct and inverse Nyquist arrays, characteristic locus, robust control, pole shifting techniques, identification algorithms, minimum variance control, self-tuning adaptive regulator, linear quadratic regulator design, state estimation and the Kalman filter.

Assessment: laboratory work including two seminar presentations worth 50 per cent; three out of four assignments worth 50 per cent.

49274

Advanced Robotics

6cp; 3hpw or block attendance; prerequisite(s): suitable undergraduate subjects
All courses
Postgraduate
Subject Coordinator: to be advised

This subject covers advanced topics in robotics and robot programming, including mechanical manipulation using robots, actuation, sensing and vision systems, and robotic applications. Upon completion of the subject, the student is expected to be competent to

program and control robots with up to six degrees of freedom. In addition, the student is expected to have sufficient understanding to build robots with two-dimensional (terrestrial) and three-dimensional (aquatic) motions using advanced techniques such as subsumption architecture and artificial intelligence.

Assessment: assignments worth 30 per cent; laboratories and quizzes worth 10 per cent; final examination worth 60 per cent.

49275

Neural Networks and Fuzzy Logic

6cp; 3hpw; prerequisite(s): suitable undergraduate subjects
All courses
Postgraduate
Subject Coordinator: Professor H Nguyen

The principal objective of this subject is to introduce students to neural networks and fuzzy theory from an engineering perspective. In the identification and control of dynamic systems, neural networks and fuzzy systems can be implemented as model-free estimators and/or controllers. As trainable dynamic systems, these intelligent control systems can learn from experience with numerical and linguistic sample data.

Assessment: three assignments worth 25 per cent; project worth 50 per cent and final examination worth 25 per cent.

49276

Sliding Mode Control

6cp; 3hpw or block attendance; prerequisite(s): suitable undergraduate subjects
All courses
Postgraduate
Subject Coordinator: Professor H T Nguyen

This subject covers the salient aspects of deterministic control of uncertain systems from an engineering perspective. It deals specifically with sliding mode techniques for achieving effective control of systems with uncertain dynamics or bounded unknown disturbances. Students develop ability to identify bounded disturbances and model variations, to analyse and design appropriate sliding mode controllers, and to implement control solutions in a specified application. The project is presented through lectures, tutorials and a semester-length practical project.

Assessment: assignment worth 25 per cent; examination worth 25 per cent; project worth 50 per cent.

49306

Quality and Operations Management Systems

6cp; 3hpw or block attendance
All courses
Postgraduate
Subject Coordinator: Dr H Akpolat

This subject helps students to understand how to design, develop and implement a quality system and how to achieve certification of the quality system according to the International Standards ISO 9000 series. It develops understanding of the means of defining the structure of the quality system in manufacturing and service organisations, determining what resources are needed to complete the documentation and the evaluation of the quality system.

This subject also highlights the use of an effective quality system for continuous quality improvements.

Assessment: assignments worth 30 per cent; examination worth 70 per cent.

49307

Internal Combustion Engines and Environmental Issues

6cp; 3hpw or block attendance
All courses
Postgraduate
Subject Coordinator: Dr G Hong

This subject emphasises solutions to environmental and energy resource problems related to internal combustion (IC) engine design, development and utilisation. It introduces a pragmatic engineering field of internal combustion engines and provides opportunities to students to develop an understanding of the applications of IC engines in environmental protection, transportation, electricity generation and other areas.

Assessment: laboratory reports worth 35 per cent; projects worth 35 per cent; examination worth 30 per cent.

49309

Quality Planning and Analysis

6cp; 3hpw or distance mode; prerequisite(s): suitable undergraduate subjects
All courses
Postgraduate
Subject Coordinator: Dr H Akpolat

This subject develops understanding of the imperatives, culture, philosophy, scope, strategies and practice of total quality management and covers problem identification,

process design, continuous improvement, vendor supplies, customer service, quality auditing and the development of a quality assurance practices manual and compliance with relevant Australian Standards and supplier assessment schemes.

Assessment: assignments worth 30 per cent; formal examination worth 70 per cent.

49311

Advanced Heat Transfer

6cp; 3hpw
All courses
Postgraduate
Subject Coordinator: Dr J Madadnia

This subject develops concepts and methods for dealing with some advanced topics in heat transfer. These include boiling, natural convention and radiation. Numerical simulation and practical laboratory experiments are important components of the course.

Assessment: assignments, projects and/or an examination.

49312

Advanced Flow Modelling

6cp; 4hpw; prerequisite(s): suitable undergraduate subjects, plus some programming experience
All courses
Postgraduate
Subject Coordinator: Dr A Mack

Computational fluid dynamics (CFD) is a cornerstone of modern engineering and a technology which is regarded as crucial to the success of the major economies. Along with more traditional modelling techniques, this subject provides exposure to the numerical methods in CFD computer codes and experience in the practical application of commercial CFD packages. Importantly, it develops skill in the evaluation of the solution integrity. The subject culminates in a major project of the students' own choosing. On completion, students should have proficiency to undertake leadership roles in this exciting new field across the entire engineering spectrum and, in particular, in the mechanical, aeronautical, civil and environmental context. The subject has particular relevance to the design of vehicles, buildings, structures, engines, turbomachinery, manufacturing processes, heat transfer, combustion behaviour, pollutant dispersal, weather patterns, ocean currents and biomedical phenomena.

Assessment: projects worth 50 per cent; assignments worth 35 per cent; laboratories worth 15 per cent.

49316

Materials Handling

6cp; 3hpw
All courses
Subject Coordinator: J Dartnall

The materials handling industry is very broad, covering almost all industries including mining, mineral processing, agricultural production, food processing, power production, chemical processing, manufacturing, packaging, pharmaceutical production and many others. Since the industrial revolution, people have made increasing use of mechanical methods of handling materials. This has been to such an extent that in the western world almost everything, included food, raw materials building materials and finished products, has probably been mechanically handled many times before it reaches the consumer.

This subjects covers the main systems and methods of mechanical handling of materials, both bulk solids handling and discrete handling of products and goods.

Topics include: screw, belt and bucket conveyors and elevators; pneumatic and hydraulic conveying of bulk solids; storage systems; feeding, sampling and weighing of materials and systems for handling artifacts, factory products and packaged goods.

Assessment: two major projects worth 30 per cent, labs and minor assignments worth 30 per cent, one day visit to Wollongong industries (report) worth 15 per cent, final examination worth 25 per cent.

49318

Manufacturing Systems Management

6cp; 3hpw or distance mode; prerequisite(s): 48621 Manufacturing Engineering or equivalent
All courses
Postgraduate
Subject Coordinator: Dr G Hong

Systems thinking is a vital strategy in the international competitiveness of modern manufacturing industry. In this subject, a manufacturing system is analysed by partitioning, to model its flow of materials and information, and to identify waste and value adding activities. Manufacturing system paradigms are reviewed in the context of their application to different businesses, professional disciplines and functional areas. Simple linear control systems are contrasted with nonlinear, long time lag learning systems with multi-input strategies to achieve

corporate objectives interacting with multiple performance indices; assumptions for the simplification of complexity for scaling, modelling and simulation. Case studies relevant to the student's learning needs or employment may incorporate issues of marketing, forecasting, maintenance, modularity, group technology, flexible manufacturing, time to market, clean production, life cycling, bench marking and the control of inventory, production or finance. The design and synthesis of new systems built on interlinked sub-systems with manageable modules are considered through incremental development and step change innovation.

Assessment: formative projects worth 35 per cent; formative assignments worth 35 per cent; examination worth 30 per cent.

49321

Energy Conversion

6cp; 3hpw
All courses
Postgraduate
Subject Coordinator: Dr J Madadnia

The subject develops the capability to appraise, analyse and evaluate sustainability in design, selection and application of energy conversion systems. Topics for the subject include three kinds of conversion systems: renewable (direct and indirect, solar, wind, hydro, biomass and tidal), alternative (hydrogen and methanol) and non-renewable (coal, petroleum and natural gas) systems. Aspects to be covered include technological (design concepts), economic (cost and efficiency) and environmental (greenhouse effects including life cycle analysis and pollution) analysis of energy conversion system. From an Australian perspective, the subject considers the future developments for energy supply, using solar energy, wind turbines, water turbines, steam turbines, gas turbines, internal combustion engines, and fuel cells relevant to social and environmental criteria. Case studies and relevant laboratory-based projects are directed towards improving understanding of the fundamentals of the energy conversion.

Assessment: assignments worth 15 per cent; laboratories and case studies worth 60 per cent; examination worth 25 per cent.

49322

Airconditioning

6cp; 3hpw; prerequisite(s): 48651 Thermodynamics
All courses
Postgraduate
Subject Coordinator: Dr G Hong

Airconditioning systems are required by modern society and promoted by high technology to be functional, well-controlled, energy-efficient and environmentally friendly, in maintaining human comfort and health as well as industrial productivity. The objectives of this subject are: to advance student understanding of refrigeration and airconditioning systems; to develop basic skills for carrying out the design and construction of airconditioning for buildings; to enhance knowledge of energy conservation and management as applicable to airconditioning systems.

Topics include: principles of thermodynamics and heat transfer, airconditioning systems and components, design criteria and standards, psychometry and airconditioning processing, refrigeration, load estimation, computer software for load estimation, duct and pipe design, control system, noise and pollution.

Assessment: laboratory report worth 20 per cent; project worth 30 per cent; examination worth 50 per cent.

49323

Vibration Analysis: Theory and Applications

6cp; 3hpw or block attendance; prerequisite(s): 48662 Mechanical Applications
All courses
Postgraduate
Subject Coordinator: Associate Professor N Zhang

This subject extends students' understanding of vibration theory and its application to problems encountered in mechanical and structural engineering. It focuses on learning and practising the techniques and skills most frequently used in engineering practice. After a brief revision of basic vibration theory for single-degree-of-freedom systems, the subject moves on to multiple-degree-of-freedom systems, modal analysis, torsional vibration, approximation and numerical methods for transverse vibration including influence coefficient methods, transfer matrix method and finite element methods. Applications include vibration reduction by passive and active means, design of vehicle suspension systems, experimental modal analysis, rotor dynamics and spin stability and analysis.

Assessment: assignments and laboratory reports worth 70 per cent; final examination worth 30 per cent.

49324

Instrumentation and Condition Monitoring

6cp; 3hpw or block attendance; prerequisite(s): 48660 Dynamics and Control
All courses
Postgraduate
Subject Coordinator: Dr F C O Sticher

This subject introduces students to the fundamentals of strain-stress, sound and vibration measurement commonly used in condition monitoring and maintenance programs of major equipment in modern industries. It covers topics of strain gauging, data acquisition, frequency response analysis, signal processing, characterisation of signatures and infra-red techniques. Experiments include taking various physical measurements by using strain gauges, sound meters, accelerometers, temperature measuring devices, etc., together with their associated data acquisition/analysis systems. Students apply these skills to detection and diagnosis of faults in the bearings and gear transmission systems of rotating machines.

Assessment: laboratory reports worth 70 per cent; final examination worth 30 per cent.

49325

Computer-aided Mechanical Design

6cp; 3hpw or block attendance; prerequisite(s): 48650 Mechanical and Manufacturing Design
All courses
Postgraduate
Subject Coordinator: T Brown

This subject extends the development of students' design skills. Students use computer-aided methods to complement and enhance the analytical and theoretical skills and knowledge obtained in undergraduate subjects and in practice. Mechanical system simulation software is used for designing mechanical systems and controls, and to introduce virtual prototyping. A finite element analysis program is used for analysing stresses in mechanical components. Although commercially available software is used, students are not simply trained in the use of that particular program. Rather, the objective of the subject is that students understand the general approach to computer-aided engineering and the importance of having a sound knowledge of the fundamental mechanics.

Assessment: assignments and projects worth 70 per cent; quiz worth 30 per cent.

49326

Heat Transfer and Equipment Design

6cp; 3hpw
All courses
Postgraduate
Subject Coordinator: Dr J Madadnia

This subject is a combination of heat transfer and equipment design and is for electrical, electronic and mechanical engineers wishing to learn creative design skills and the practical implementation of their ideas. The equipment studied requires cooling, heating or heat exchange for its operation.

The first part of the subject covers the principles and practical results of heat transfer, namely conduction, convection and radiation, to a level appropriate for engineering design. Thermal-network models are developed for the analysis of steady-state and transient heating and cooling. It also discusses thermal degradation, thermal properties of materials, Australian Standards relating to thermal requirements, and the selection of electrical and mechanical materials. Laboratory work is used to develop skills in thermal measurements and a deeper understanding of cooling techniques and heat exchangers.

The second part of the subject covers the design of electrical, electronic and mechanical equipment. There is close integration of the two parts because good thermal design is required for reliable performance and high efficiency and/or low cost of equipment. This part will be taught through team solution of problem-based design projects and case studies selected according to the students' interest. The focus is on overall design optimisation to achieve a specified objective, subject to constraints of Australian Standards, available materials, total energy consumption, and customer requirements. Typical topics include power resistors, power transistor circuits, inductors, transformers, rotating machines, heat engines, cooling coils, and heat exchangers.

Assessment: assignments worth 10 per cent; laboratory reports worth 10 per cent; design projects worth 50 per cent; examination worth 30 per cent.

49327

Advanced Kinematics and Dynamics

6cp; 3hpw
All courses
Postgraduate
Subject Coordinator: Dr F Sticher

This subject extends the standard courses in planar kinematics and dynamics, and then applies the study of three-dimensional kinematics and dynamics to such topics as the kinematics of robots, the dynamics of gyro-compasses and inertial navigation, calculation of forces in swash plate mechanisms and the theory of spin stability and non-syndronous whirl.

Assessment: five assignments worth 100 per cent.

49550

Computing for Groundwater Specialists

0cp; block attendance totalling 24 hours or distance mode availability: ME(GWM), GDE(GWM) only
Postgraduate
Subject Coordinator: D Yates, National Centre for Groundwater Management

This subject 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. The subject is conducted through three intensive computer lab sessions.

Assessment: continuous assessment involving assignments and problems.

49551

Surface Hydrology and Groundwater

6cp; block attendance totalling 36 hours or distance mode availability: all courses (core for ME(GWM) and GDE(GWM))
Postgraduate
Subject Coordinator: Professor M J Knight, National Centre for Groundwater Management

This subject, conducted through a combination of classroom and lab sessions, provides the interface process link between surface hydrology and groundwater. Topics include hydrological cycle, water and energy balances and circulation, precipitation, interception, infiltration, storm run-off, hydrograph analysis, evaporation and transpiration, surface and groundwater interactions, land-use effects, artificial recharge.

Assessment: continuous assessment involving assignments and problems and short examinations.

49554

Groundwater Computing

6cp; block attendance or distance mode availability: all courses (elective for ME(GWM) and GDE(GWM))
Postgraduate
Subject Coordinator: Dr N Merrick, National Centre for Groundwater Management

This subject, conducted through a combination of classroom and lab sessions, provides a strong computing basis for groundwater management especially in the area of statistics and graphics as applied to groundwater problems involving computing. It provides an introduction to DOS and Windows operating systems, databases, spreadsheets, word processing, elements of geostatistics and graphical packages with applications related to groundwater processes, and groundwater computing project.

Assessment: continuous assessment involving assignments and problems. Assignments and problems assessed at a more advanced level than 49550 Computing for Groundwater Specialists.

49555

Groundwater Modelling

6cp; block attendance totalling 36 hours or distance mode; corequisite(s): 49550 Computing for Groundwater Specialists availability: all courses (core for ME(GWM) and GDE(GWM))
Postgraduate
Subject Coordinator: Dr N Merrick, National Centre for Groundwater Management

The subject, conducted through a combination of classroom and lab sessions, provides the computer modelling tools required for particular 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.

49629

New Business Creation

6cp; prerequisite(s): 48250 Engineering Economics and Finance
Spring semester
Postgraduate
Subject Coordinator: Professor R Belcher

This course is offered to final year students from the University of New South Wales, the University of Sydney and UTS through the Australian Technology Park, Eveleigh. It prepares graduates to take control of their own employment future, increasing their options through knowledge required to create and grow a company.

The course pays particular emphasis to technology-based companies.

The course develops understanding of R & D management, intellectual property, technology contracts, product development, marketing, financial management and business planning and should lead many of its graduates into active involvement within technology-based firms, both in Australia and internationally.

One three-hour block each week consists of lectures, presentations, case study discussions and workshops, videos and computer print-based material.

In addition to the three-hour block, students are expected to spend up to three hours per week out of class reviewing material and preparing case studies for in-class discussion.

Assessment: in-course involvement worth 10 per cent; two assignments worth 10 per cent and 20 per cent respectively; two-hour examination worth 60 per cent.

49701

Gas Sector Planning

6cp; block attendance; prerequisite(s): 49021 Evaluation of Infrastructure Investments; 49023 Energy and Environmental Economics
Postgraduate
Subject Coordinator: Associate Professor D Sharma

This subject aims to develop an understanding of the nature, characteristics and methods of gas sector planning. Topics include: nature of gas sector planning; planning perspectives; planning concepts and methods; economic and technological dimensions of gas sector planning and operation; integrated resource planning; institutional structures and ownership of the gas industry; regulatory issues; gas pricing; social, environmental and political dimensions of gas planning; other selected topics. Emphasis is placed on achieving depth and balance in all major aspects of gas sector planning and policy, with topical case studies providing an application focus.

Assessment: assignments worth 40 per cent; quizzes worth 50 per cent; contribution to class discussion worth 10 per cent.

49702

Gas Distribution Technology and Management

6cp; block attendance
All courses
Postgraduate
Subject Coordinator: Associate Professor D Sharma

This subject aims to introduce the principles, concepts and methods of designing, operating and managing gas distribution systems with due regard for security, safety and other related aspects. Topics include: general overview of gas distribution; typical features of gas distribution systems; gas distribution technologies; gas distribution network design; construction of gas distribution systems; network operational practices and procedures; maintenance and safety issues; management of gas distribution networks; marketing issues and technological trends. Emphasis is placed on achieving depth and balance in all aspects of the design and development of gas distribution networks, with topical case studies providing an application focus.

Assessment: assignments worth 40 per cent; quizzes worth 50 per cent; contribution to class discussion worth 10 per cent.

49703

Selected Topics (Energy Pricing)

3cp; block attendance; prerequisite(s): 49023 Energy and Environmental Economics
Postgraduate
Subject Coordinator: Associate Professor D Sharma

This subject aims to develop understanding of the microeconomic principles and methods of energy pricing. Topics include: microeconomic foundations of energy pricing; demand, supply and demand–supply interactions under various market conditions; pricing as a planning tool; pricing and efficiency; methods of pricing; case studies on the pricing of electricity, gas, oil and other energy resources.

Assessment: assignments worth 40 per cent; quizzes worth 50 per cent; contribution to class discussion worth 10 per cent.

49706

Regulatory Economics

6cp; block attendance; prerequisite(s): 49021 Evaluation of Infrastructure Investments; 49023 Energy and Environmental Economics; 49026 Electricity Sector Planning and Restructuring
Postgraduate
Subject Coordinator: Associate Professor D Sharma

This subject focuses on developing an understanding of the economics of regulation, and methods and principles of regulation design for the energy sector and other sectors of the economy. Topics include: historical overview of regulation; drivers for regulation; costs and benefits of regulation; impacts of regulation; institutional structure, ownership and regulation; regulatory frameworks; regulation design; policy issues and politics of regulation; case studies on regulatory aspects will be provided from the energy section and other sectors of the economy.

Assessment: assignments worth 40 per cent; quizzes worth 50 per cent; contribution to class discussion worth 10 per cent.

SUBJECTS OFFERED BY OTHER FACULTIES

16061

Construction Management 1A

6cp

Introduction to the management of the building and construction process. The subject is designed to provide an introduction and overview of the skills and activities involved in construction management by introducing the topics time management, human resource management, scope management, work breakdown structure, materials handling, quality management, cost management, and safety management, etc.

16062

Construction Management 2A[1]

6cp

Management of the construction process is further developed with the issues of quality management and organisation theory formally addressed. Time, cost, scope and quality management are further developed in the case study. Project case studies relating to multi-residential or industrial buildings are utilised in this subject.

16065

Construction Management 2S[1]

6cp

Management of the construction process is further developed with the issues of cost management and contract administration formally addressed. Time, cost, scope and quality management are further developed in the case study. Project case studies relating to multi-residential or industrial buildings are utilised in this subject.

16063

Construction Management 3A[1]

6cp

Management of the construction process is further developed with the issues of occupation health and safety and industrial relations formally addressed. Time, cost, scope and quality management are further developed in the case study. Project case studies relating to multi-storey buildings are utilised in the case study.

16066

Construction Management 3S[1]

6cp

Management of the construction process is further developed with the issue of sub-contractor management formally addressed and the issue of cost management developed in greater detail. Time, cost, scope and quality management are further developed in the case study. Project case studies relating to multi-storey buildings are utilised in the case study.

16064

Construction Management 4A[1]

6cp

Management of the construction process is further developed with the issues of management information systems and environmental management formally addressed and the issue of organisation theory developed in greater detail. Time, cost, scope and quality management are further developed in the case study. Project case studies relating to multi-storey buildings are utilised in the case study.

16067

Construction Management 4S[1]

6cp

Management of the construction process is further developed with the issues of design management, production management and client management formally addressed. Time, cost, scope and quality management are further developed in the case study. Project case studies relating to multi-storey buildings are utilised in the case study.

[1] The issues developed within one of the levels 2 to 4 may be switched within the same level between the subject designated A and the subject designated S.

21128

International Business

6cp
Undergraduate

Introduces students to the multidimensional nature of international business. Discusses the importance of globalisation and how it has changed the competitive environment of business. Introduces the role of multinational corporations and the complexity of international operations and management. Discusses current debates surrounding multilateral bodies. An Australian perspective is adopted throughout with students also developing an understanding of business in Asia.

21193

Introduction to Corporate Strategy

6cp; prerequisite(s): four completed core subjects of the Bachelor of Business
Undergraduate

Introduces students to the concept and process of strategic analysis and decision making. Provides students with competencies, skills and the understanding necessary for implementing and managing the strategy process which aims to ensure the long term viability and success of an enterprise. Thus students can more readily understand, communicate and materially contribute to the purpose of the organisation. Gives participants an understanding of the contemporary business environment in which business operates and how decision-making processes, leadership and organisational politics impact on the strategic activities of managers.

21715

Strategic Management

6cp; prerequisite(s): 22747 Accounting for Managerial Decisions; 25706 Economics for Management; 24734 Marketing Management; 25742 Financial Management
Postgraduate

This is an integrating subject concerned with top management strategy for, and management of, change in the economic and social environments of business. Case studies from real business situations are examined. Topics include strategy formulation, strategic planning, management audits, management of change, and social responsibility and corporate effectiveness.

21718

Organisation Analysis and Design

6cp
Postgraduate

Develops skills in organisational analysis. Develops diagnostic and prescriptive skills in regard to organisations. Focuses on the description and analysis of organisations as formal structures, political systems and cultural entities.

21720

Employment Relations

6cp
Postgraduate

This subject presents an introduction to the areas of industrial relations and human resource management. Topics covered include historical steps in the development of the human resource function and the forces that have shaped its development; major functions of employment relations managers; the relationship between the human resource and industrial relations functions in the modern organisation; the nature of industrial relations and the contribution to understanding made by several conflict theorists; the structure and functioning of formal industrial relations; the form and function of the employer and employee organisations, parties to employment relations; and the nature of efficiency restructuring and enterprise bargaining and their impact upon the management of employment relations.

21813

Managing People

6cp
Postgraduate

Uses a behavioural science theory and research perspective to diagnose organisational processes. Students learn to apply behavioural science ideas to analyse individual performance issues and organisational processes in the management of human performance at work; relate people management practices to developments in management thought and to changing values in the world of business and administration; critically evaluate the major theories and models that have been developed to explain individual, group and inter-group behaviour in work organisations; and appraise organisational communication practices in the context of organisational diversity.

Provides an introduction to the field of people management; basic individual psychology; motivation, job design and performance management; managing groups at work; self-managing work teams; intergroup behaviour and conflict in organisations; leadership; behavioural aspects of decision-making; and communication for people management.

22107

Accounting for Business

6cp
Undergraduate

In most economies business success is measured in financial terms. It is the accountants who undertake this measurement. Many decisions in business are made based on accounting information, both historical (based on past events) and projected (based on estimates of the future). Understanding accounting as a systematic way of measuring and communicating financial information on the financial status of various business entities is the foundation for any successful career in both the private and public business sectors.

22207

Accounting Transactions and Business Decisions

6cp; prerequisite(s): 22107 Accounting for Business
Undergraduate

Continues the study of accounting as an information system and equips students with the appropriate accounting skills necessary to participate in a managerial capacity in the analysis of accounting information as it is used to facilitate and enhance decision-making, accountability and control. Ethical implications of decisions will be considered throughout the subject. Covers areas in both financial and management accounting, including the preparation and examination of accounting reports for partnerships and companies; the development of relevant cost concepts used in cost systems and the use of this information in performance evaluation. A computer software package is used in the review and presentation of accounting information.

22747

Accounting for Managerial Decisions

6cp
Postgraduate

Introduces students to the basics of financial and management accounting. Topics include the nature and purpose of accounting, accounting reports (balance sheets, profit and loss statements, cash flow statements) and analysing accounting; accounting reports and financial reports; the nature of management accounting and cost concepts; strategic planning and budgeting; cost accumulation systems (traditional costing systems and

activity-based costing systems); and responsibility accounting (the management control structure, and analysing and reporting on performance).

24108

Marketing Foundations

6cp
Undergraduate

Covers the basic principles of marketing. Develops an understanding of the overall process of marketing planning, implementation and control in the contemporary business environment. Also develops a basic understanding of marketing information systems; market research and marketing ethics; market segmentation; buyer behaviour; product development; and the development of product, distribution, promotion and pricing strategies for both goods and services domestically and internationally.

24734

Marketing Management

6cp
Postgraduate

Recognises marketing as a key managerial decision-making area, in particular relating the organisation to its environment to bring about change. Drawing extensively on the literature in marketing and marketing management, the subject will adopt a range of teaching approaches to demonstrate the nature and complexity of managerial marketing decision making, and at the same time develop knowledge and skills for effectively managing the complexity of exchange processes.

25115

Economics for Business

6cp
Undergraduate

Develops an understanding of basic economic principles and their application to business decision making and business strategy. Provides a foundation for further studies in business, economics and finance. Provides students with the ability to read and understand analyses presented in the financial and business media and be able to effectively participate in the formulation of business strategies.

25300

Fundamentals of Business Finance

6cp; prerequisite(s): 22107 Accounting for Business; 25115 Economics for Business; corequisite(s): 26133 Business Information Analysis
Undergraduate

Introduces students to the concepts of financial management and the main approaches to solving financial problems of the firm. Topics include financial markets; introduction to foreign exchange risk; introduction to futures and options; capital budgeting; financing decisions and working capital management. Develops skills in searching for financial information via the web and the use of computer packages such as Excel.

25706

Economics for Management

6cp
Postgraduate

Provides an intensive introduction to the two major components of economic theory – microeconomics (which deals with the behaviour of individuals, firms and industries) and macroeconomics (which deals with the behaviour of the national and international economies). Provides a working knowledge of the economic environment for managers.

25742

Financial Management

6cp
Postgraduate

Provides the analytical framework for corporate financial decisions. Introduces students to financial theory and to the tools of financial decision making. Concerned primarily with investment project evaluation and determining the financing mix necessary to achieve the firm's financial objectives. Topics include the conceptual basis of financial decisions, accounting statements and cash flow, net present value, the valuation of debt and equity, capital budget issues, risk and return, the capital asset pricing model (CAPM), capital structure – determinants of the optional balance of debt and equity, dividend policy, and leasing.

31425

Principles of Software Development B

6cp; prerequisite(s): 31415 Principles of Software Development A or another programming subject

The specification and implementation of stacks, queues, lists and trees are discussed as abstract data types. Formal mathematical specification of software and program correctness are discussed. Program-testing methods are emphasised throughout the subject, as are aspects of software quality such as useability.

31429

Procedural Programming

6cp; prerequisite(s): 31415 Principles of Software Development A

This subject deals with top-down structured program design techniques and their application to the development of commercial programming applications. Emphasis is on the quality and useability of the resultant systems. Debugging and testing skills are developed. The language used is C.

31434

Database Design

6cp; prerequisite(s): 31424 Systems Modelling

This subject introduces the students to basic database design and implementation concepts. Database design techniques, including relational design and E-R analysis, are presented. Database programming using SQL is covered in lectures and supported by practical exercises. Object database and distributed database concepts are introduced.

31514

Computing Theory

6cp

This subject introduces students to some of the theory underlying computing science. It includes such topics as formal methods and computational complexity.

31777

Human–Computer Interaction

6cp; prerequisite(s): 31444 Systems Design and Development or equivalent

This subject focuses on the design, evaluation and implementation of interactive computing systems for human use within actual situations. Students gain an understanding of human–computer interaction (HCI) principles, including the main concepts, tools and techniques available to build user-centred systems. This subject considers the effects on use of the different metaphors for human activity that designers use in their systems and how user-centred design and evaluation methods can improve the useability of computer systems.

31862

Principles of Human–Computer Interaction

6cp; prerequisite(s): 48440 Software Engineering

This subject introduces students to the fundamental knowledge required to understand the nature and scope of HCI, the contribution to HCI of human factors, language and communications, and ergonomics, and the role of HCI in the software and systems design and development process. Approaches to incorporate HCI into the software design and systems development process will be examined with an emphasis on how HCI can ensure more usable software and systems.

31931

Software Quality Assurance

6cp; prerequisite(s): 31424 Systems Modelling or equivalent

The subject aims to provide students with the practical knowledge and skills that are necessary to effectively measure and control the quality of software products. Major topics include: quality assurance principles; quality metrics; verification, validation and testing; implementing quality assurance, and software engineering methods and tools.

32108

Applications of Artificial Intelligence

6cp

Availability: Honours and postgraduate degree students

This subject covers some important areas of artificial intelligence and their applications. These areas include, broadly: knowledge representation; problem solving; planning; knowledge-based systems; dealing with uncertainty; explanation facilities; and machine learning and applications of AI. The subject quickly introduces students to the basic AI techniques and then deals with individual topics in depth.

33130

Mathematical Modelling 1

6cp; prerequisite(s): no formal prerequisites, but a knowledge of 3 units of HSC Mathematics is assumed; corequisite(s): 68037 Physical Modelling

On completion of this subject students should be able to: understand the relevance of mathematics to engineering science and practice; understand the way in which mathematics can supply useful tools and resources to model real world problems; use mathematical terminology and concepts; use formal and informal language to demonstrate understanding of these concepts; demonstrate a high level of skill in the computational techniques of the subject; demonstrate understanding of the theoretical results which justify the use of these techniques; communicate the above knowledge clearly, logically and critically; use the computer algebra system *Mathematica* to perform calculations and explore mathematical ideas relevant to the subject content; be able to apply the subject matter covered in lectures, tutorials and assignments to previously unseen problems; be aware of the historical context of mathematical development.

Topics covered include the following: presentation of a collection of physical problems; functions and their relationship to measurement and the interpretation of physical results; differentiability; differential equations arising from physical problems; solution by series; growth and decay problems; oscillatory motion; trigonometric functions and inverse trigonometric functions; integration; the logarithm function; inverse functions; methods of integration; and introduction to nonlinear oscillations.

The computer algebra system *Mathematica* is used throughout the subject as an aid to computation, graph plotting and visualisation.

33132

Mathematical Modelling 1 (two-semester mode)

6cp; prerequisite(s): no formal prerequisites, but a knowledge of 3-unit Mathematics is assumed; corequisite(s): 68039 Physical Modelling

On completion of this subject students should be able to: understand the relevance of mathematics to engineering science and practice; understand the way in which mathematics can supply useful tools and resources to model real world problems; use mathematical terminology and concepts; use formal and informal language to demonstrate understanding of these concepts; demonstrate a high level of skill in the computational techniques of the subject; demonstrate understanding of the theoretical results which justify the use of these techniques; communicate the above knowledge clearly, logically and critically; use the computer algebra system Mathematica to perform calculations and explore mathematical ideas relevant to the subject content; be able to apply the subject matter covered in lectures, tutorials and assignments to previously unseen problems; be aware of the historical context of mathematical development.

Topics covered include the following: presentation of a collection of physical problems; functions and their relationship to measurement and the interpretation of physical results; differentiability; differential equations arising from physical problems; solution by series; growth and decay problems; oscillatory motion; trigonometric functions and inverse trigonometric functions; integration; the logarithm function; inverse functions; methods of integration; and introduction to nonlinear oscillations.

The computer algebra system Mathematica will be used throughout the subject as an aid to computation, graph plotting and visualisation.

33190

Mathematical Modelling for Science

6cp; 6hpw; prerequisite(s): no formal prerequisite but a knowledge of 2 units of HSC Mathematics is assumed

Topics covered in this subject include: 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; and solution of differential equations by integration and inverse functions. The computer algebra system *Mathematica* is used for symbolic, graphical and numerical computations.

33230

Mathematical Modelling 2

6cp; prerequisite(s): 33130 Mathematical Modelling 1 or 33132 Mathematical Modelling 1 (two-semester mode)

On completion of this subject students should be able to: understand the relevance of mathematics to engineering science and practice; understand the way in which mathematics can supply useful tools and resources to model real world problems; use mathematical terminology and concepts; use formal and informal language to demonstrate understanding of these concepts; demonstrate a high level of skill in the computational techniques covered in the subject content; demonstrate understanding of the theoretical results which justify the use of these techniques; communicate the above knowledge clearly, logically and critically; use the computer algebra system *Mathematica* to perform calculations and explore mathematical ideas relevant to the subject content; apply the subject matter covered in lectures, tutorials and assignments to previously unseen problems and proofs; be aware of the historical context of mathematical development.

Topics include the following: linear algebra; solutions to sets of equations resulting from particular problems; the need to develop a variety of ways of solving sets of equations; matrices and determinants, eigenvectors and eigenvalues; a standard treatment of vectors building on that given in Physical Modelling; partial derivatives using waves and temperature distributions as illustrative examples; optimisation; the method of least squares; multiple integrals and their applications; probability with a focus on the determination of the reliability of a system of components in various engineering contexts; variance, skewness and kurtosis; probability distributions, conditional probability and bivariate probability.

The computer algebra system *Mathematica* is used throughout the subject as an aid to computation, graph plotting and visualisation.

33290

Computing and Mathematics for Science

6cp; 6hpw; prerequisite(s): 33190 Mathematical Modelling for Science

In the computing component of this subject students will study a range of computing modules designed to give them basic computing application skills and some more advanced modules appropriate to their particular discipline. The mathematics component includes 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; and method of least squares. The computer algebra system Mathematica will be used for symbolic, graphical and numerical computations.

33390

Mathematics and Scientific Software

6cp; 4hpw; prerequisite(s): 33290 Computing and Mathematics for Science

Topics covered in this subject include: 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; and fourier series. An introduction to C and Mathematica programming in the context of problems from this subject and its prerequisite is also covered.

33490

Computational Mathematics and Physics

6cp; 5hpw; prerequisite(s): 68201 Physics in Action (Physics 2); 33390 Mathematics and Scientific Software

Topics covered include: 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; and singular points and their use in contour integration.

The subject is an introduction to the study of complex physical systems by computer and an introduction to computational tools used in areas such as molecular spectroscopy, fluid flows, diffusion of pollutants, scanning tunnelling microscopy, wave propagation along optic fibres.

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.

65012

Chemistry 1A

6cp; 6hpw

This subject is an introduction to some fundamental concepts in chemistry. Topics covered are: chemicals and chemical reactions; atomic structure; periodic table; chemical bonding; enthalpy changes in chemical reactions; and the structures and properties of solids. There is a laboratory program which complements the learning experiences in the lectures and tutorials. Other important aims of this subject are to enhance students' thinking skills, to foster their abilities to work cooperatively with their peers and to assist in the development of their communication skills.

65022

Chemistry 2A

6cp; 6hpw; prerequisite(s): 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; and 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; prerequisite(s): 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; prerequisite(s): 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(s): 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; and 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(s): 65201 Chemistry 2C or equivalent

The structures and reactions of the important families of organic compounds (aliphatic and aromatic hydrocarbons, halogen compounds, alcohols, ethers, carbonyl compounds, carboxylic acid derivatives and amines) are studied with emphasis on stereochemistry, reaction mechanisms and organic synthesis. Lecture and tutorial material is closely integrated with laboratory exercises in which students gain experience in techniques used in performing reactions, and in isolating, purifying and characterising products.

65306

Analytical Chemistry 1

6cp; 5–6hpw; prerequisite(s): 65201 Chemistry 2C or equivalent

Lecture, laboratory and computer-aided instruction components of the course cover: (a) spectroscopic methods of analysis including mass spectron and infra-red, ultraviolet-visible and NMR spectroscopy; (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; prerequisite(s): 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.

65409

Analytical Chemistry 2

6cp; 4.5hpw; prerequisite(s): 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(s): 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(s): 65201 Chemistry 2C or 65022 Chemistry 2A or equivalent

Transition metals: electron configurations and oxidation states. Fundamentals of coordination chemistry. Crystal field theory. Spectral and magnetic properties of metal complexes. Chelating agents and applications in analytical chemistry, industrial processes and medicine.

65508

Organic Chemistry 2 (Structure Elucidation and Synthesis)

6cp; 4.5hpw; prerequisite(s): 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 are complemented by a relevant practical program and tutorial sessions.

65509

Inorganic Chemistry 2 (New Inorganic Materials)

6cp; 4.5hpw; prerequisite(s): 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.

65606

Analytical Chemistry 3

6cp; 4.5hpw; prerequisite(s): 65306 Analytical Chemistry 1

Lecture and laboratory topics cover: (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; and (d) error propagation in analytical chemistry, systematic and random errors.

65607

Physical Chemistry 2

6cp; 4.5hpw; prerequisite(s): 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.

66014

Hydrogeology

6cp

This subject, conducted through a combination of classroom and lab sessions, provides a knowledge of geological occurrence and hydraulics of groundwater flow, exploration techniques, extraction engineering and borefield management.

66015

Hydrogeochemistry

6cp

This subject, conducted through a combination of classroom and lab sessions, 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 are covered.

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, and site assessment technology. Further details are available at the website:

http://groundwater.ncgm.uts.edu.au/ncgm/

or contact the Subject Coordinator on telephone (02) 9514 2614.

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 complemented by two full-day field excursions and other self-paced field work.

66204

Field Studies 1

6cp; approximately 3-4hpw for 10 weeks, six-day field excursion in NSW, and up to four local half-day excursions; prerequisite(s): 66101 Earth Science 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 is taught during one major field camp and supported by one or more afternoons of local field work.

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[1] This subject is no longer offered.

66304

Earth Materials

6cp; prerequisite(s): 33101 Mathematics 1 (Life Sciences) or equivalent; 65012 Chemistry 1A; 66101 Earth Science 1

Students are introduced to the rocks and minerals that are found at or near the surface of the Earth. The subject covers 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; prerequisite(s): 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(s): 66304 Earth Materials; corequisite(s): 66409 Surficial Processes and Products

Introduction to the nature of ore bodies including genesis and classification. Laboratory investigation of ore deposits. Introduction to exploration methods and reserve estimation for mineral deposits. World energy market, geology of fossil fuels deposits including coal and associated strata, oil, natural gas and synfuels derived from oil shale, tar sands and other petroliferos sediments. Concepts of exploration and resource estimation. Alternate energy sources and their viability.

66409

Surficial Processes and Products

6cp; prerequisite(s): 66204 Field Studies 1; 66304 Earth Materials;
65012 Chemistry 1A; 91311 Biology 1[1]; or 91101 Cells, Genetics and Evolution

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.

[1] This subject is no longer offered.

66508

Crustal and Mantle Processes

6cp; prerequisite(s): 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; 4hpw lectures/tutorials, 2hpw flexible; prerequisite(s): 66101 Earth Science 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.

66609

Environmental and Quaternary Geology

6cp; prerequisite(s): 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; prerequisite(s): 66101 Earth Science 1; 33101 Mathematics 1 (Life Sciences);
65012 Chemistry 1A or equivalent;
66409 Surficial Processes and Products;
corequisite(s): 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.

67101

Introduction to Materials

6cp; corequisite(s): 65101 Chemistry 1C or equivalent

An introduction to materials science, providing a foundation in microscopic structure and composition for the understanding of the behaviour of engineering materials. Topics include classification and structure of solids, phase diagrams, properties of metals, ceramics, polymers, timber and composites.

67303

Mechanical Properties of Materials

6cp; prerequisite(s): 33190 Mathematical Modelling for Science; 67101 Introduction to Materials

This subject provides an understanding of the mechanical properties of materials by the use of standard mechanical tests and the determination of materials property data. The concepts of stress, strain, elasticity, plasticity and criteria for yielding and fracture are addressed and applied to a wide range of mechanical test methods and materials. The issue of fractography as a means failure analysis is also addressed. Basic statics is introduced to the student along with an introduction to fracture mechanics. This subject also ensures that the student develops the necessary laboratory and analysis skills required by professionals involved in the mechanical testing of materials for either research or quality assurance.

67304

Physical Metallurgy

6cp; 6hpw; prerequisite(s): 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; prerequisite(s): 65201 Chemistry 2C; 67101 Introduction to Materials or equivalent

This subject provides an introduction to the chemistry and physics of polymers and includes comprehensive coverage of the structures, polymerisation mechanisms and characterisation techniques of polymers. Practical classes provide experience with relevant techniques and complement the theory presented in lectures. The applications of polymers are also addressed. This subject gives students a solid grounding in the field of polymers and the practical foundation for work in the polymer industry.

67306

Industrial Ceramics

6cp; 6hpw; prerequisite(s): 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; prerequisite(s): 67101 Introduction to Materials; 68201 Physics in Action (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; prerequisite(s): 67303 Mechanical Properties of Materials; 67304 Physical Metallurgy

The subject provides an understanding of application of metallurgical principles and theoretical concepts to the present and developing metal processing technologies, including foundry and casting technology, metalworking processes, welding technology, surface finishing and powder metallurgical techniques. The theory and application of non-destructive testing techniques are studied for examination of metal components and structures. Attention is also given to the environmental impact and the latest recycling technology of metals and alloys.

67409

Polymer Technology

6cp; 6hpw; prerequisite(s): 67305 Polymer Science; 67303 Mechanical Properties of Materials

This subject provides a comprehensive coverage of the physical properties of polymers and processing methods used in their manufacture. Practical classes provide experience with such processing methods and the relevant mechanical testing techniques. This subject gives students a practical foundation for work in the polymer industry.

67506

Technical Ceramics

6cp; 6hpw; prerequisite(s): 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.

67606

Corrosion and Degradation of Materials

6cp; 6hpw; prerequisite(s): 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; prerequisite(s): 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. Students learn to understand why composites are used and what advantages they can give the designer/engineer over monolithic materials . Students gain a basic knowledge of composite design and cost analysis in the use of composites. In addition students 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.

68037

Physical Modelling

6cp; prerequisite(s): NSW HSC 2 unit Mathematics is assumed, and HSC 2 unit Physics is recommended; corequisite(s): 33130 Mathematical Modelling 1

CE, CEE, CSE, ESE, EE, ME, SE, TE, BEBA, BEBBus CORE

The objectives of this subject are to develop: a conceptual basis in mechanics, thermal properties, waves and optics, electric and

magnetic fields. Problem-solving skills are developed in partnership with a hands-on program designed to use physical concepts in a mathematical formulation and apply those concepts to engineering problems. The key role of modelling in understanding and describing the natural world is supported by a development of the basic techniques of physical measurement, data anaylsis, verification of models and presentation of those skills by good technical communication.

68038

Advanced Mathematics and Physics

EE, BEBA, BEBBus
6cp; prerequisites: 68037/68039 Physical Modelling; 33230 Mathematical Modelling 2; 48510 Introduction to Electrical Engineering
FIELDS OF PRACTICE: ELECTRICAL ENGINEERING PROGRAM

The objectives of this subject are: to develop the mathematical skills and foundations required to describe a range of electrical engineering and engineering science systems, especially those to be encountered in senior undergraduate and postgraduate programs; to provide an introductory understanding of key concepts in modern physics which underpin modern electrical engineering technologies; to equip students with a basic understanding of the dielectric and magnetic properties of key electrical engineering materials; to introduce some fundamental insights into select electronic and photonic devices and transducers.

Topics include: advanced Mathematics – 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; application to field and potential problems; 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; inverse Laplace transforms. Advanced Physics – electrons as quantum entities, basic quantum concepts, simple solutions of the Schroedinger equation; energy levels in atoms, molecules and semiconductors. Selection of two from: laser, optical absorption and emission, optical sensors, or magnetisation and dielectric polarisation fundamentals, or ferroelectrics, piezoelectrics, dielectric breakdown, or basis of some everyday transducers (e.g. temperature, pressure, force, velocity).

68039

Physical Modelling (two-semester mode)

6cp; prerequisite(s): NSW HSC 2 unit Mathematics is assumed, and HSC 2 unit Physics is recommended; corequisite(s): 33132 Mathematical Modelling 1 (2 semester mode)
CE, CEE, CSE, ESE, EE, ME, SE, TE, BEBA, BEBBus CORE

This subject is identical to the program and aims of 68037 Physical Modelling, but is offered in a full-year mode (13 hours per week), enabling participation by part-time students and those with less background in mathematics or physics to absorb the material over a longer time period.

68101

Foundations of Physics

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, waves and electricity. A strong emphasis is placed on the investigative nature of physics research with an integrated laboratory program developing further the problem-solving skills of the lecture and tutorial material to an appreciation of good experimental design and significance in information obtained under real-life modelling situations.

68201

Physics in Action (Physics 2)

6cp; 6hpw; prerequisite(s): 68101 Foundations of Physics

This subject extends the material studied in 68101 Foundations in Physics, with statics and dynamics extended to a study of rotation, thermal physics extended to the first two laws of the thermodynamics, and waves extended to a study of geometrical optics and optical devices. At the same time, students are introduced to electric circuitry and electromagnetism and commence a historical study of atomic and nuclear physics.

68311

Atoms, Photons and Orbits (Physics 3)

6cp; 5hpw; prerequisite(s): 33190 Mathematical Modelling for Science or equivalent; 68201 Physics in Action (Physics 2); corequisite(s): 33290 Computing and Mathematics for Science

First-year mathematical techniques enable students in this subject to extend the understanding and modelling of mechanics and optics to more real-world situations and at the same time explores the exciting evolution from Newtonian Physics to Quantum Physics. It provides the foundation for later core physics subjects, the emphasis of the subject being mainly theoretical, but it has an experimental component applying the explorative first year techniques to optical experimentation, a study of radioactivity and computer simulation of dynamical systems.

Mechanics topics include the generalisation of kinematics to 3D motion and orbital mechanics. Optics studies include refraction, lenses, photography, the dispersion of light, aberrations, polarisation and scattering phenomena. 'Modern' physics studies the basic properties of the atom, radioactivity and relativity and lead into an introductory segment on Quantum Physics.

68312

Electrotechnology and Data Analysis

6cp; 5hpw; prerequisite(s): 68201 Physics in Action (Physics 2); 33290 Computing and Mathematics for Science

Scientific writing, rigorous analysis and a command of methods of presentation are essential tools for the physicist of the 21st century. In this subject, students study the concepts of electricity, electromagnetism and electrical measurements and their application to dynamical systems, and at the same time explore contemporary techniques of analysis of experimental data. These two areas are integrated into a project component which develops further the skills of experimental design developed in 68101 Foundations of Physics in an electromagnetic context, and enables the students to become critical analysers of their own and others' experimental work.

68314

Electronics

6cp; 5hpw; prerequisite(s): 68201 Physics in Action (Physics 2); 33290 Computing and Mathematics for Science

This subject develops students' understanding of the basic building blocks of electronic circuits. Review of circuit theory, semiconductor 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 are a key feature. The subject is equivalent to the Engineering subject 48520 Electronics.

68411

Vibrations, Quanta and Nucleons (Physics 4)

6cp; 5hpw plus 1 flexible; prerequisite(s): 68311 Atoms, Photons and Orbits (Physics 3); 33290 Computing and Mathematics for Science; 33390 Mathematics and Scientific Software or equivalent

This subject aims to complete the basic core physics training for Applied Physics students by applying the treatment of mechanics to vibrations, variable mass and fluid flow and to the special features of the mechanics of the atom. Students learn the basic techniques of quantum mechanics to begin to understand the findings of atomic theory introduced in 68311 Atoms, Photons and Orbits (Physics 3). Processes involving the considerable forces associated with the inner structure of the nucleus are studied to provide an understanding of the power of nuclear applications in the fields of medicine and forensic science. This is core material, providing the foundation for a study of the solid-state and leads directly into the subject 68511 Quantum and Solid-state Physics.

68412

Energy Science and Technology

6cp; 5hpw; prerequisite(s): 68201 Physics in Action (Physics 2); 33290 Computing and Mathematics for Science or equivalent

Solar, renewable and convential energy issues including energy efficiency and the possibilities for energy use posed by the laws of thermodynamics. Vacuum and thin films play a key role in many energy technologies – this part of the course is laboratory and project-

based, including a practical study in either advanced windows, roof coatings or solar absorbers.

68511

Quantum and Solid-state Physics

6cp; 5hpw; prerequisite(s): 68411 Vibrations, Quanta and Nucleons (Physics 4); 33490 Computational Mathematics and Physics

This subject highlights the fundamental nature of quantum mechanics and its application to the understanding of solids. Potential wells, eigenstates and eigenvalues, solutions to the Schrödinger equation in 3 dimensions, linear combination of atomic orbitals, band theory, pure and doped semiconductors, pn-junction and the light emitting diode are explored. A student does not have to be Einstein to understand the quantum mechanical basis of modern devices and their application in modern life. A major assignment is computational and utilises software skills developed in 33490 Computational Mathematics and Physics.

68512

Research Methods in Applied Physics

6cp; 5hpw; prerequisite(s): 68312 Electrotechnology and Data Analysis 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 are able to develop skills in cutting edge research techniques. Exact topics covered 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 is predominantly project and laboratory based. The subject is a suitable elective for students in all branches of the physical sciences.

68514

Electronics and Interfacing

6cp; 5hpw; prerequisite(s): 68314 Electronics; 48520 Electronics or equivalent instrumentation experience

The subject further develops students' understanding of computer interfacing in applied physics and science in general. Students learn how to construct functioning interfaces and the role of digital electronics. Digital electronics, computer interfacing, and the use of the LabView package are the main components of the subject. A sequence of small projects involves the design and construction of circuits and interfaces and is a key feature of the subject. This subject is useful to students in science courses who have an interest in developing their skills in the instrumentation and interfacing areas, with project work oriented to students' needs and interests.

68611

Electromagnetics and Optics

6cp; 5hpw; prerequisite(s): 68201 Physics in Action (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 benefits 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 also engage in an extensive laboratory program in experimental optics. Computer simulation and data visualisation techniques underpin the electromagnetics theory. Students are be encouraged to explore topics of interest through project activities.

70105

Legal Research

4cp
Undergraduate

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*, 3rd edn, Federation Press, 1997

70113

Legal Process and History

10cp
Undergraduate

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 are 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 are 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

Morris, G et al, *Laying Down the Law*, 4th edn, Butterworths, 1996

Parkinson, P, *Tradition and Change in Australian Law*, 2nd edn, Law Book Company, 2000

70211

Law of Contract

8cp; prerequisite(s): 70113 Legal Process and History; corequisite(s): 70217 Criminal Law; 70105 Legal Research
Undergraduate

This subject deals with the legal principles related to binding promises, 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, intention, writing); content and construction; vitiating factors (capacity, privity, 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

Monahan, *Essential Contract Law*, 2nd edn, Cavendish Press, 2001

70217

Criminal Law

6cp; corequisite(s): 70113 Legal Process and History; 70105 Legal Research
Undergraduate

This 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 et al, *Criminal Law*, 2nd edn, Federation Press, 1996

70311

Law of Tort

8cp; prerequisite(s): 70113 Legal Process and History; corequisite(s): 70105 Legal Research; 70217 Criminal Law
Undergraduate

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*, 9th edn, Law Book Company, 1998

Trindade, F & Cane, P, *The Law of Torts in Australia*, 3rd edn, Oxford University Press, 1999

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, 1993

70317

Real Property

8cp; prerequisite(s): 70211 Law of Contract; corequisite(s): 70311 Law of Tort
Undergraduate

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, 1996

Conveyancing Act 1919 (NSW)

Land & Skapinker, *Sale of Land*, 3rd edn, Longmans

Real Property Act 1900 (NSW)

Sappideen, C et al, *Cases and Materials on Real Property*, 3rd edn, Law Book Company, 1990

70318

Personal Property

4cp; prerequisite(s): 70211 Law of Contract; corequisite(s): 70311 Law of Tort
Undergraduate

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.

Text

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

70417

Corporate Law

8cp; prerequisite(s): 70317 Real Property
Undergraduate

The response of the law to the activities of business entities is dealt with in this subject. Although the emphasis is on corporations, there is a brief discussion of the manner in which non-corporate entities including partnerships are regulated. The study of corporations law includes 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, 2000

Redmond, P, *Corporations Law – Cases and Materials*, Law Book Company, 1999

Australian Corporations Legislation (2000 edition)

70516

Equity and Trusts

8cp; prerequisite(s): 70317 Real Property; corequisite(s): 70417 Corporate Law
Undergraduate

Equity is a body of rules or principles developed in the Court of Chancery before 1873. The doctrines of equity developed as a response to defects in the English common law system, defects 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

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 & Loughlin, *Equity and Trusts and Cases and Materials*, Butterworths, 1997

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

Parkinson, P, *The Principles of Equity*, Law Book Company, 1996

70616

Federal Constitutional Law

8cp; prerequisite(s): 70113 Legal Process and History; 70105 Legal Research; corequisite(s): 70211 Law of Contract
Undergraduate

This subject examines the effect of the Australian Constitution on the legal and fiscal relationship of the Commonwealth, States, and Territories. 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*, 2nd edn, Butterworths, 1998

Keyser, P, *Constitutional Law*, Butterworths, 1998

Blackshield, T & Williams, G, *Australian Constitutional Law and Theory: Commentary and Materials*, 2nd edn, Federation Press, 1998

70617

Administrative Law

8cp; prerequisite(s): 70616 Federal Constitutional Law
Undergraduate

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 et al, *General Principles of Administrative Law*, 4th edn, Butterworths, 1997

Allars, M, *Australian Administrative Law: Cases and Materials*, Butterworths, 1997

Douglas, R & Jones, M, *Administrative Law: Commentary and Materials*, 2nd edn, Federation Press, 1996

Ellis-Jones, I, *Essential Administrative Law*, Cavendish, 1997

71005

Practice and Procedure

4cp; prerequisite(s): 70516 Equity and Trusts
Undergraduate

Practice and Procedure is a core subject that develops the students' understanding of the process of litigation from the commencement of proceedings through to the final hearings. Topics include statements of claim in contracts and torts; defence, cross-claims and replies; equitable proceedings; particulars; discovery, inspection and interrogatories; notice of motion; drafting affidavits; subpoenas; and advocacy skills.

71116

Remedies

6cp; prerequisite(s): 70516 Equity and Trusts
Undergraduate

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 is also 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

Tibury, M, Noone, M & Kercher, B, *Remedies: Commentary and Materials*, 3rd edn, Law Book Company, 2000

71216

Law of Evidence

6cp; corequisite(s): 70516 Equity and Trusts
Undergraduate

This subject deals with adjectival law and the determination of how information may be presented to the court in litigation, when such information is 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 are studied, as well as the incidence of the burden of proof.

Texts and references

Aronson, M et al, *Litigation: Evidence and Procedure*, 6th edn, Butterworths, 1998

Australian Law Reform Commission, *Evidence*, ALRC Reports Nos 26 (Interim, two vols, 1985) and 38 (1987)

Brown, R, *Documentary Evidence in Australia*, 2nd edn, Law Book Company, 1996

Buzzard, J H, May, R & Howard, M N, *Phipson on Evidence*, 14th edn, Sweet & Maxwell, 1990

Byrne, D & Heydon, J D, *Cross on Evidence*, 6th Aust. edn, Butterworths, 2000

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*, 3rd edn, Butterworths, 1998

Ligertwood, A, *Australian Evidence: Cases and Materials*, Butterworths, 1995

McNicol, R, *Law of Privilege*, Law Book Company, 1992

Odgers, S, *Uniform Evidence Law*, 4th edn, Law Book Company, 2000

Palmer, A, *Principles of Evidence*, Cavendish, 1998

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

79203

Business Law and Ethics

6cp; core
Undergraduate Cross-disciplinary

Business Law and Ethics provides the fundamental foundation for all future law subjects in the Bachelor of Business. It covers Australian and international commercial relationships in contract and consumer protection, as well as developing laws, such as intellectual property. Students learn legal research techniques involving the Internet and paper-based library resources and focus on skills and developing general principles that can be applied to all areas of law, both now and in the future. In particular, the subject focuses on resolving personal and professional ethical dilemmas, as well as the choice of resolving commercial disputes in and outside the court system.

79371

Legal Issues in Communications

6cp; one semester; availability: Bachelor of Engineering in Telecommunications Engineering
Undergraduate Cross-disciplinary

This subject introduces students to the legal context of telecommunications and information technology in Australia and internationally, and develops students' understanding of the interplay between technical, commercial and legal aspects of introducing a new product or service, and in particular how the regulatory structure shapes market opportunities. Topics to be covered include contract law; product liability; professional liability; intellectual property law; patents; privacy; and consumer rights.

85208

Reconciliation Studies

6cp
Undergraduate

Reconciliation is a key strategy for a sustainable future for Australia. By reconciliation we mean creating 'a united Australia which respects this land of ours; values the Aboriginal and Torres Strait Islander heritage; and provides justice and equity for all' (Council for Aboriginal Reconciliation, 1992). Reconciliation Studies introduces students to the challenges of this process. Core reconciliation issues are investigated and discussed, drawing on relevant life experiences, academic research and professional practice. Skills in applying reconciliation principles in a professional field, industry or community are developed, including the use of cultural plurality and diversity of perspectives found in reference material and the classroom.

85209

Reconciliation Studies

8cp
Undergraduate

For subject description, see 85208 Reconciliation Studies.

85210

Reconciliation Studies

6cp
Postgraduate

For subject description, see 85208 Reconciliation Studies.

85211

Reconciliation Studies

8cp
Postgraduate

For subject description, see 85208 Reconciliation Studies.

91101

Cells, Genetics and Evolution[1]

6cp; 6hpw (average)

This foundation subject in biological science introduces a number of associated topics relating to the cells as well as the whole organism. It covers general evolutionary principles, emphasising the biological diversity from genetic variation to the diversity of species and ecosystems. Topics include scientific inquiry, concept of science (as applied to evolutionary thought), principles of genetics, the nature of variation, and human evolution. Multimedia technology is integrated throughout the lecture and laboratory curricula.

Students normally work in groups of four in the three-hour laboratory block. Laboratory work is designed to involve students in investigation, problem-solving and discovery exercises and may involve computer simulation exercises supplementing other 'hands-on' activities with living organisms. Computer exercises allow students to further investigate principles of genetics, classification of organisms based on evolutionary relationships, evolutionary mechanisms, population ecology and other topics. Small group work develops communication skills. This unit introduces students to many of the fundamental concepts in biological sciences, and as such could also serve as an elective for other courses.

[1] This subject replaces 91311 Biology 1.

91102

Functional Biology[1]

6cp; 6hpw (average)

This foundation subject in the biological sciences, introduces a number of associated topics relating to animals and plants. The evolution and diversity of the Australian biota is discussed within the context of climate changes and other environmental factors. Adaptations of animals and plants are explored by considering how they function. Multimedia technology is integrated throughout the lecture and laboratory curricula.

The laboratory classes are normally three-hour blocks, designed to involve students in investigation, problem-solving and discovery exercises. Students work in small groups with computer simulation programs and other activities involving living organisms. The development of communication skills is recognised as a key strategy in this foundation subject.

This introductory unit focusing on the Australian environment and its animals and plants could serve as an elective for other courses.

[1] This subject replaces 91312 Biology 2.

91110

Experimental Design and Sampling

6cp; prerequisite(s): 91395 Biocomputing; 33106 Statistical Design and Analysis or equivalent; 91312 Biology 2[1] or 91102 Functional Biology

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.

[1] This subject is no longer offered.

91111

Pollution Assessment

6cp; prerequisite(s): 65012 Chemistry 1A or equivalent; 91312 Biology 2[1] or 91102 Functional Biology

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 introduces the concepts of bioaccumulation, biotransformations, acute and chronic toxicity as well as the applicability of field and laboratory methods in the biomonitoring process.

[1] This subject is no longer offered.

91112

Ecological Principles and Modelling

6cp; prerequisite(s): 91395 Biocomputing; 91312 Biology 2[1] or 91102 Functional Biology

This subject provides a foundation in the characteristics and functioning of populations and communities in terrestrial and aquatic ecosystems. It includes exploration of population and community processes, including inter- and intraspecific interactions and the origins of temporal and spatial patterns in communities and populations of plants and animals. This subject may include a field excursion which could be conducted before commencement of semester.

[1] This subject is no longer offered.

91119

Terrestrial Ecosystems

6cp; 3hpw; prerequisite(s): 91309 Australian Biota; 91307 Community and Population Ecology[1]; 91110 Experimental Design and 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.

[1] This subject is no longer offered.

91120

Mapping and Remote Sensing

6cp; prerequisite(s): 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 is used to address issues associated with resources management, while remote sensing techniques are 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; prerequisite(s): 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.

91124

Coastal and Marine Ecosystems[1]

6cp; includes a 5-day field excursion to Jervis Bay, normally held in February; prerequisite(s): 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 is given firstly to Environmental Biology students who are enrolled in the Coastal and Marine Sciences sub-major, and thereafter is based on academic performance over Stages 1 and 2.

[1] This subject was formerly called Field Studies: Introductory Marine Sciences. Students should not enrol in Coastal and Marine Ecology if they have completed Field Studies: Introductory Marine Sciences.

91128

Plant Biotechnology

3cp; 3hpw; prerequisite(s): 91314 General Microbiology; plus first year Biology subjects

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, and totipotent suspension as a means of multiplication, and determining phenotypic and genetic stability of tissue cultured plants. The program also includes media preparation and nutrient requirements, and the use of robotics and biofermentors in micropropagation. Pathogen detection and elimination, production of virus-free plants, pathogen indexing, certification of horticultural crops, plant quarantine, germplasm preservation, cryopreservation, long-term storage, and biosecondary metabolites are covered. Physiological status of micropropagated plants, transplanting and hardening-off stages are demonstrated, and practices and problems in micropropagation such as vitrification, phenolic exudates, vessel environment, and large-scale production are covered. Special emphasis is given to Australian indigenous and rare flora.

91142

Biotechnology

6cp; 6hpw; prerequisite(s): 1st year biology or medical science subjects; corequisite(s): 91313 Biochemistry 1 or 91314 General Microbiology

This subject provides an overview of the discipline of biotechnology encompassing the traditional industries of food and industrial (chemical) biotechnology to the more recent high-technology applications in agriculture and medicine. The emphasis is placed on the

principles and processes of biological manipulation and the resulting product. Practical projects are used along with relevant site visits and workshops to demonstrate specific applications.

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; prerequisite(s): 65012 Chemistry 1A; 91312 Biology 2[1] or 91102 Functional Biology

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.

[1] This subject is no longer offered.

91234

Uses of Australian Plants

6cp; prerequisite(s): 65022 Chemistry 2A or equivalent; corequisite(s): 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(s): 91270 Plant Physiology

This subject provides knowledge of the main group of plant pathogens causing plant diseases, and an understanding of their mode of attack and prevention from spreading. 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(s): 91270 Plant Physiology

This subject is designed to develop students' 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[1]

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 introduces students to plant morphology and anatomy in relation to plant function, through the study of plant organs and tissues, with a particular focus on vegetative biology. Also studied are techniques of plant propagation, both sexual and asexual, including seeds, cuttings, budding, grafting, layering, separation and division.

[1] 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[1]

6cp; prerequisite(s): 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.

[1] 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; prerequisite(s): 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 develops students' understanding of the technical aspects of nursery management and plant production. Cost-benefit analysis is 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 are the technical aspects of personnel management, and seasonal and budgetary factors involved. Cost-benefit analysis of physical, biological, and human resources is considered. Long-term and construction design of plant production units are discussed.

91249

Plant Genetics and Breeding

6cp; prerequisite(s): 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 is introduced as is the genetic manipulation of the plant genome. Traditional methods of plant breeding and production of pure seed and stocks are also covered.

91250

Plants in the Landscape

6cp; prerequisite(s): 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(s): 91312 Biology 2[1] or 91102 Functional Biology

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.

[1] This subject is no longer offered.

91309

Australian Biota

6cp; prerequisite(s): 91312 Biology 2[1] or 91102 Functional Biology

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.

[1] This subject is no longer offered.

91313

Biochemistry 1

6cp; 6hpw; prerequisite(s): 65022 Chemistry 2A or equivalent; 91101 Cells, Genetics and Evolution or 91701 Medical Science 1

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. Glycosis, 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

General Microbiology[1]

6cp; 5hpw; prerequisite(s): 1st year Biology or Medical Science subjects

An introduction to the structure, function and taxonomy of the bacteria, fungi, protozoa and viruses. Several key topics in the study of microbiology are discussed including microscopy, sterilisation and disinfection, microbial nutrition and growth, antibiotics and the classification and identification of microorganisms. Basic mycology also covers their role in disease and the environment. The mode of transmission and symptoms of important diseases caused by both parasites, such as malaria, sleeping sickness, schistosomiasis, elephantiasis, and viruses such as HIV and hepatitis, are studied. The practical exercises give the student experience of the principal laboratory procedures for the isolation, manipulation, growth and identification of microorganisms.

[1] This subject was formerly called Microbiology 1.

91320

Biochemistry 2

6cp; 6hpw; prerequisite(s): 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.

91326

Analytical Biochemistry

6cp; 6hpw; prerequisite(s): 91313 Biochemistry 1

Modern methods in biochemical analysis emphasising instrumentation, underlying principles, aims and strategies. Spectroscopic methods; spectrophotometry, spectrofluorometry flame emission and absorption photometry, magnetic resonance, mass spectrometry. Chromatography principles and practice, GLC, HPLC. Electrophoresis, centrifugation; applications to nucleic aids and proteins. Cryoscopic osmometry. Electrochemical methods; potentiometry and ion electrodes, polarography. Introduction to radiochemistry. Immunoassay methods.

91330

Epidemiology and Public Health Microbiology[1]

6cp; 6hpw; prerequisite(s): 91314 General Microbiology

Public health microbiology. Basic epidemiological principles; mathematical formulation of epidemics; measures of disease frequency (rates and risk factors); sociological aspects. The public health laboratory environment; food, water and airborne diseases; exotic and notifiable diseases; zoonoses. Application of bacterial enumeration and identification techniques to the examination of water and food. Epidemiological tracing methods; biotyping; serotyping; bacteriophage typing; bacteriocin (BLIS) typing; molecular typing. Control measures; hygiene; sanitation; disinfection; sterilisation; vaccines, vaccination procedures and vaccination programs.

[1] This subject was formerly called Microbiology 2.

91332

Molecular Biology 1

8cp; 6hpw; prerequisite(s): 91314 General Microbiology; 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 are 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(s): 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.

91351

Immunology 1

3cp; 3hpw; prerequisite(s): 91314 General Microbiology; 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.

91354

Anatomical Pathology

6cp; 6hpw; prerequisite(s): 91702 Medical Science 2; 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; prerequisite(s): 91354 Anatomical Pathology; 91314 General Microbiology 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.

91363

Animal Ecophysiology

6cp; prerequisite(s): 91312 Biology 2[1] or 91102 Functional Biology

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.

[1] This subject is no longer offered.

91368

Bioreactors and Bioprocessing

8cp; 6hpw; prerequisite(s): 91313 Biochemistry 1; 91314 General Microbiology

This subject covers the practical aspects of modern biotechnology including bioreactor operation, microbial kinetics, extraction techniques and downstream processing. It includes the microbiological physiological and biochemical basis of industrially useful fermentations in food, beverage, pharmaceutical and other relevant industries. Economic and other factors impinging on the operation of fermentation industries are also undertaken in this subject. The theory and laboratory practice is further developed by visits to local biotechnology businesses.

91369

Biobusiness and Environmental Biotechnology

8cp; 6hpw; prerequisite(s): 91314 General Microbiology; 91330 Epidemiology and Public Health Microbiology recommended

This subject explores microbial habitats, the microbial biogeochemical cycles and environmental biotechnology including sewage treatment, industrial/agricultural waste, biodegradation, bioremediation, microbial mining and biofuels. Also included in this subject are quality control techniques, ISO9000, ISO14000, HACCP, legislation, intellectual property and the financing, establishment and management of biotechnology companies. Industrial visits are an important component of this subject.

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, transcrip-

tion, 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(s): 91701 Medical Science 1

This subject completes the coverage of the anatomy and physiology of the body systems begun in 91701 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 are also 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; 4hpw; prerequisite(s): 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 91701 Medical Science 1 and 91702 Medical Science 2. It provides an understanding of cell membrane transport processes and how these principles apply to the body; the importance of ion channels generally in cell physiology and the application of ion channels to nanotechnology; the role of ion channels in the physiology of the cardiovascular system; and mechanisms of fluid secretion in the kidneys and regulation of extracellular fluid composition and volume. The subject encourages students to be active learners.

91704

Behavioural Sciences

6cp; 4hpw; prerequisite(s): 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; prerequisite(s): 68041 Physical Aspects of Nature or 68101 Foundations of Physics; 91703 Physiological Systems

This subject provides an introduction to the principles of operation and use of typical devices encountered in medical practice. Specific emphasis is given to various methods of transducing information from the body such as pressure, internal voltage signals, oximetering temperature. Principles of active stimulation of various organs such as heart, muscle and cochlear are also taught. A medical overview of the regulatory framework imaging modalities explored is also given.

91706

Neuroscience

8 cp; 4hpw; prerequisite(s): 91703 Physiological Systems

This subject provides an advanced understanding of the physiological basis of the nervous system. It covers physiology of excitable tissue, with particular reference to coordination 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; and case studies of disease states in the nervous system. Emphasis is placed on student participation as active learners, for example in presentation of case studies and seminars.

91707

Pharmacology 1

8cp; 6hpw (average); prerequisite(s): 91313 Biochemistry 1; 91703 Physiological Systems

This subject provides the introductory principles governing drug and xenobiotic action to be developed further in 91709 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 are 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(s): 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 on the underlying physiological mechanisms. Implications for health are emphasised throughout the course. The subject encourages 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(s): 91707 Pharmacology 1

This subject develops and extends the principles governing drug and xenobiotic action covered in 91707 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.

95560

Multimedia Industry and Process

8cp

This subject will examine the nature of the interactive multimedia industry today. It explores industry structure and trends, government policies in relation to the industry, job specifications, multimedia development teams and roles, the interactive multimedia development process, costs associated with development, and significant issues such as copyright and intellectual property. This subject also includes a series of optional master classes to introduce some common Web development tools and techniques.

95561

Multimedia Products and Technologies

8cp

This subject situates the study of multimedia products and technologies in the comparative, historical context of the traditional media. It looks at debates about the impact of communication technologies on society and culture, the trends and impacts of globalisation, and the ways in which audiences can create meaning out of print and audio-visual communication.

INTERNATIONAL STUDIES SUBJECTS

Language programs

971111, 972111, 973111, 974111 Chinese Language and Culture

The Chinese 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 in the combined degree 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 lays a solid foundation for further cultural studies in Chinese.

Chinese Unit 1

8cp; 6hpw; prerequisite: nil

Chinese 1 aims to develop in students a survival communicative ability in basic social interactions. It teaches students *Pinyin*, the official transcription system, as a guide to the pronunciation of the Chinese language, and some basic structures and devices of the language. Students are expected to know about 300 Chinese characters by the end of this unit.

Chinese Unit 2

8cp; 6hpw; prerequisite: Chinese Unit 1

Chinese 2 continues to develop in students a survival communicative ability in basic social interactions. It also introduces students to some of the basic structures and devices of the language. Students are expected to know about 600–800 Chinese characters by the end of this unit.

Chinese Unit 3

8cp; 6hpw; prerequisite: Chinese Unit 2 or HSC 2/3-unit Chinese

Chinese 3 is the entry point for students who have completed HSC 2/3-unit Chinese and who first learnt Chinese at school in Australia.

Chinese 3 aims to further develop students' oral communicative competence in basic social interactions. More written texts are gradually introduced to enhance the ability of students to use Chinese characters. The basic structures and devices of the language are reinforced. Students are expected to know about 1,200 Chinese characters by the end of this unit.

Chinese Unit 4

8cp; 6hpw; prerequisite: Chinese Unit 3

Chinese 4 is the second unit for students who have completed HSC 2/3-unit Chinese.

Chinese 4 aims to further develop students' communicative competence in basic social interactions. More written texts are introduced to enhance the ability of students to use Chinese characters. The basic structures and devices of the language are also reinforced. Students are expected to know about 1,600 Chinese characters by the end of this unit.

Chinese Unit 5

8cp; 6hpw; prerequisite: Chinese Unit 4

Chinese 5 is the third unit for students who first learnt Chinese at school in Australia and obtained HSC 2/3-unit Chinese.

Chinese 5 aims to further develop students' communicative competence in general social interactions. While reinforcing the macro-skills of reading, writing, listening and speaking, this unit focuses on practical writing skills. Students are expected to know about 2,000 Chinese characters by the end of this unit.

Chinese Unit 6

8cp; 6hpw; prerequisite: Chinese Unit 5

Chinese 6 is the fourth subject for students who have obtained HSC 2/3-unit Chinese with basic communicative skills and the ability to undertake In-country Study in China.

Chinese 6 aims to further develop students' communicative competence in general social interactions. While reinforcing basic structures and devices of the language, this unit further develops students' writing skills. Students are expected to know about 2,500 Chinese characters by the end of this unit.

Chinese Unit 7

8cp; 4hpw; prerequisite: a working knowledge of Chinese characters as well as communicative competence in a Chinese language other than Modern Standard Chinese.

Chinese 7 is for students who have a working knowledge of Chinese characters as well as communicative competence in a Chinese language other than Modern Standard Chinese.

This unit aims to develop communicative competence to meet students' needs in social and professional interactions where Modern Standard Chinese (also known as Mandarin, *Putonghua* or *Guoyu*) is used. Simplified characters, pronunciation, intonation and situational Chinese usages are the focus of class instruction.

Chinese Unit 8

8cp; 4hpw; prerequisite: Chinese Unit 7 or equivalent

This unit aims to develop a communicative competence at a more sophisticated level. Students are exposed to a range of Chinese texts in varied sociocultural contexts in order to master the use of Chinese for different purposes, and are provided with opportunities to further improve speaking and listening skills through discussions of the texts and making cross-cultural comparisons.

Chinese Unit 9

8cp; 4hpw; prerequisite: Chinese Unit 8 or equivalent

This unit aims to develop in students a high level of communicative competence required for understanding various electronic and published media articles, correspondence and texts related to contemporary society where Modern Standard Chinese (also known as Mandarin, *Putonghua* or *Guoyu*) is used. Students are exposed to a range of Chinese texts in order to master the use of Chinese for different purposes, and are provided with opportunities to maintain speaking and listening skills through discussion of the texts.

Chinese Unit 10

8cp; 4hpw; prerequisite: Chinese Unit 9 or equivalent

This unit aims to further develop in students a high level of communicative competence in reading and writing to meet students' needs in social and professional interactions. Modern Standard Chinese (also known as Mandarin, *Putonghua* or *Guoyu*) is used. Students are exposed to a range of diverse texts from modern Chinese literature, history, language and culture in order to master the use of written Chinese for different purposes, and are provided with further opportunities to maintain speaking and listening skills through discussion of the texts.

971411, 972411, 973411, 974411 French Language and Culture

French is a language program for students who are either complete beginners or who first learnt French at school. There are two points of entry: the first for complete beginners; the second for students who have successfully completed HSC 2/3-unit French, or its equivalent. Students in the combined degree take four units in the program, either units 1–4 (beginners) or 3–6 (post-HSC), determined by their point of entry. Students with a language competence in French that is higher than the program may be able to undertake further studies in French at other universities in the Sydney area through arrangements made by the Institute.

The language program covers a broad range of communicative situations relevant to daily interaction in French. The focus is on the development of speaking, listening, reading and writing skills appropriate to the situations that students are likely to encounter. Vocabulary and grammar cover a range of themes and are presented using written and audiovisual materials.

Upon successful completion of the program, students are expected to be able to communicate about familiar things, events and opinions and to have developed skills and strategies for continuing their learning of the language in French-speaking environments. Those students with prior knowledge of French entering the program at a higher level

are expected to communicate comfortably on a wide range of topics, with the ability to adjust their language according to social variables such as formality, age and status. Each unit is covered in 13 weeks in one semester. There are six hours of language classes per week. Some of the class time may be conducted in the Learning Resources Centre using computers and the language laboratory.

French Unit 1

8cp; 1st semester, 6hpw; prerequisite: nil

French 1 is the first in a series of four units designed to provide students who have no prior knowledge of the French language with basic survival skills in language and culture, and the ability to undertake In-country Study in France.

By the end of the unit, students are expected to have achieved 'elementary proficiency' and be able to satisfy immediate communication needs required in basic social interaction, using expressions and phrases they have learnt. The program allows for the development of listening, speaking, reading and writing skills, and an understanding of the sociocultural contexts in which the language is used. In particular, students gain an awareness of the background of French-speaking countries. Students also develop strategies for predicting the meaning of new expressions and anticipating ways to express new meanings.

The approach adopted is communicative and provides students with many opportunities to interact and use the language in various social and cultural contexts. Audiovisual equipment and computers are used to facilitate learning.

French Unit 2

8cp; 2nd semester, 6hpw; prerequisite: French Unit 1 or equivalent

French 2 is the second in a series of four units designed to provide students who have no prior knowledge of the French language with basic survival skills in language and culture, and the ability to undertake In-country Study in France.

By the end of the unit, students are expected to have achieved 'minimum survival proficiency' in speaking, listening, reading and writing and be able to satisfy immediate communication needs and minimum courtesy requirements required in basic social interaction. Students also develop an understanding of the sociocultural contexts in which the language is used and develop further communication strategies.

The approach adopted is communicative and provides many opportunities for students to interact and use the language in a meaningful way in various social and cultural contexts. Audiovisual equipment and computers are used to facilitate learning.

French Unit 3

8cp; 1st semester, 6hpw; prerequisite: French Unit 2, HSC French, or equivalent

French 3 is the third in a series of four units for students with no prior knowledge of the French language, or the first in a series of four units for students who have successfully completed HSC 2/3-unit French, or its equivalent. It provides students with basic survival skills in French language and culture, and the ability to undertake In-country Study in France.

By the end of the unit, students are expected to have achieved communicative competence in speaking, listening, reading and writing skills to be able to satisfy all 'survival' needs and limited social needs. They are also expected to have developed an awareness of the various social and cultural contexts in which the language is used. In this unit, students develop the ability to understand the general content of magazine and newspaper articles.

The approach adopted is communicative and provides many opportunities for students to interact and use the language in various social and cultural contexts. Audiovisual equipment and computers are used to facilitate learning.

French Unit 4

8cp; 2nd semester, 6hpw; prerequisite: French Unit 3 or equivalent

French 4 is the fourth in a series of four units for students with no prior knowledge of the French language, or the second in a series of four units for students who have successfully completed French 3, HSC 2/3-unit French, or its equivalent; and equips these students with basic survival skills in French language and culture and the ability to undertake In-country Study in France.

By the end of the unit, students are expected to have begun to develop the communication skills required to satisfy limited routine social or work demands related to the situation

covered. Students would also have developed an awareness of the various social and cultural contexts in which the language is used. Students learn to express opinions, discuss education, entertainment and travel, and develop the language skills and background knowledge required to find accommodation.

The approach adopted is communicative and provides many opportunities for students to interact and use the language in various social and cultural contexts. Audiovisual equipment and computers are used to facilitate learning.

French Unit 5

8cp; 1st semester, 6hpw; prerequisite: French Unit 4 or equivalent

French 5 is the third in a series of four units designed to provide students who have successfully completed French 4, HSC 2/3-unit French, or its equivalent, with the ability to consolidate and extend their knowledge during a period of In-country Study in France.

By the end of the unit, students are expected to have achieved the communicative competence required to satisfy routine social demands and limited work requirements in speaking, listening, reading and writing skills. They are also expected to have developed an awareness of the various social and cultural contexts in which the language is used. Students learn to communicate in French and to compare lifestyles, university life and education and practice interview techniques in preparation for In-country Study.

The approach adopted is communicative and provides many opportunities for students to interact and use the language in a meaningful way in various social and cultural contexts. There are discussions and debates on set topics. Audiovisual equipment and computers are used to facilitate learning.

French Unit 6

8cp; 2nd semester, 6hpw; prerequisite: French Unit 5 or equivalent

French 6 is the fourth in a series of four units designed to provide students who have successfully completed French 5, or its equivalent, with the ability to consolidate and extend their knowledge during a period of In-country Study in France.

By the end of the unit, students are expected to have achieved the communicative competence required for limited formal and informal conversations on practical and social topics. Students are also expected to have developed the ability to read and write with sufficient accuracy to meet a limited range of social needs and limited work needs. Language development focuses on topics such as economy, class and social stratification, gender roles, religion and beliefs, literature and the arts.

The approach adopted is communicative and provides many opportunities for students to interact and use the language in a meaningful way in various social and cultural contexts. There are discussions and debates on set topics. Audiovisual equipment and computers are used to facilitate learning.

French Unit 7

8cp; 1st semester, 4hpw; prerequisite: French Unit 6

French 7 is designed to provide students who have successfully completed French 6, or its equivalent, with the ability to consolidate and extend their knowledge of French in preparation for a period of In-country Study in France.

By the end of the unit, students are expected to be able to communicate confidently in French in a wide variety of everyday situations, and to have comprehension skills which enable them to read a wide variety of authentic materials in French. Students are expected to extend their knowledge of present-day French society and culture and to have acquired the vocabulary and linguistic structures necessary to participate in formal and informal conversations with considerable accuracy.

The classroom approach provides students with opportunities to further develop their vocabulary, fluency and accuracy as they use French to respond to authentic texts and to discuss set topics. Students are required to read extensively in preparation for classroom presentations and discussions.

French Unit 8

8cp; 2nd semester, 4hpw; prerequisite: French Unit 7

French 8 is designed to provide students who have successfully completed French 7, or its equivalent, with the ability to consolidate and extend their knowledge of French in preparation for a period of In-country Study in France.

By the end of the unit, students are expected to demonstrate the linguistic skills and cultural awareness required to engage appropriately in a range of formal and informal discussions in social, professional and educational contexts.

The classroom approach provides students with opportunities to further develop their vocabulary, fluency and accuracy as they use French to discuss set topics and to respond to authentic texts, television programs and films. Students are required to read extensively in preparation for classroom presentations and discussions.

971421, 972421, 973421, 974421 German Language and Culture

German is a language program for students who are either complete beginners or who first learnt German at school. There are two points of entry: the first for complete beginners; the second for students who have successfully completed HSC 2/3-unit German, or its equivalent. Students in the combined degree take four units in the program, either units 1–4 (beginners) or 3–6 (post-HSC), determined by their point of entry. Students with a language competence in German that is higher than the usual level accepted in the program may be able to undertake further studies in German at other universities in the Sydney area through arrangements made by the Institute.

The language program covers a broad range of communicative situations relevant to daily interaction in German. The focus is on the development of speaking, listening, reading and writing skills appropriate to the situations that students are likely to encounter. Vocabulary and grammar cover a range of themes.

Upon successful completion of the program, students are expected to be able to communicate about familiar things, events and opinions and to have developed skills and strategies for continuing their learning of the language in German-speaking environments. Those students with prior knowledge of German entering the program at a higher level are expected to communicate comfortably on a wide range of topics, with the ability to adjust their language according to social variables such as formality, age and status. Each unit is covered in 13 weeks in one semester. There are six hours of language classes per week. Some of the class time may be conducted in the Learning Resources Centre using computers and the language laboratory.

German Unit 1

8cp; 1st semester, 6hpw; prerequisite: nil

German 1 is the first in a series of four units designed to provide students who have no prior knowledge of the German language with basic survival skills in German language and culture, and the ability to undertake In-country Study in Germany.

By the end of the unit, students are expected to have achieved 'elementary proficiency' and be able to satisfy immediate communication needs required in basic social interaction, using expressions and phrases they have learnt. The program allows for the development of listening, speaking, reading and writing skills, and an understanding of the sociocultural contexts in which the language is used. Students gain, in particular, an awareness of the background of German-speaking countries. Students also develop strategies for predicting the meaning of new expressions and anticipating ways of expressing new meanings.

The approach adopted is communicative and provides students with many opportunities to interact and use the language in various social and cultural contexts. Audiovisual equipment and computers are used to facilitate learning.

German Unit 2

8cp; 2nd semester, 6hpw; prerequisite: German Unit 1 or equivalent

German 2 is the second in a series of four units designed to provide students with no prior knowledge of the German language with basic survival skills in German language and culture, and the ability to undertake In-country Study in Germany.

By the end of the unit, students are expected to have achieved 'minimum survival proficiency' in speaking, listening, reading and writing and be able to satisfy immediate communication needs and minimum courtesy requirements required in basic social interaction. Students also develop an understanding of the sociocultural contexts in which the language is used and further communication strategies.

The approach adopted is communicative and provides many opportunities for students to interact and use the language in a meaningful way in various social and cultural contexts. Audiovisual equipment and computers may be used to facilitate learning.

German Unit 3

8cp; 1st semester, 6hpw; prerequisite: German Unit 2, HSC German, or equivalent

German 3 is the third in a series of four units for students with no prior knowledge of the German language, or the first in a series of four units for students who have successfully completed HSC 2/3-unit German, or its equivalent. It provides students with basic survival skills in German language and culture and the ability to undertake In-country Study in Germany.

By the end of the unit, students are expected to have achieved the communicative competence in speaking, listening, reading and writing skills to be able to satisfy all 'survival' needs and limited social needs. They are also expected to have developed an awareness of the various social and cultural contexts in which the language is used. In this unit, students also develop the ability to understand the general content of magazine and newspaper articles.

The approach adopted is communicative and provides many opportunities for students to interact and use the language in various social and cultural contexts. Audiovisual equipment and computers are used to facilitate learning.

German Unit 4

8cp; 2nd semester, 6hpw; prerequisite: German Unit 3 or equivalent

German 4 is the fourth in a series of four units for students with no prior knowledge of the German language, or the second in a series of four units for students who have successfully completed German 3, HSC 2/3-unit German, or its equivalent. It provides them with basic survival skills in German language and culture and the ability to undertake In-country Study in Germany.

By the end of the unit, students are expected to have begun to develop the communication skills required to satisfy limited routine social and work demands related to the situation covered. Students would also have developed an awareness of the various social and cultural contexts in which the language is used. Students learn to express opinions, discuss education, entertainment and travel, and develop the language skills and background knowledge required to find accommodation.

The approach adopted is communicative and provides many opportunities for students to interact and use the language in various social and cultural contexts. Audiovisual equipment and computers are used to facilitate learning.

German Unit 5

8cp; 1st semester, 6hpw; prerequisite: German Unit 4 or equivalent

German 5 is the third in a series of four units designed to provide students who have successfully completed German 4, HSC 2/3-unit German, or its equivalent, with the ability to consolidate and extend their knowledge during a period of In-country Study in Germany.

By the end of the unit, students are expected to have achieved the communicative competence required to satisfy routine social demands and limited work requirements in speaking, listening, reading and writing skills. Students would have developed an awareness of the various social and cultural contexts in which the language is used. Students learn to communicate in German when comparing lifestyles, university life and education and to practice interview techniques in preparation for In-country Study.

The approach adopted is communicative and provides many opportunities for students to interact and use the language in a meaningful way in various social and cultural contexts. There are discussions and debates on set topics. Audiovisual equipment and computers are used to facilitate learning.

German Unit 6

8cp; 2nd semester, 6hpw; prerequisite: German Unit 5 or equivalent

German 6 is the fourth in a series of four units designed to provide students who have successfully completed German 5, or its equivalent, with the ability to consolidate and extend their knowledge during a period of In-country Study in Germany.

By the end of the unit, students are expected to have achieved the communicative competence required to speak the language with reasonable accuracy, and to be able to participate readily in limited formal and informal conversations on practical and social topics. Students are also expected to have developed the ability to read and write with sufficient accuracy to meet a limited range of social needs and limited work needs. Language focuses on topics such as the economy, class and social stratification, gender roles, religion and beliefs, and literature and the arts.

The approach adopted is communicative and provides many opportunities for students to interact and use the language in a meaningful way in various social and cultural contexts.

There are discussions and debates on set topics. Audiovisual equipment and computers are used to facilitate learning.

German Unit 7

4cp; 1st semester, 4hpw; prerequisite: German Unit 6

German 7 is designed to provide students who have successfully completed German 6, or its equivalent, with the ability to consolidate and extend their knowledge of the German language in preparation for a period of In-country Study in Germany.

By the end of the unit, students are expected to be able to communicate confidently and with a high level of accuracy in German in a wide range of formal and informal conversations, and to have comprehension skills which enable them to read a wide variety of authentic materials in German. Students are expected to be able to read and write for academic and general purposes with sufficient accuracy to meet a wide range of social and academic needs.

The classroom approach provides students with opportunities to further develop their vocabulary, fluency and accuracy as they use German to respond to authentic texts and to discuss set topics. Students are required to read extensively in preparation for classroom presentations and discussions.

German Unit 8

4cp; 2nd semester, 4hpw; prerequisite: German Unit 7

German 8 is designed to provide students who have successfully completed German 7, or its equivalent, with the ability to consolidate and extend their knowledge of German in preparation for a period of In-country Study in Germany.

By the end of the unit, students are expected to have achieved a high level of proficiency and speak the language with a high level of accuracy. They are able to participate in a wide range of formal, informal and academic conversations on topics such as the economy, gender roles, social life, politics and current issues. They also learn about academic writing and develop academic skills such as note taking and essay writing in German. They are expected to read and write academic and general texts with a high degree of accuracy to meet a wide range of social and academic needs.

The classroom approach provides students with opportunities to further develop their vocabulary, fluency and accuracy as they use German to discuss set topics and to respond to authentic texts, television programs and films. Students are required to read extensively in preparation for classroom presentations and discussions.

971710, 972710, 973710, 974710 Greek

Greek is offered to UTS students through arrangements with other universities. Students are placed in classes appropriate to their level of competence. The program focuses on furthering writing and oral skills in contemporary Greek and learning about Hellenic literature, society and culture.

971311, 972311, 973311, 974311 Indonesian Language and Culture

Indonesian is offered to UTS students through arrangements with other universities. Students are placed in classes appropriate to their level of competence. The aim of the Indonesian language program is to give students a good working knowledge of modern written and spoken Indonesian and to enable them to express themselves in the language correctly and with reasonable clarity.

971431, 972431, 973431, 974431 Italian Language and Culture

Italian is a language program for students who are either complete beginners or who first learnt Italian at school. There are two points of entry: the first for complete beginners; the second for students who have successfully completed HSC 2/3-unit Italian, or its equivalent. Students in the combined degree take four units in the program, either units 1–4 (beginners) or 3–6 (post-HSC), determined by their point of entry. Students with a language competence in Italian that is higher than the program may be able to undertake further studies in Italian at other universities in the Sydney area through arrangements made by the Institute.

The language program covers a broad range of communicative situations relevant to daily interaction in Italian. The focus is on the development of speaking, listening, reading and writing skills appropriate to the situations that students are likely to encounter. Vocabulary and grammar cover a range of themes and are presented using written and audiovisual materials.

Upon successful completion of the program, students are expected to be able to communicate about familiar things, events and opinions and to have developed skills and strategies for continuing their learning of the language in Italian-speaking environments. Those students with prior knowledge of Italian, who are entering the program at a higher level, are expected to communicate comfortably on a wide range of topics, with the ability to adjust their language according to social variables such as formality, age and status. Each unit is covered in 13 weeks in one semester. There are six hours of language classes per week.

Italian Unit 1

8cp; 1st semester, 6hpw; prerequisite: nil

Italian 1 is the first in a series of four units designed to provide students who have no prior knowledge of the Italian language with basic survival skills in Italian language and culture, and the ability to undertake In-country Study in Italy.

By the end of the unit, students are expected to have achieved 'minimum creative proficiency' and be able to satisfy immediate communication needs required in basic social interaction, using expressions and phrases they have learnt. The program allows for the development of listening, speaking, reading and writing skills, and an understanding of the sociocultural contexts in which the language is used. In particular, students gain an awareness of the background of Italian-speaking countries. Students also develop strategies for predicting the meaning of new expressions and anticipating ways of expressing new meanings.

The approach adopted is communicative and provides students with many opportunities to interact and use the language in various social and cultural contexts. Audiovisual equipment and computers are used to facilitate learning.

Italian Unit 2

8cp; 2nd semester, 6hpw; prerequisite: Italian Unit 1 or equivalent

Italian 2 is the second in a series of four units designed to provide students who have no prior knowledge of the Italian language with basic survival skills in Italian language and culture, and the ability to undertake In-country Study in Italy.

By the end of the unit, students are expected to have achieved 'basic transactional proficiency' in speaking, listening, reading and writing, and be able to satisfy immediate communication needs and minimum courtesy requirements for basic social interaction. Students also develop an understanding of the sociocultural contexts in which the language is used and further communication strategies.

The approach adopted is communicative and provides many opportunities for students to interact and use the language in a meaningful way in various social and cultural contexts. Audiovisual equipment and computers are used to facilitate learning.

Italian Unit 3

8cp; 1st semester, 6hpw; prerequisite: Italian Unit 2, HSC Italian, or equivalent

Italian 3 is the third in a series of four units for students with no prior knowledge of the Italian language, or the first in a series of four units for students who have successfully completed HSC 2/3-unit Italian, or its equivalent. It provides them with basic survival skills in Italian language and culture and the ability to undertake In-country Study in Italy.

By the end of the unit, students are expected to have achieved the communicative competence in speaking, listening, reading and writing skills to be able to satisfy all 'survival' needs and limited social needs. They are also expected to have developed an awareness of the various social and cultural contexts in which the language is used. In this unit, students also develop the ability to understand the general content of magazine and newspaper articles.

The approach adopted is communicative and provides many opportunities for students to interact and use the language in various social and cultural contexts. Audiovisual equipment and computers are used to facilitate learning.

Italian Unit 4

8cp; 2nd semester, 6hpw; prerequisite: Italian Unit 3 or equivalent

Italian 4 is the fourth in a series of four units for students with no prior knowledge of Italian language, or the second in a series of four units for students who have successfully completed Italian 3, HSC 2/3-unit Italian, or its equivalent. It provides them with basic survival skills in Italian language and culture and the ability to undertake In-country Study in Italy.

By the end of the unit, students are expected to have begun to develop the communication skills required to satisfy limited routine social and work demands related to the situation covered. Students would also have developed an awareness of the various social and cultural contexts in which the language is used. Students learn to express opinions, discuss education, entertainment and travel, and develop the language skills and background knowledge required e.g. to find accommodation.

The approach adopted is communicative and provides many opportunities for students to interact and use the language in various social and cultural contexts. Audiovisual equipment and computers are used to facilitate learning.

Italian Unit 5

8cp; 1st semester, 6hpw; prerequisite: Italian Unit 4 or equivalent

Italian 5 is the third in a series of four units designed to provide students who have successfully completed Italian 4, HSC 2/3-unit Italian, or its equivalent, with the ability to consolidate and extend their knowledge of the Italian language and culture during a period of In-country Study in Italy.

By the end of the unit, students are expected to have achieved the communicative competence required to satisfy routine social demands and limited work requirements in speaking, listening, reading and writing skills. They are also expected to have developed an awareness of the various social and cultural contexts in which the language is used. Students learn to communicate in Italian while comparing lifestyles, university life and education and practice interview techniques in preparation for In-country Study.

The approach adopted is communicative and provides many opportunities for students to interact and use the language in a meaningful way in various social and cultural contexts. There are discussions and debates on set topics. Audiovisual equipment and computers are used to facilitate learning.

Italian Unit 6

8cp; 2nd semester, 6hpw; prerequisite: Italian Unit 5 or equivalent

Italian 6 is the fourth in a series of four units designed to provide students who have successfully completed Italian 5, or its equivalent, with the ability to consolidate and extend their knowledge of the Italian language and culture during a period of In-country Study in Italy.

By the end of the unit, students are expected to have achieved the communicative competence required to speak the language with sufficient accuracy for limited formal and informal conversations on practical and social topics. Students are also expected to be able to read and write with sufficient accuracy to meet a limited range of social needs and limited work needs. Language focuses on topics such as the economy, class and social stratification, gender roles, religion and beliefs, literature and the arts.

The approach adopted is communicative and provides many opportunities for students to interact and use the language in a meaningful way in various social and cultural contexts. There are discussions and debates on set topics. Audiovisual equipment and computers are used to facilitate learning.

971211, 972211, 973211, 974211 Japanese Language and Culture

This program comprises six units offered in two main streams: beginners and post-HSC. There are two main points of entry into the Japanese Language and Culture program. Students with no prior experience of the language enter the program at Japanese 1, while students with HSC-level Japanese or equivalent are required to enter the program at the post-HSC level (Japanese 3).

The program enables students to develop the skills to communicate in everyday situations in order to live, study and work in a Japanese-speaking environment; or interact with Japanese people in a social, university or work-related context. The emphasis is on the development of communication skills, particularly speaking and listening, with an increased focus on reading and writing skills at the post-HSC level. The study of socio-cultural aspects of Japan is an integrated and essential part of the language program.

Japanese Unit 1

8cp; 6hpw; prerequisite: nil

This is the first subject in the Japanese Language and Culture program. It is designed as the first step in providing students who have no prior knowledge of Japanese with the basic language survival skills and socio-cultural awareness to enable them to undertake In-country Study in Japan.

While focusing primarily on the development of speaking and listening skills, this subject also provides a working knowledge of the

hiragana and *katakana* scripts and approximately 50 *kanji*. Sociocultural aspects are integrated into the program as they relate to the need for students to learn to use the language appropriately in various social and cultural contexts.

Japanese Unit 2

8cp; 6hpw; prerequisite: Japanese Unit 1

This is the second in a series of four units for students with no prior knowledge of the Japanese language. By the completion of this unit, the student should be able to demonstrate the language and sociocultural skills required to establish and maintain relationships in social or work-related spheres, and fulfil basic survival needs in a Japanese-speaking environment.

Emphasis is given to the development of speaking and listening skills, but students also further develop their reading and writing skills. Besides *kana*, they will know approximately 150 *kanji* by the end of the unit. Sociocultural aspects are integrated into the program as they relate to the need for students to learn to use the language appropriately in various social and cultural contexts.

Japanese Unit 3

8cp; 6hpw; prerequisite: Japanese Unit 2 or HSC Japanese

Japanese 3 is the third in a series of four units for students with no prior knowledge of the Japanese language, or the first in a series of four units for students who have successfully completed HSC-level Japanese. By the end of the unit, students are expected to have achieved 'survival proficiency' in the use of the language, and be able to satisfy survival needs and limited social demands relating to topics and situations covered.

At the end of the subject, students are expected to have developed their listening, speaking, reading and writing skills to a level where they can communicate in everyday situations, and are able to demonstrate an awareness of the social implications of language and behaviour.

It is expected that students know approximately 250 *kanji* by the end of the unit.

Japanese Unit 4

8cp; 6hpw; prerequisite: Japanese Unit 3

Japanese 4 is the fourth in a series of four units for beginners. It is also the second in a series of four units for those who have successfully completed HSC-level Japanese, or its equivalent, and aim to further develop Japanese listening, speaking, reading and writing skills. By the end of the unit, students are expected to have achieved 'limited social proficiency', and be able to interact in limited social, study and work contexts with Japanese speakers in Japan or Australia. They will also have learnt approximately 350 *kanji*.

Japanese Unit 5

8cp; 6hpw; prerequisite: Japanese Unit 4

Japanese 5 is the third in a series of four units in the post-HSC series, and is for those who have successfully completed either Japanese 4, or its equivalent, and aim to further develop listening, speaking, reading, writing and cultural skills. By the end of the unit, students are expected to have achieved 'limited social proficiency', and be able to satisfy routine social and limited work demands. The emphasis is on the development of the language and of the cultural sensitivity required in both formal and informal situations. By the end of the subject, students are expected to be able to read and write approximately 470 *kanji*.

Japanese Unit 6

8cp; 6hpw; prerequisite: Japanese Unit 5

Japanese 6 is the fourth in a series of four units in the post-HSC series and is for those who have successfully completed either Japanese 5, or its equivalent. By the end of this subject, students are expected to have achieved 'minimal vocational proficiency', and be able to speak the language with sufficient structural accuracy and vocabulary to participate effectively in many formal and informal conversations on practical, social and limited vocational topics. The emphasis is on the development of the language and of the cultural sensitivity required in both formal and informal situations. By the end of the subject, students should be able to read simple prose and read and write approximately 600 *kanji*.

Japanese Unit 7

8cp; 4hpw; prerequisite: Japanese Unit 6

Japanese 7 is designed to provide students who have successfully completed Japanese 6 or its equivalent with the ability to consolidate and extend their knowledge of Japanese.

Students are expected to continue to develop communication skills required to function effectively in academic and vocational contexts in Japan. In the first half of the unit, the focus is on the development of academic reading and writing skills and the acquisition

of vocabulary based on reading, understanding and discussing various topics and viewpoints on the interrelationship between Japanese language and culture. In the second half of the unit, the focus is on workplace communication and the comprehension of university lectures in Japan, with an emphasis on the development of listening and note-taking skills. In terms of literacy development, students will be expected to be able to recognise and pronounce the *kanji* introduced in the prescribed texts, to have increased their pace of reading as a result of regular and habitual reading and improved dictionary skills, and to be able to write an increasing number of *kanji* as required for specific academic tasks.

971331, 972331, 973331, 974331 Malaysian Language and Culture

Malaysian is offered to UTS students through arrangements with other universities. Students are placed in classes appropriate to their level of competence. The aim of the Malaysian language program is to give students a good working knowledge of modern written and spoken Malaysian and to enable them to express themselves in the language correctly and with reasonable clarity.

971734, 972734, 973734, 974734 Russian

Russian is offered to UTS students through an arrangement with other universities. Students are placed in classes appropriate to their level of competence. The aim of the Russian language program is to give students a good working knowledge of modern written and spoken Russian and to enable them to express themselves in the language correctly and with reasonable clarity.

971501, 972501, 973501, 974501 Spanish Language and Culture

This language program is designed for students who are either complete beginners or who first learnt Spanish at school in Australia. There are two points of entry: the first for complete beginners and the second for students who have successfully completed HSC-level Spanish or its equivalent. Students in the combined degree take four units in the program, either units 1–4 (beginners) or 3–6 (post-HSC), determined by their point of entry.

The language program covers a broad range of communicative situations relevant to daily interaction in Spanish. The focus is on the development of speaking, listening, reading and writing skills appropriate to the situations that students are likely to encounter. Vocabulary and grammar are taught using written and audiovisual materials that cover a range of themes and situations.

Upon successful completion of the program, students are expected to be able to communicate about familiar things, events and opinions, and to have developed skills and strategies for continuing their learning of the language in Spanish-speaking countries. Those students with prior knowledge of Spanish, who enter the program at a higher level, are expected to be able to communicate comfortably on a wide range of themes, with the ability to adjust their language according to social variables such as formality, age and status. Each subject is covered in 13 weeks in one semester. There are six hours of language classes per week.

Spanish Unit 1

8cp; 1st semester, 6hpw; prerequisite: nil

Spanish 1 is the first in a series of four units designed to provide students who have no prior knowledge of the Spanish language with basic survival skills in the language and culture, and the ability to undertake In-country Study in Latin America or Spain.

By the end of the subject, students are expected to have achieved 'elementary proficiency' and be able to satisfy immediate communication needs required in basic social interaction, using expressions and phrases they have learnt. The program allows for the development of listening, speaking, reading and writing skills, and an understanding of the sociocultural contexts in which the language is used. Students gain, in particular, an awareness of the background of Hispanic countries. Students also develop strategies for predicting the meaning of new expressions and anticipating ways they might express new meanings.

Spanish 1 consists of 78 hours of classroom instruction. The approach adopted is communicative and provides students with many opportunities to interact and use the language in various social and cultural contexts. Audiovisual equipment and computers are used to facilitate learning.

Spanish Unit 2

8cp; 2nd semester, 6hpw; prerequisite: Spanish Unit 1

Spanish 2 is the second in a series of four units designed to provide students who have no prior knowledge of the Spanish language with basic survival skills in the language and culture, and the ability to undertake In-country Study in Latin America or Spain.

By the end of the subject, students are expected to have achieved 'minimum survival proficiency' in speaking, listening, reading and writing, and be able to satisfy immediate communication needs and minimum courtesy requirements in basic social interactions. Students also develop an understanding of the sociocultural contexts in which the language is used and further communication strategies.

Spanish 2 consists of 78 hours of classroom instruction. The approach adopted is communicative and provides many opportunities for students to interact and use the language in various social and cultural contexts. Audio-visual equipment and computers are used to facilitate learning.

Spanish Unit 3

8cp; 1st semester, 6hpw; prerequisite: Spanish Unit 2 or HSC Spanish

Spanish 3 is the third in a series of four units for students with no prior knowledge of the Spanish language, or the first in a series of four units for students who have successfully completed HSC-level Spanish, or its equivalent. It provides students with basic survival skills in the language and culture, and the ability to undertake In-country Study in Latin America or Spain.

By the end of the unit, students are expected to have achieved a communicative competence in speaking, listening, reading and writing skills in order to be able to satisfy all 'survival' needs and limited social needs. They are also expected to have developed an awareness of the various social and cultural contexts in which the language is used. In this unit, students also develop the ability to understand the general content of magazine and newspaper articles.

Spanish 3 consists of 78 hours of classroom instruction. The approach adopted is communicative and provides many opportunities for students to interact and use the language in various social and cultural contexts. Audio-visual equipment and computers are used to facilitate learning.

Spanish Unit 4

8cp; 2nd semester, 6hpw; prerequisite: Spanish Unit 3

Spanish 4 is the fourth in a series of four units for students with no prior knowledge of the Spanish language, or the second in a series of four units for students who have successfully completed Spanish 3 and HSC-level Spanish, or its equivalent. It provides students with basic survival skills in the language and culture, and the ability to undertake In-country Study in Latin America or Spain.

By the end of the unit, students are expected to have begun to develop the communication skills required to satisfy limited routine social and work demands. They are also expected to have developed an awareness of the various social and cultural contexts in which the language is used. In this subject, students learn to express opinions, discuss education, entertainment and travel, and develop the language skills and background knowledge required, e.g. to find accommodation.

Spanish 4 consist of 78 hours of classroom instruction. The approach adopted is communicative and provides many opportunities for students to interact and use the language in various social and cultural contexts. Audio-visual equipment and computers are used to facilitate learning.

Spanish Unit 5

8cp; 1st semester, 6hpw; prerequisite: Spanish Unit 4

Spanish 5 is the third in a series of four units designed to provide students who have successfully completed Spanish 4 and HSC-level Spanish, or its equivalent, with the ability to consolidate and extend their knowledge during a period of In-country Study in Latin America or Spain.

By the end of the unit, students are expected to have achieved communicative competence in speaking, listening, reading and writing, and to be able to satisfy routine social demands and limited work requirements. They would have developed an awareness of the various social and cultural contexts in which the language is used. Students learn to communicate in Spanish to compare lifestyles, university life and education, and practise interview techniques in preparation for In-country Study.

Spanish 5 consists of 78 hours of classroom instruction. The approach adopted is communicative and provides many opportunities for

students to interact and use the language in various social and cultural contexts. There are discussions and debates on set topics. Audio-visual equipment and computers are used to facilitate learning.

Spanish Unit 6

8cp; 2nd semester, 6hpw; prerequisite: Spanish Unit 5

Spanish 6 is the fourth in a series of four units designed to provide students who have successfully completed Spanish 5 and HSC-level Spanish, or its equivalent, with the ability to consolidate and extend their knowledge during a period of In-country Study in Latin America or Spain.

By the end of the unit, students are expected to be able to speak the language with sufficient accuracy, and to participate in limited formal and informal conversations on practical and social topics. Students are also expected to be able to read and write with sufficient accuracy to meet a limited range of social and work needs. Language focuses on topics such as the economy, class and social stratification, gender roles, religion and beliefs, literature and the arts.

Spanish 6 consists of 78 hours of classroom instruction. The approach adopted is communicative and provides many opportunities for students to interact and use the language in various social and cultural contexts. There are discussions and debates on set topics. Audio-visual equipment and computers are used to facilitate learning.

Spanish Unit 7

8cp; 1st semester, 6hpw; prerequisite: Spanish Unit 6

Spanish 7 is designed to provide students who have successfully completed Spanish 6, or its equivalent, with the ability to consolidate and extend their knowledge during a period of In-country Study in Latin America or Spain.

By the end of the unit students are expected to be able to communicate confidently in Spanish within a wide range of everyday situations, and to have further improved their comprehension skills by reading a wide variety of authentic materials in Spanish. Students are also expected to have extended their knowledge of today's world-wide Hispanic society and culture and to have acquired the vocabulary and structures necessary to be able to discuss and write about the cultural context of texts with considerable accuracy.

The approach provides students with opportunities to further develop their vocabulary, fluency and accuracy as they use the language to respond to authentic texts and to discuss set topics. Students are required to read extensively during self-study periods in preparation for classroom presentation and discussion.

Spanish Unit 8

8cp; 2nd semester, 6hpw; prerequisite: Spanish Unit 7

Spanish 8 is designed to provide students who have successfully completed Spanish 7, or its equivalent, with a higher level of communicative and cultural competence, and the ability to consolidate and extend their knowledge during a period of In-country Study in Latin America or Spain.

By the end of the unit, students are expected to have further developed the linguistic and cultural awareness skills required to engage appropriately in a range of formal and informal discussions at a social and professional level on topics such as employment, job applications, academic presentations and university life, social welfare, human rights, leisure and sport, the media, family roles and relationships, etiquette, and immediate concerns such as arranging accommodation and banking.

The approach provides students with opportunities to further develop their vocabulary, fluency and accuracy in speaking and writing as they use the language in response to authentic texts such as newspaper, and magazine articles and television programs in Spanish. Students are required to read extensively during self-study periods in preparation for classroom presentations, debates and discussions.

971320, 972320, 973320, 974320 Thai

Thai is offered to UTS students through the language program offered jointly by the University of Sydney and Macquarie University. The program is designed to allow complete beginners in Thai to reach a survival level that will allow them to continue their studies in Thailand. If student numbers permit, classes will be available at UTS campuses.

Contemporary Society Subjects

976111

Contemporary China

8cp; 2nd semester, 4hpw

This subject examines the contours and dynamics of social, political and economic change 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.

976401

Contemporary Europe

8cp; 2nd semester, 4hpw

This subject is an introduction and an overview laying the groundwork for the study of contemporary Europe and individual countries within Europe. It aims to provide students with a basic understanding of contemporary European history, politics, society and culture, as well as national convergences and divergences in these areas. In particular, it aims to provide students with the critical skills that allow them to identify major contemporary issues in the European region of the world, and beyond it. Insights are gained into Europe's national and regional diversity and heterogeneity in national, continental and international contexts. This gives students the opportunity to develop a critical appreciation for societies outside Australia. Students are exposed to ideas that challenge Eurocentric modes of thinking, and that also draw attention to the legacies of imperialism, colonisation, and transnational capitalism and their impact on contemporary European peoples, wherever they may reside. Students develop critical thinking skills relevant to the multidisciplinary nature of the subject.

976211

Contemporary Japan

8cp; 2nd semester, 4hpw

This subject provides an introduction to the dynamics of political, social and economic systems in modern Japan. Central themes are the causes and consequences of social change and continuity in the context of Japan's emergence as an economic superpower. In the process, it offers a general introduction to Japan's culture. This subject requires no prior knowledge of Japan or of Japanese.

976301

Contemporary South-East Asia

8cp; 2nd semester, 4hpw

This subject provides an introduction to the countries of Indonesia, Malaysia, Thailand and Vietnam. The themes of modernity and identity are examined at a political–economic level and also at an individual level. Issues which are explored include: migration patterns in the context of regional interrelationships; increasing urbanisation; legacies of colonialism; the commodification of culture and the growing impact of tourism; new creative forms in the visual, literary and performing arts; the beliefs about and behaviour of women in the region; and ways in which religion and social practice intersect.

976501

Contemporary Latin America

8cp; 2nd semester, 4hpw

Latin America has been a crucible for social, political and economic change in the 19th and 20th centuries. Intense struggles for nationhood, democracy, economic modernisation and secularisation have all resonated in the countries of Latin America. During the middle of the 20th century, Latin America's primary concerns were focused on national self-determination, inward industrialisation and populist authoritarian efforts to legitimise elite rule. In the late 20th century, the emphasis shifted towards economic growth, internationalisation, and pressures to improve the capacity and accountability of governments. The unit aims to provide students with the historical background, cultural awareness and analytic skills to interpret everyday social, political and economic reality during their period of In-country Study. The subject requires no prior knowledge of Latin America or of Spanish.

50140

Comparative Social Change (U/G)

8cp
Disciplinary Strand – Social, Political and Historical Studies – 200 level
Compulsory subject in the combined degrees with International Studies. This subject is for undergraduate students only. Graduate students refer to 50175.

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 highlight a number of key issues, e.g. 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 is emphasised that differing interpretations of modernisation flow from various relations of power which lead to a multiplicity of views on its meanings and significance.

50175

Comparative Social Change (P/G)

8cp

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 highlight a number of key issues, e.g. 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 is emphasised that differing interpretations of modernisation flow from various relations of power, which lead to a multiplicity of views on its meanings and significance.

977xxx

In-country Study 1

24cp; prerequisite: completion of relevant subjects appropriate to the student's International Studies major.

In-country Study subjects are only available to students doing the Bachelor of Arts in International Studies.

As part of the International Studies combined degrees, students spend two semesters of In-country Study at a university or institution of higher education overseas. The location is determined by the student's International Studies major.

In the International Studies program, students focus on one of the following countries or majors: Chile, China, France, Germany, Indonesia, Italy, Japan, Malaysia, Mexico, Spain and Thailand. There is also a Heritage major that permits students with previous exposure to a language and culture to continue their study in countries such as Croatia, Greece, Hong Kong, Korea, Poland, Russia, Taiwan, the Phillipines, Vietnam and others.

Australia and the Asia–Pacific is only available as a major to international students. International students may access one of the other majors offered provided that the country they choose as their major is able to grant them a visa to study there. This needs to be determined prior to commencing subjects within the International Studies major. If a visa cannot be granted, then it will not be possible to undertake the chosen major.

978xxx

In-country Study 2

24cp; prerequisites: 977xxx In-country Study 1

For subject description, see 977xxx In-Country Study 1.

ALPHABETICAL LIST OF SUBJECTS

SUBJECTS OFFERED BY OTHER FACULTIES

Accounting for Business	22107
Accounting for Managerial Decisions	22747
Accounting Transactions and Business Decisions	22207
Administrative Law	70617
Advanced Mathematics and Physics	68038
Analytical Biochemistry	91326
Analytical Chemistry 1	65306
Analytical Chemistry 2	65409
Analytical Chemistry 3	65606
Anatomical Pathology	91354
Animal Ecophysiology	91363
Applications of Artificial Intelligence	32108
Aquatic Ecology	91121
Atoms, Photons and Orbits (Physics 3)	68311
Australian Biota	91309
Behavioural Sciences	91704
Biobusiness and Environmental Biotechnology	91369
Biochemistry 1	91313
Biochemistry 2	91320
Biology and Ecology for Engineers	91150
Bioreactors and Bioprocessing	91368
Biotechnology	91142
Business Law and Ethics	79203
Cells, Genetics and Evolution	91101
Chemical Safety and Legislation	65410
Chemistry 1A	65012
Chemistry 1C	65101
Chemistry 2A	65022
Chemistry 2C	65201
Chemistry and Materials Science	60101
Chinese East Asia	976101
Chinese Language and Culture	97x111
Coastal and Marine Ecology	91124
Comparative Social Change	50140
Composites	67608
Computational Mathematics and Physics	33490
Computing and Mathematics for Science	33290
Computing Theory	31514
Construction Management 1A	16061
Construction Management 2A	16062
Construction Management 2S	16065
Construction Management 3A	16063
Construction Management 3S	16066
Construction Management 4A	16064
Construction Management 4S	16067
Contaminated Site Management	66025
Contemporary China	976111
Contemporary Europe	976401
Contemporary Japan	976211
Contemporary Latin America	976501
Contemporary South-East Asia	976301
Corporate Law	70417
Corrosion and Degradation of Materials	67606
Criminal Law	70217
Crustal and Mantle Processes	66508
Database Design	31434
Earth Materials	66304
Earth Resources	66408
Earth Science 1	66101
Ecological Principles and Modelling	91112
Economics for Business	25115
Economics for Management	25706
Electromagnetics and Optics	68611
Electronics	68314
Electronics and Interfacing	68514
Electrotechnology and Data Analysis	68312
Employment Relations	21720
Energy Science and Technology	68412
Engineering and Groundwater Geology	66611
Environmental and Quaternary Geology	66609
Epidemiology and Public Health Microbiology	91330
Equity and Trusts	70516
Experimental Design and Sampling	91110
Extractive Metallurgy	65062
Federal Constitutional Law	70616
Field Studies 1	66204
Financial Management	25742
Fold Belts and Cratons	66305
Foundations of Physics	68101
French Language and Culture	97x411
Functional Biology	91102
Fundamentals of Business Finance	25300
General Microbiology	91314
German Language and Culture	97x421
Groundwater Geophysics	66018
Haematology 1	91355
Human-Computer Interaction	31777
Hydrogeochemistry	66015
Hydrogeology	66014
Immunology 1	91351
In-country Study 1	977xxx
In-country Study 2	978xxx
Indonesian Language and Culture	97x311
Industrial Ceramics	67306
Industrial Metallurgy	67408
Inorganic Chemistry 1	65411
Inorganic Chemistry 2	65509
International Business	21128
Introduction to Corporate Strategy	21193
Introduction to Materials	67101
Italian Language and Culture	97x431
Japanese Language and Culture	97x211
Landscape Design and Plant Culture	91247
Law of Contract	70211
Law of Evidence	71216
Law of Tort	70311
Legal Issues in Communications	79371
Legal Process and History	70113
Legal Research	70105

BOARDS AND COMMITTEES

FACULTY BOARD IN ENGINEERING

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Associate Dean, Research and Development
Professor W R Belcher

Associate Dean, International and Enterprise Development
Associate Professor J V Parkin

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Professor S Vigneswaran
Professor R Braun

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Ms B Buckenmaier
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Ms E Mudge
Mr D Orr

One remaining vacancy exists for a postgraduate by research program student.

COMMITTEES OF THE FACULTY BOARD

Academic Conduct Committee
Advanced Standing Committee
Faculty Educational Development Committee
Examination Review Committees
Graduate Courses Committee
Prizes Committee
Research Degrees Committee
Student Assessment Appeals Committee

(Composition, terms of reference and membership details are available from the Faculty Manager.)

ADVISORY COMMITTEES

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Alcatel Australia

Mr Lyall Foy
Senior Executive NSW
Skilled Engineering Limited

Mr David Hudson
Managing Director
Barclay Mowlem Construction Ltd

Mr Michael Kirby
Engineering Consultant/Director
Kirby Engineering Pty Ltd

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Transfield Group

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Powerlink Queensland Board

Mr Ian Stuart
General Manager – National and International Projects
Pacific Power International

Mr John Wood
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Mr Johnathon Withers
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S Tanuwijaya

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G Lye

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L Weber

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C E Evans

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CPEng
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S Murray, BE (N'cle), MIEEE

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C P Killen, BSME (Virginia), MEM (UTS)
F C O Sticher, BE, PhD (Syd)

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Engineering Management and Practice

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H T McGregor, BS (Drexel), MA (Macq)

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W R Belcher, BE, MEngSc (Q'ld), PhD (Lond), DIC, FIEAust, CPEng, MIEE

Director, International Engineering Program
P Maloney, BA (Macq), MA (Syd)

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P Stapleton, BE, MEngSc (UNSW)

Associate Professor
P Bryce, BSc, PhD (UNSW), FIREE, MSSRE

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R K Bagia, BE (UNSW), MEngSc (Syd), MBA (Deakin), MIEEE
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D Sharma, BScEng (Punjab), MEng, DEng (AIT), MIEAust, CPEng
H Akpolat, BE, ME, PhD (TU Berlin)

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B Jacobs, BSc (GenSc) (Syd), MEd (Syd)
V McKain, BSc, BH MS (Ed) (Q'ld), MS (Penn State), BE (QUT), Graduate Certificate in Higher Education (UTS)
R Jarman, BE (UTS)

Centre for Local Government

University Centre linked to the faculties of Engineering; Business; and Design, Architecture and Building.

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G Sansom, BA(Hons) (Oxon), MTCP (Syd), FRAPI

Manager, Special Projects
R Mellor, MPS (UNSW)

Research Fellow
Dr J Porter, BSc, PhD (Birm)

Administrative Officer
T Kemp

National Centre for Groundwater Management

Joint Centre of the Faculties of Engineering and Science

Professor and Director of Centre
M J Knight, BSc, PhD (Melb), FGS, MIE (Aust), MAIMM

Senior Lecturers
N P Merrick, BSc, MSc (Syd), GradDipDataProc (NSWIT), PhD (UTS), (Deputy Director, National Centre for Groundwater Management)
W A Milne-Home, BSc (Leic), MSc (Lond), PhD (Alta), CertEngGCH (UNSW)
R G McLaughlan, BSc (Melb), Graduate Certificate in Higher Education (UTS), GradDipCivEng, MAppSc, PhD (UNSW)

Office Manager
H P Xu

Principle Scientist
D Yates, BAppSc(Hons) (UNSW), GradDipEnvStud (Macq)

Administrative Assistant
L Dixon

INDEX

A

B

C

D

E

F

G

H

I

J

L

M

N

O

P

Q

R

S

T

U

V

W

Y

UTS CONTACTS

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international +61 2 9514 2000
fax (02) 9514 1551
email info.office@uts.edu.au
www.uts.edu.au

Postal address
PO Box 123
Broadway NSW 2007
Australia

City campus

Broadway

- Tower, Building 1 (CB01)
  15 Broadway, Broadway
- Building 2 (CB02)
  15 Broadway, Broadway
- Bon Marche, Building 3 (CB03)
  765 Harris Street, Broadway
- Building 4 (CB04)
  751 Harris and 95 Thomas Streets
- Peter Johnson Building
  Building 6 (CB06)
  702 Harris Street, Broadway
- The Terraces (CB08)
  9, 11 and 13 Broadway, Broadway

Haymarket

- Haymarket, Building 5
  (CM05A–CM05D)
  1–59 Quay Street
  Haymarket

Blackfriars

- Corner Blackfriars and Buckland Streets
  Chippendale (CC01–CC07)

Smail Street

- 3 Smail Street, Ultimo (CS01)

Harris Street

- 645 Harris Street, Ultimo (CH01)

McKee Street

- McKee Street Childcare (CK01)
  1–15 McKee Street, Ultimo

Quay Street

- 10 Quay Street, Haymarket
- Prince Centre
  8 Quay Street, Haymarket

Student housing

- Bulga Ngurra (CA02)
  23–27 Mountain Street, Ultimo
- Geegal (CA01)
  82–84 Ivy Street, Chippendale

Institute for Sustainable Futures

- National Innovation Centre
  Corner Garden, Cornwallis and
  Boundary Streets
  Eveleigh NSW 1430
  telephone (02) 9209 4350
  fax (02) 9209 4351

Kuring-gai campus

- Buildings KG01–KG05
  Eton Rd, Lindfield
  (PO Box 222, Lindfield NSW 2070)
- UTS Northshore Conference Centre

St Leonards campus

- Dunbar Building (SL01)
  Corner Pacific Highway and
  Westbourne Street, Gore Hill
- Clinical Studies Building (SH52)
  Centenary Lecture Theatre (SH51)
  West Wing (SH11A), Reserve Road
  Royal North Shore Hospital
- Gore Hill Research Laboratories (SH44)
  and Biological Annexe (SHHHA) Royal
  North Shore Hospital

Yarrawood conference and research centre

- 689 Springwood Road
  Yarramundi NSW 2753

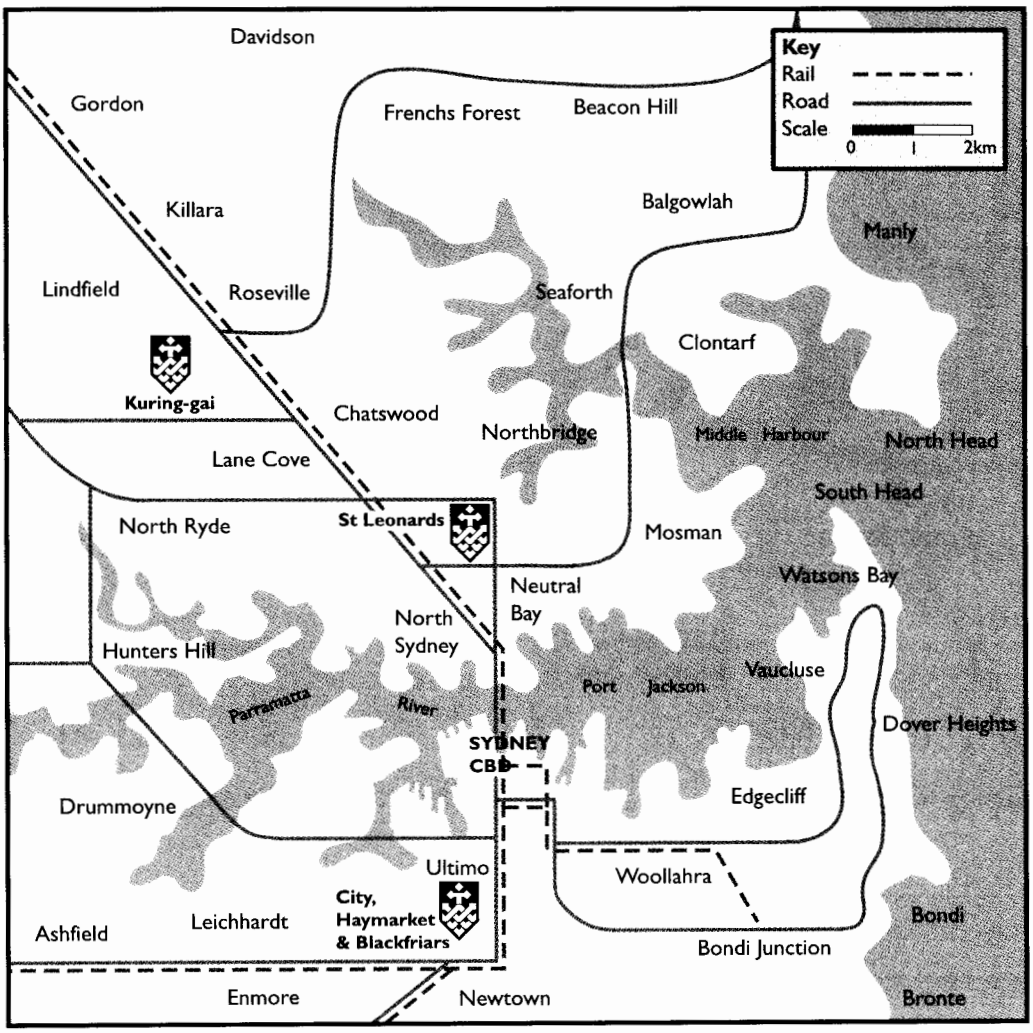
Stroud field station

- 2605 The Bucketts Way
  Booral NSW 2425

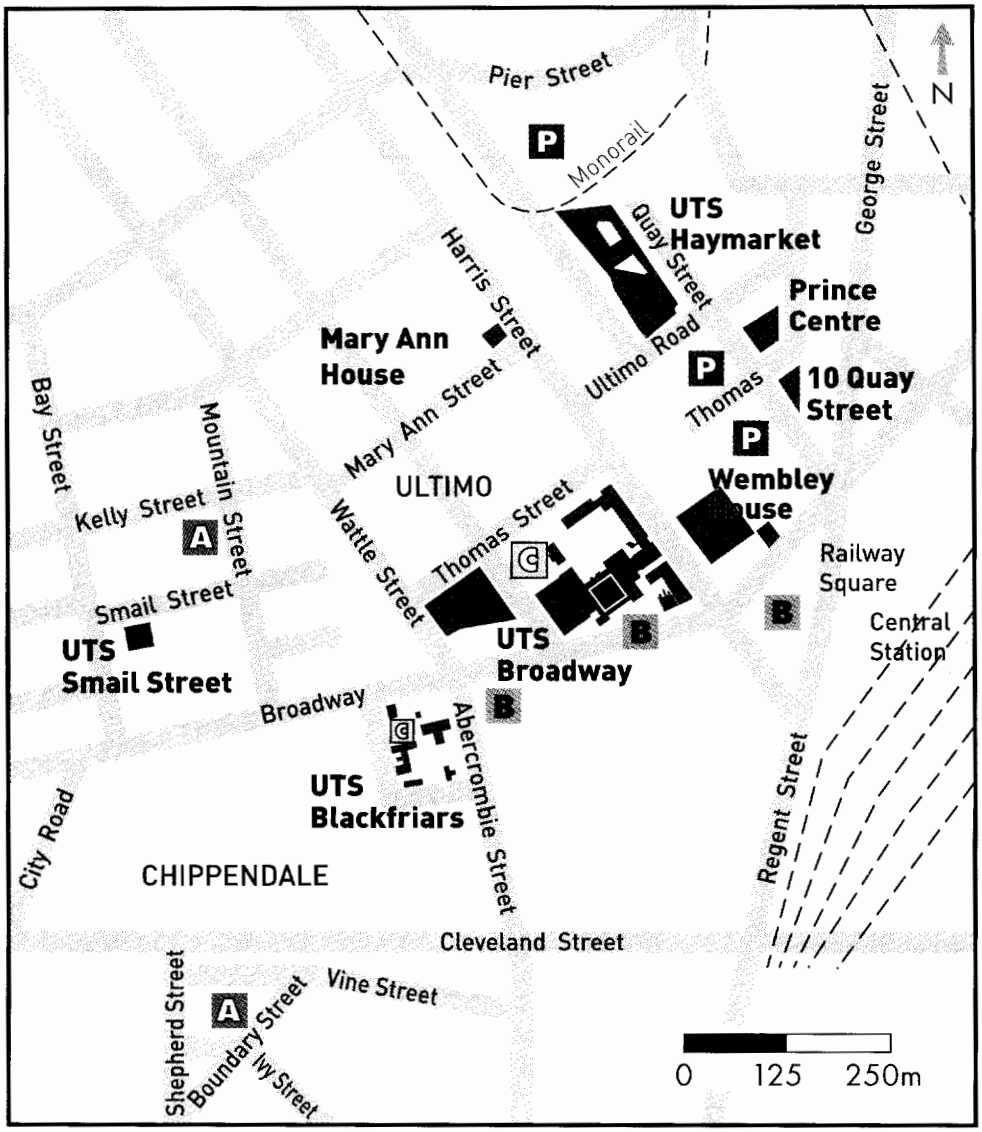
Note: In 2002 UTS City campus will extend to include Building CB10 (Jones Street) and a number of faculties and administrative units will be relocated.

UTS MAPS

Sydney regional map



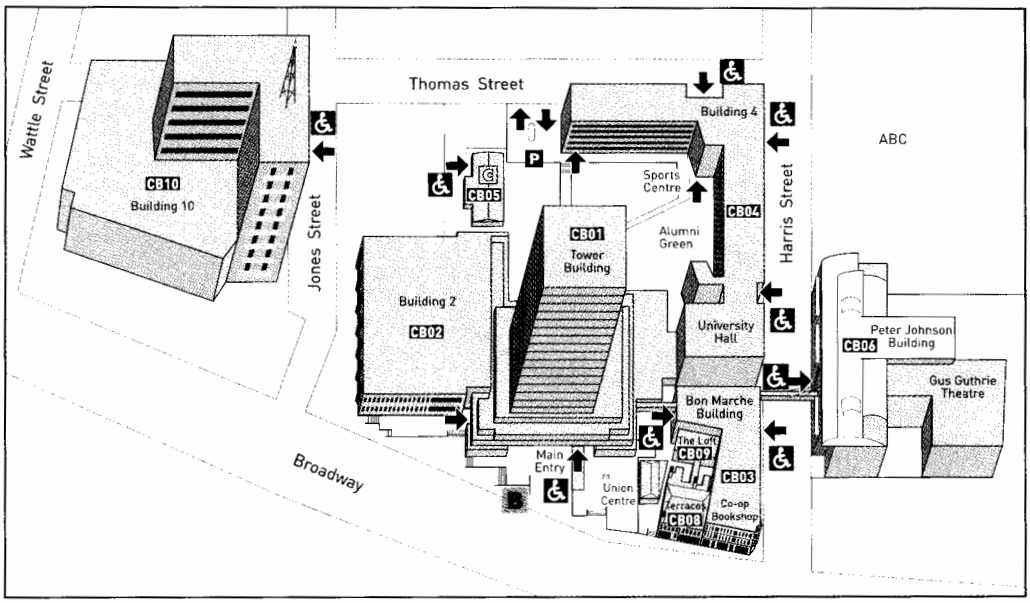
City campus



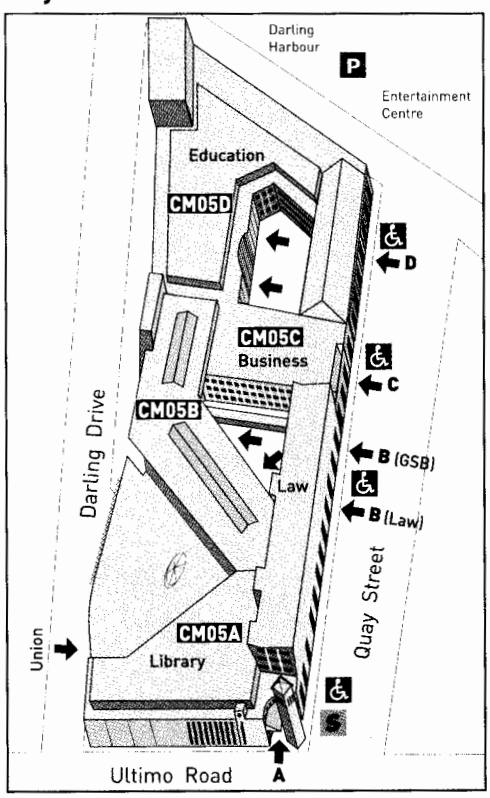
KEY

- Entry / Exit
- Disabled access
- B Main bus stop
- S UTS shuttle bus
- P Parking
- C Child care
- A Student accommodation
- CB01 Building numbers

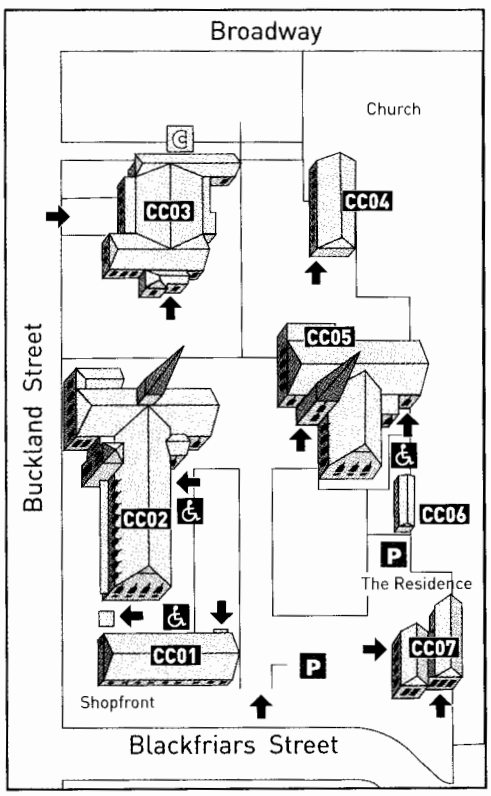
Broadway



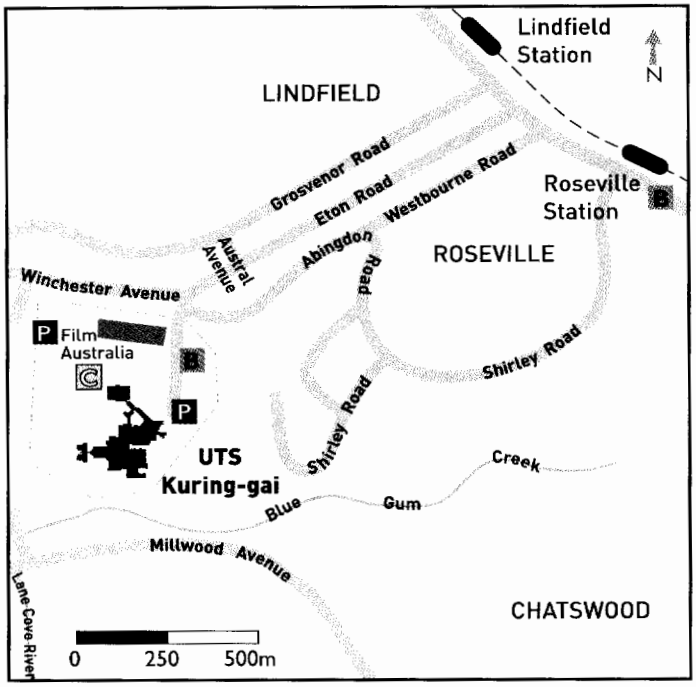
Haymarket



Blackfriars

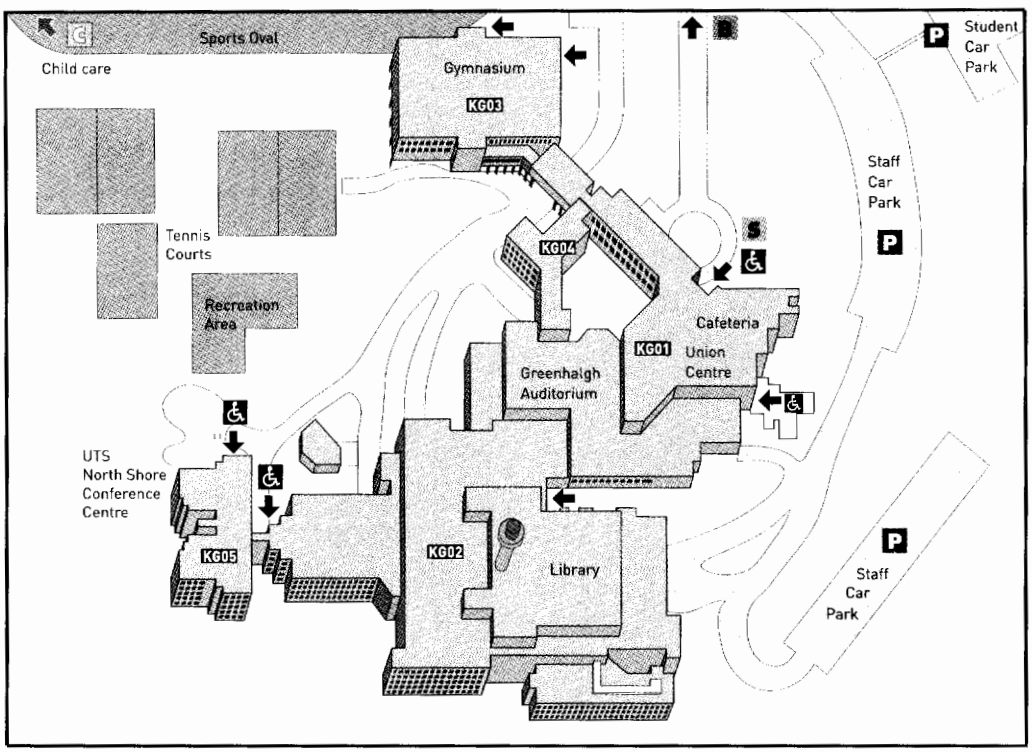


Kuring-gai campus

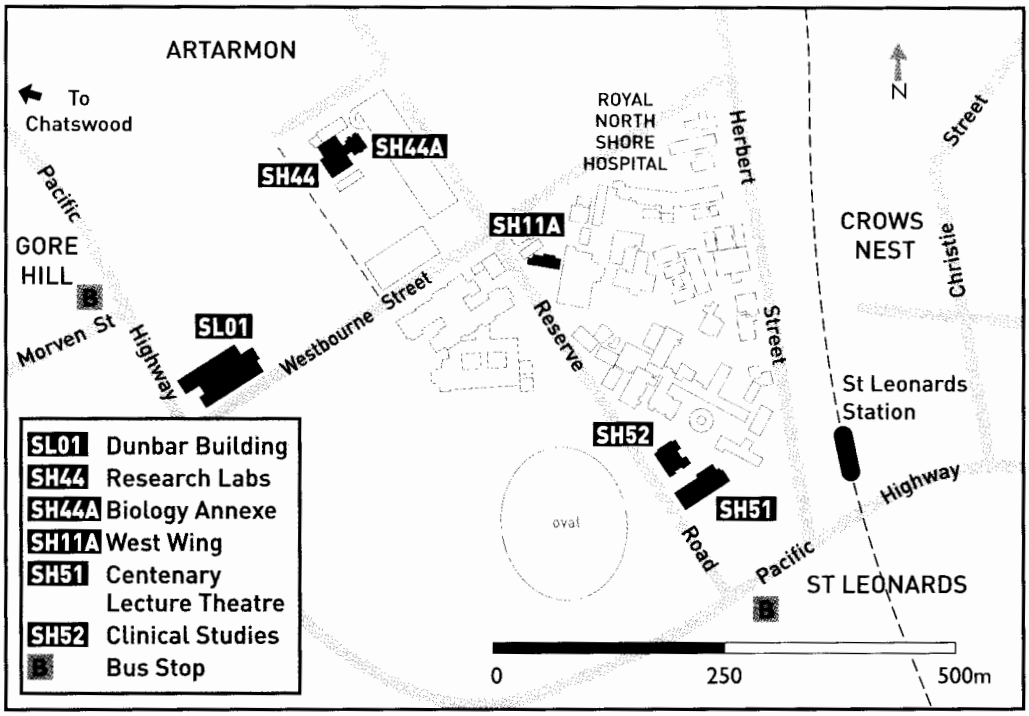


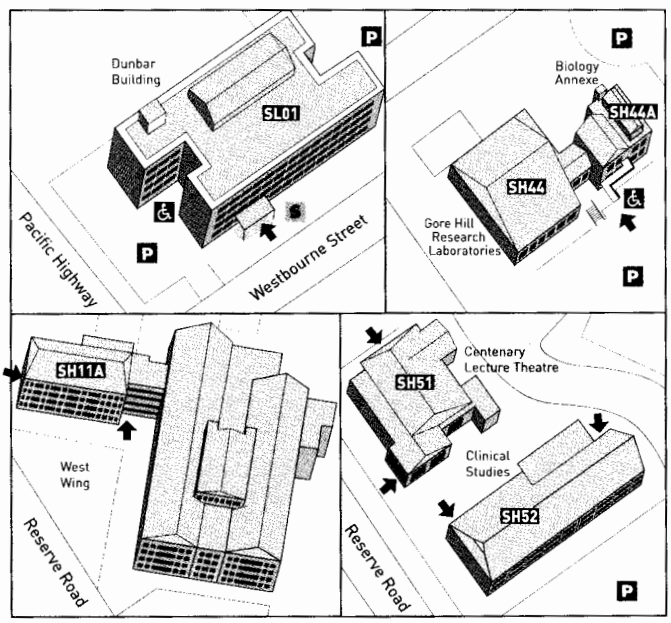
KEY

- Entry / Exit
- Disabled access
- Main bus stop
- UTS shuttle bus
- Parking
- Child care
- Student accommodation
- CB01 Building numbers



St Leonards campus





KEY

- Entry / Exit
- Disabled access
- B Main bus stop
- S UTS shuttle bus
- P Parking
- C Child care
- A Student accommodation
- CB01 Building numbers

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