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UNIVERSITY OF
TECHNOLOGY SYDNEY

2001

**UTS:ENGINEERING
HANDBOOK**

University of Technology,
Sydney. Faculty of
Engineering.
Faculty of Engineering
handbook
Received on: 31-10-00
CITY CAMPUS



UTS:ENGINEERING

HANDBOOK 2001

DISCLAIMER

This publication contains information which was current at 1 September 2000. Changes in circumstances after this date may impact upon the accuracy or currency of the information. The University takes all due care to ensure that the information contained here is accurate, but reserves the right to vary any information described in this publication without notice. Readers are responsible for verifying information which pertains to them by contacting the Faculty or the UTS Student Info & Admin Centre.

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; family 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.

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/

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GENERAL INFORMATION

WELCOME

Welcome to the University of Technology, Sydney (UTS), one of the largest universities in New South Wales – a university with an international reputation for quality programs and flexible learning. UTS develops and regularly revises its programs of study in partnership with industry, government and professional bodies, so that its degrees are based on the latest professional standards and current practices. As a result, UTS produces graduates who are ready for work, and this is demonstrated in the high numbers of its students who 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 2001* 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 2001* 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

Level 4 foyer, Building 1 (Tower Building)
1 Broadway, Ultimo

Kuring-gai campus

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

Faculty student offices

Business

Undergraduate inquiries

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

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

email undergraduate.business@uts.edu.au

Postgraduate inquiries

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

Design, Architecture and Building

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

Education

Room D101, Building 5
Haymarket, City campus
telephone (02) 9514 3900
email education@uts.edu.au

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

Engineering

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

Humanities and Social Sciences

Faculty Student Centre

Level 2, Building 3 (Bon Marche Building)
City campus
telephone (02) 9514 2300
email fhss.student-centre@uts.edu.au

Faculty Research Office

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

Information Technology

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

Law

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

Nursing, Midwifery and Health

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

Science

Level 3, Building 4
City campus
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

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 more information about applying to study at UTS, contact the UTS Student Info & Admin Centre.

International students

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

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 four 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 components¹

Union Entrance Fee

a once-only charge for new students \$22

Union Fee

a semester-based charge for currently enrolled students \$113 per semester

Students' Association Fee

a yearly charge for currently enrolled students \$54.40 per year

Student Accommodation Levy

a yearly charge for currently enrolled students \$58 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 page). 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. Please 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\$8,250 per semester, and for postgraduate international students from A\$4,000 to A\$8,250 per semester. These vary from time to time and the International Programs Office should be contacted for up-to-date information.

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.

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

(Higher Education Contribution Scheme)

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

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

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

Note: These options may not apply to New Zealand citizens and 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.

For Autumn semester, the HECS census date is 31 March, and for Spring semester, the HECS census date is 31 August. HECS census dates for other teaching periods can be obtained from the UTS 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.

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

For more information, talk to a financial assistance officer in the Student Services Unit.

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

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

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

Abstudy

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

Level 17, Building 1 (Tower Building)
telephone (02) 9514 1902

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 opening 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 3388

Kuring-gai Campus Library

Eton Road, Lindfield
telephone (02) 9514 5313

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

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

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

www.gradschool.uts.edu.au

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
- campus interview program.

10 General information

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 2001

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.

For more information, contact:

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

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 industry experience or permanent or casual employment. Contact the Careers Service on:

telephone (02) 9514 1471 (City campus)
www.uts.edu.au/div/cas

Counselling

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

For further information, contact:

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

Telephone counselling is available on (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.

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.

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

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.

telephone (02) 9514 1177

Locations for 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

Level 6, Building 1 (Tower Building)

- Counselling Service
- Health Service
- Special Needs and Financial Assistance Service

Level 3, Building 1 (Tower Building)

- Careers Service
- 9 Broadway
- Housing Service

Kuring-gai campus

Level 5, Building K1

- Counselling Service
- Health Service

Computer laboratories

Computer laboratories are located throughout the University and are available for all students and staff to use. Details of locations and availability of the computer laboratories may be obtained from the Information Technology (ITD) Support Centre on:

telephone (02) 9514 2222

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 UTS Email, visit the website:

www.uts.edu.au/email/

Alternatively, pick up the brochure *Your UTS Email Account* available in all ITD General Purpose Laboratories and drop-in centres. If you have any problems activating your account or with the use of UTS Email, contact the IT Support Centre on:

telephone (02) 9514 2222

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

Room 211, Building 4

City campus

Rosemary Ward

telephone (02) 9514 1729

email rosemary.ward@uts.edu.au

www.science.uts.edu.au/depts/cmf/chem/clrc/index.html

Computing Study Centre

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

Level 16, Building 1 (Tower Building)

City campus

John Colville, Director

telephone (02) 9514 1854

email john.colville@uts.edu.au

English Language Study Skills Assistance (ELSSA) Centre

ELSSA Centre provides free English language and study skills courses for all UTS students completing their degree in English.

ELSSA Centre

Alex Barthel (Director)

Level 18, Building 1 (Tower Building)

City campus

telephone (02) 9514 2327

or

Room 522, Building K2

Kuring-gai campus

telephone (02) 9514 5160

email elssa.centre@uts.edu.au

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

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

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

Jumbunna CAISER

Level 17, Building 1 (Tower Building)

City campus

telephone (02) 9514 1902

www.indigenet.com.au/jumbunna

Mathematics Study Centre

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

Level 16, Building 1 (Tower Building)

City campus

Leigh Wood (Director)

telephone (02) 9514 2268

email leigh.wood@uts.edu.au

Room 522, Building K2

Kuring-gai campus

telephone (02) 9514 5186

Physics Learning Centre

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

Level 11, Building 1 (Tower Building)
City campus
(with an adjoining computer laboratory)

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

EQUITY AND DIVERSITY

UTS is committed to equal opportunity and the right of all staff and students to work, study and access services in a university environment which is safe, equitable, free from discrimination and harassment, and in which everybody is respected and treated fairly. 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 all students and staff are able to develop to their full potential.

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. 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; family responsibilities, disability, age; homosexuality; transgender status; political conviction; and religious belief.

The Equity & Diversity Unit provides a range of services for students and prospective students. These include 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
Level 17, Building 1 (Tower Building)
telephone (02) 9514 1084
email equity.diversity.unit@uts.edu.au
www.equity.uts.edu.au

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.

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

Freedom of Information

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 Officer
Level 4A, Building 1 (Tower Building)
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 appropriate, 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/

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 Debbie.Anderson@uts.union.uts.edu.au

City campus at Haymarket
telephone (02) 9514 3369

Kuring-gai campus
telephone (02) 9514 5011

Union Sports Centre

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

Lower ground floor, Building 4
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.

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

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

Co-op Bookshop

The Co-op Bookshop stocks the books on 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 kuringgai@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: it is an organisation run by students for students. UTS students have the right to stand for election of the SA and to vote in the annual elections. The SA also employs caseworkers to provide advocacy for students on academic and non-academic matters.

City campus office
Level 3, Building 1 (Tower Building)
telephone (02) 9514 1155

Kuring-gai campus office
Level 4, Building 2
telephone (02) 9514 5237

Radio Station 2SER-FM (107.3 FM)

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

Level 26, Building 1 (Tower Building)
City campus
telephone (02) 9514 9514

UTS Gallery and Art Collection

The UTS Gallery is a dedicated public gallery on the City campus. The UTS Gallery presents regularly changing exhibitions of art and design from local, interstate and international sources.

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

Level 4, Building 6 (Peter Johnson Building)
City campus
702 Harris Street
telephone (02) 9514 1284
fax (02) 9514 1228
email uts.gallery@uts.edu.au
www.utsgallery.uts.edu.au

PRINCIPAL DATES FOR 2001

January

- 1 New Year's Day – public holiday
- 2 Summer session classes recommence (to 2 February)
- 4 UTS Advisory Day
- 5 Closing date for change of preference to the Universities Admissions Centre (UAC), by mail or in person
- 6 Closing date (midnight) for change of preference to UAC, via UAC Infoline and website (www.uac.edu.au)
- 8 Formal supplementary examinations for 2000 Spring semester students
- 12 Last day to submit appeal against exclusion from Spring 2000
- 19 Final examination timetable for Summer session available
- 19 Main round of offers to UAC applicants
- 22–27 Enrolment of new main round UAC undergraduate students at City campus
- 24 Closing date for change of preference to UAC for final round offers
- 26 Australia Day – public holiday
- 29 Public School holidays end

February

- 2 Final round of offers to UAC applicants
- 2 Summer session ends for subjects with formal exams
- 2 Last day to lodge a Stage 2 appeal against assessment grade for Spring semester 2000
- 5–16 Formal examinations for Summer session
- 5–23 Enrolment of new students at City campus
- 9 Third round closing date for postgraduate applications for Autumn semester 2001 (except Faculty of Business – closing date 16 February)
- 16 Faculty of Business third round closing date for postgraduate applications for Autumn semester 2001
- 26 Orientation week for new students commences (to 2 March)
- 26 Release of results for Summer session
- 28 Union 'O' Day – Clubs and activities day
- 28 Late enrolment day

March

- 5 Autumn semester classes commence
- 7 Late enrolment day
- 9 Last day to lodge a Stage 2 appeal against assessment grade for Summer session
- 16 Last day to enrol in a course or add subjects¹
- 16 Last day to pay upfront HECS or postgraduate course fees for Autumn semester 2001
- 19 Applications open for Vice-Chancellor's Postgraduate Research Student Conference Fund (for conferences July – December)
- 30 Last day to apply to graduate in Spring ceremonies 2001
- 31 Last day to withdraw from a course or subject without financial penalty¹
- 31 HECS census date

April

- 12 Last day to withdraw from a course or subject without academic penalty¹
- 12–30 Public School holidays
- 13 Good Friday – public holiday
- 16 Easter Monday – public holiday
- 16–20 Vice-Chancellors' Week (non-teaching)
- 18–20 Graduation ceremonies (Kuring-gai campus)
- 25 Anzac Day – public holiday

May

- 1 Applications open for undergraduate courses, where applicable, and postgraduate courses for Spring semester 2001
- 7–18 Graduation ceremonies (City campus)
- 11 Provisional examination timetable available
- 22 Closing date for applications for Vice-Chancellor's Postgraduate Research Student Conference Fund (for conferences July – December)
- 31 Closing date for undergraduate and first round postgraduate applications for Spring semester 2001
- 31 Closing date for applications for Postgraduate Equity Scholarships for Spring semester 2001

June

- 1 Final examination timetable available
- 11 Queen's Birthday – public holiday
- 15 Last teaching day of Autumn semester
- 16 Formal examinations commence (to 6 July)
- 29 Second round closing date for postgraduate applications for Spring semester 2001

July

- 2–6 Vice-Chancellors' Week (non-teaching)
- 6–23 Public School holidays
- 16–20 Formal alternative examination period for Autumn semester students
- 18–26 Enrolment of new students for Spring semester
- 25 Release of Autumn semester examination results
- 26 Formal supplementary examinations for Autumn semester students
- 30 Spring semester classes commence

August

- 1 Applications available for undergraduate and postgraduate courses for Autumn semester 2002
- 1 Applications available for Postgraduate Research Scholarships
- 3 Last day to withdraw from full-year subjects without academic penalty
- 3 Last day to lodge a Stage 2 appeal against assessment grade for Autumn semester 2001
- 10 Last day to enrol in a course or add subjects¹
- 17 Last day to pay upfront HECS or postgraduate course fees for Spring semester 2001
- 30 Last day to apply to graduate in Autumn ceremonies 2002
- 31 Last day to withdraw from a course or subject without financial penalty¹
- 31 HECS census date

September

- 7 Last day to withdraw from a course or subject without academic penalty¹
- 7 Applications open for Vice-Chancellor's Postgraduate Research Student Conference Fund (for conferences January – June 2002)
- 24–28 Vice-Chancellors' Week (non-teaching)
- 24–28 Graduation ceremonies (City campus)
- 28 Applications open for UTS Academic Internships
- 28 Closing date for undergraduate applications via UAC (without late fee)
- 28 Closing date for in/UTS Educational Access Scheme via UAC
- 28 Public School holidays commence

October

- 1 Labour Day – public holiday
- 5 Provisional examination timetable available
- 15 Public School holidays end
- 26 Final examination timetable available
- 31 Closing date for undergraduate applications via UAC (with late fee)
- 31 First round closing date for postgraduate applications for Autumn semester 2002
- 31 Closing date for Australian Postgraduate Awards, the R L Werner and University Doctoral Scholarships
- 31 Closing date for applications for Postgraduate Equity Scholarships for Summer session

November

- 9 Last teaching day of Spring semester
- 10–30 Formal examination period
- 20 Closing date for applications for Vice-Chancellor's Postgraduate Research Student Conference Fund (for conferences January – June 2002)
- 30 Closing date for applications for UTS Academic Internships
- 30 Closing date for undergraduate applications direct to UTS (without late fee)

December

- 3 Summer session commences
(to 1 February 2002)
 - 7 Closing date for undergraduate
applications via UAC (with late fee)
 - 10–14 Formal alternative examination period
for Spring semester students
 - 14 Last day for students enrolled in
Summer session to apply to graduate in
Autumn ceremonies 2002
 - 19 Release of Spring semester examination
results
 - 20 Public School holidays commence
(to 28 January 2002)
 - 25 Christmas Day – public holiday
 - 26 Boxing Day – public holiday
-

¹ HECS/Postgraduate course fees will apply after the HECS census dates (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 9 August 2000. The University reserves the right to vary any information described in Principal Dates for 2001 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 – six months of paid work in industry linked with academic preparatory and debriefing subjects. This contextualisation is critical in preparing students to be lifelong learners, 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, 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:

- Institution of Engineers, Australia Award for Cultural Change in Engineering Education: UTS Engineering for the Bachelor of Engineering, Diploma in Engineering Practice.¹
- Australian Association for Engineering Education: Boeing Medal for Excellence in Engineering Education awarded to Ms Elizabeth Taylor in 1998 and to Associate Professor Stephen Johnston in 1999.
- 1998 Australian National Awards for University Teaching – Engineering category: Associate Professor Tom Anderson. 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.

¹ The curriculum has the potential to equip UTS graduates for engineering practice in the 21st century by contributing to their formation as future professionals in their chosen field of practice; their personal development as socially and environmentally aware citizens; and their academic development as scholars and lifelong learners.



*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 BE 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 2000, the Faculty has some 2,670 undergraduate students and 550 postgraduate students. Of the latter, some 70 are candidates for higher degrees by research, and 480 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 in later coming to grips with the human aspects of engineering and with the demands of practice.

Practice-based engineering education requires that students 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 after 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

The engineering profession in Australia has traditionally attracted few women. Currently women represent around 5 per cent of practising 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 concept 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 inhibit the contribution of women to the engineering profession.

The Program is 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 groundbreaking 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 BE DipEngPrac curriculum. The Program has recently translated its experience in communicating with schools about engineering into curriculum innovation in the BE at UTS.

The Faculty 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 promotes opportunities for inclusive team building for students, within and beyond their curriculum and also for staff in their academic practice and development.

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 descriptions 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 Engineering and Manufacturing
- Telecommunications Engineering
- Technical Support
- Administrative Support.

The Faculty's governing body is the Faculty Board in Engineering, details of which are given later. 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 a network of advisory committees with membership drawn from industry, the profession and the community, of which details are also given later.

The Faculty is represented on most of the University's boards and committees.

LOCATION

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

- Dean, Faculty Manager, Undergraduate and Postgraduate Office, Industrial Liaison, International and Enterprise Development Office, and Women in Engineering Program: level 7, Building 2
- Associate Dean, Teaching and Learning Programs: level 24, Building 1
- Associate Dean, International and Enterprise Development: level 7, Building 2
- Associate Dean, Research and Development: level 5, Building 2

General guide to locations of staff and facilities

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

PRINCIPAL CONTACTS

		Location ¹	Phone
<i>Dean of Engineering</i>	Professor Archie Johnston	2/7092	2599
<i>Faculty Manager</i>	Ms Sandra Meiras	2/7093	2594
<i>Associate Dean, Teaching and Learning</i>	Professor Warren Yates	1/2427	2436
<i>Manager, Undergraduate and Postgraduate Office</i>	Ms Susana Tanuwijaya	2/7098	2671
<i>Director, Undergraduate Programs</i>	Associate Professor David Lowe	2/7100	2526
<i>Director, Postgraduate Programs</i>	Associate Professor Tom Anderson	2/7088	2422
<i>Associate Dean, International and Enterprise Development</i>	Associate Professor Jim Parkin	2/7078	2638
<i>Manager, International and Enterprise Development</i>	Ms Beate Buckenmaier	2/7080	2590
<i>Associate Dean, Research and Development</i>	Professor Rod Belcher	2/511C	2423
Group Heads			
<i>Telecommunications</i>	Dr Robin Braun	1/2424	2460
<i>Electrical</i>	Dr Jianguo Zhu	1/1823	2318
<i>Mechanical</i>	Dr Guang Hong	2/619	2677
<i>Environmental</i>	Dr Pam Hazelton	2/512	2661
<i>Civil</i>	Professor Bijan Samali	2/7070	2023
<i>Engineering Management and Practice</i>	Associate Professor Helen McGregor	2/628	2673
<i>Computer Systems</i>	Professor Chris Drane	1/2221B	2390
Research Program Heads in 2000			
In Key University Research Strengths			
<i>Built Infrastructure</i>	Professor Bijan Samali (alternate Associate Professor Keith Crews)	2/511B	2023
<i>Water and Waste Management</i>	Professor Vigi Vigneswaran (alternate Professor Archie Johnston)	2/523	2641
<i>Health Technologies</i>	Associate Professor Hung Nguyen (alternate Dr Ananda Sanagavarapu)	1/2517	2451
In University Centres			
<i>Electrical Machines and Power Electronics</i>	Dr Jianguo Zhu (alternate Dr Peter Watterson)	1/1823	2318
<i>Groundwater Management</i>	Professor Michael Knight	1/1715	2692
<i>Satellite Systems</i>	Associate Professor Sam Reisenfeld (alternate Dr Tim Aubrey)	1/2512B	2448
In Faculty/Unit Designated Research Strengths			
<i>Intelligent Transport Systems</i>	Professor Chris Drane	1/2221B	2390
In Emerging Research Strengths			
<i>Energy Planning and Policy</i>	Associate Professor Deepak Sharma	2/527	2422
<i>Engineering Practice and Education</i>	Ms Elizabeth Taylor	1/2430	2442
<i>Fluid Systems</i>	Dr Simon Beecham	2/507	2623
<i>Information Systems</i>	Associate Professor David Lowe	2/7100	2526
<i>Mechanical Systems</i>	Dr Nong Zhang	2/608	2662
<i>Systems and Software Engineering</i>	Mr John Leaney (Professor Rod Belcher)	1/2221A	2389
<i>Wireless Communication</i>	Dr Robin Braun	1/2424	2460
<i>Director, Industrial Liaison</i>	Mr Paul Stapleton	2/7097	2592
<i>Director, International Engineering Program</i>	Mr Paul Maloney	2/7087	2591
<i>Director, Women in Engineering Program</i>	Ms Bronwyn Holland	2/7071	2601
<i>Community Outreach Coordinator</i>	Ms Betty Jacobs	2/7074	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*.

¹ Note that some locations are provisional and may change.

RESEARCH PROGRAMS

An outline of the Faculty's research interests and strengths appears in the Postgraduate section of this handbook under the heading 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 11 and 70.

Insearch

Insearch, 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
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 (formerly Institute for Interactive Multimedia)
- Institute for International Studies
- Institute for Sustainable Futures.

Further details of all these centres, institutes and other organisations are published in the *UTS Calendar 2001*.

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 the telephone number is (02) 9929 8544.

Corporate membership of IEAust (in the grades of Member or Fellow) confers the status of Chartered Engineer and 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 a 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 call APESMA on (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	2/7088	2639
Dr Simon Beecham Water Engineering	2/507	2623
Mr Alan Brady Surveying	2/511A	2627
Associate Professor Keith Crews Timber Engineering, Structural Design	2/528	2619
Mr Ken Halstead Local Government Engineering	2/522	2640
Dr Reza-ul Karim Structural Mechanics, Analysis and Design	2/505	2621
Dr Kin Leung Lai Structural Mechanics, Concrete Structures	2/510	2626
Dr Sia Parsanejad Steel and Composite Structures, Structural Analysis	2/504	2620
Dr R Sri Ravindrarajah Concrete Technology	2/529	2625
Dr Gerald Ring Soil Engineering	2/506	2622
Dr Ali Saleh Structural Mechanics, Finite Element Analysis, Computational Mechanics	2/517	2635
Professor Bijan Samali Structural Dynamics, Wind and Earthquake Engineering	2/7070	2632
Mr Chris Wilkinson Structural Design Philosophies, Structure of Steel, Reinforced and Prestressed Concrete	2/518	2648
<i>Postdoctoral Fellow</i>		
Dr Danielle Simone Klimesch Fibre-Cement Building Products, Advanced Materials Analysis/Characterisation	2/524	2642

24 Faculty information

	Location	Telephone
<i>Research Fellows</i>		
Dr Jianchun Li Dynamic Analysis and Testing	2/509	2651
Ms Yi Min Wu Dynamic Testing	2/536A	2582
<i>Adjunct Professor</i>		
Professor Steve Bakoss Structural Mechanics, Structural Design	2/503	2629
Computer Systems Engineering		
Mr Noel Carmody Microcomputer System Design, Operating Systems, Computer Architecture, Digital Control Systems, Electrical Engineering	1/2221C	2391
Professor Chris Drane Positioning Systems, Intelligent Transport Systems, Software Engineering	1/2221B	2390
Dr Martin Evans Software Engineering, Philosophy in Engineering	1/2224	2351
Dr K K Fung Parallel Processing, Software Engineering, Computer Simulation, Microcomputer Engineering, Digital Systems	1/2225	2394
Mr John Leaney Software/Systems Engineering, Systems/Software Architecture, Open Systems	1/2221A	2389
Associate Professor David Lowe Hypermedia Information Modelling, Web and Hypermedia Development Processes, Web Project Scoping	2/7100	2526
Mr Steve Murray Embedded Systems, Real-time Systems, Operating Systems, Computer Systems Engineering	1/2222	1553
Associate Professor Chris Peterson Industry Research Policy, Year 2000 Software Compliance, Software Project Management	1/2220A	2392
Dr Keiko Yasukawa Mathematics Education, Nonlinear Systems and Control, Numeracy and Engineering	1/2210C	2437
Electrical Engineering		
Associate Professor Hung Nguyen Computer Control and Instrumentation, Biomedical Technology, Neural Networks and Fuzzy Logic	1/2429	2451
Mr Peter McLean Embedded Systems, Signal Processing, Numerical Methods	1/1921	2339
Mr Andrew Mears Biomedical Engineering, Instrumentation and Control, Biosensors, Signal Processing and Identification	1/2432	2427
Dr John Nicol Control Theory, Optimal Control, Multivariable Control	1/2428	2438

	Location	Telephone
Dr Venkat Ramaswamy Power Electronics, Electrical Machines, Variable-Speed Drives, Computer Simulation and Modelling	1/2417A	2418
Dr Ben Rodanski Numerical Methods, Computer-aided Design, Device Modelling for CAD, Software Engineering	1/2420B	2426
Dr Jianguo Zhu Electromagnetics, Electrical Machines and Drive Systems, Power Electronics <i>Senior Research Fellow</i>	1/1823	2318
Dr Peter Watterson Electromagnetics, Engineering Mathematics, Numerical Methods	1/1823	2319
Engineering Management and Practice		
Mr Ravindra Bagia Systems Engineering, Software Engineering, Engineering Management	1/2423	2432
Professor Rod Belcher Antenna and Microwave Systems, Systems Engineering	2/511	2423
Associate Professor Paul Bryce Micro-hydroelectricity, Appropriate Technology, Fibre-optic Communications, Electromagnetic Theory	1/2420A	2425
Mrs Betty Jacobs Engineering Science and Design Education, Communication	2/7074	2450
Associate Professor Stephen Johnston Appropriate Technology, Design, Ergonomics, Philosophy, Practice and Social Context of Engineering	2/627	2668
Mr Peter Lewis Engineering Education, Engineering Management, Project Management	1/2431	2431
Mr Paul Maloney International Engineering, Philosophy of Science	2/7079	2591
Associate Professor Helen McGregor Human Communication, Engineering and Social Issues, Cooperative Education, Engineering Documentation, Professional Development	2/620	2678
Ms Vicki McKain Instrumentation and Control, Biomedical Engineering	1/2433	2443
Associate Professor Deepak Sharma Energy Planning and Policy, Institutional Restructuring and Decision Processes, Project Planning and Performance	2/527	2422
Mr Paul Stapleton Industrial Liaison	2/7097	2592
Ms Elizabeth Taylor Sociology and Engineering, Engineering Education, Appropriate Engineering and Society, Technology, Law and Society	1/2430	2442

	Location	Telephone
Environmental Engineering		
Professor Vigi Vigneswaran Environmental Engineering, Water and Waste Treatment, Management and Re-use, Industrial Waste Minimisation, Cleaner Production	2/523	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	1/1715	2692
Associate Professor Jim Parkin Engineering Management, Environmental Planning, Decision Theory	2/7087	2638
Dr Prasanthi Hagare Water and Wastewater Treatment Plant Design, Industrial/Hazardous Waste Management, Auditing Landfill Management	2/520	1952
Dr Pamela Hazelton Applied Soil Science, Land Resource Management	2/512	2661
Ms Bronwyn Holland Environmental Engineering, Women in Engineering Program	2/7071	2601
Mr James Irish Environmental Risk Assessment, Risk Engineering, Statistical Hydrology	2/501	2617
Professor Archie Johnston Environmental Hydraulic Engineering, Fluid Mechanics or Water Quality, Groundwater Pollution, Urban Drainage, Oil Spill Hydrodynamics, Riverbank Stabilisation	2/7092	2599
Dr Robert McLaughlan Ecohydrology, Contaminated Sites Management (National Centre for Groundwater Management)	1/1715	2614
Mr Noel Merrick Groundwater Modelling, Flow Modelling and Optimisation (technical and economic coupling), Geophysical Mapping or Salinised Sites, (National Centre for Groundwater Management)	1/1715	2612
Dr William Milne-Home Aquifer Pumping Test Analysis, Dry Land Salinity and its Management, Isotope Tracers (National Centre for Groundwater Management)	1/1715	2654
Dr Hao Ngo Advanced Water and Wastewater Treatment Processes, Water Quality Assessment and Monitoring, Argo-industries Waste Management	2/547	2653
Mr Derek Yates Soilwater Physics, Unsaturated Flow, Groundwater Modelling (National Centre for Groundwater Management)	1/1715	2702

	Location	Telephone
Mechanical Engineering and Manufacturing		
Mr Terry Brown Experimental and Computer-aided Stress Analysis and Design, Adhesives	2/604	2658
Mr John Dartnall Mechanical Engineering Design	2/622	2541
Dr David Eager Acoustics, Project Management, Occupational Health and Safety, Building Services Engineering, Fire Engineering, Children's Playgrounds and Amusement Parks and Devices	2/612B	2687
Dr Guang Hong Internal Combustion Engines, Active Flow Control, Thermodynamics, Engineering Statistics	2/619	2677
Dr Phuoc Huynh Computational Mechanics, Fluid Mechanics, Heat Transfer	2/616	2675
Ms Catherine Killen Computer-aided Design, Product Data Management, Management and Technology	2/624	2697
Dr Austin Mack Aerodynamics, Finite Element Methods, Computational Fluid Dynamics, Computational Electromagnetics	2/612C	2684
Dr Jafar Madadnia Sustainable Engineering, Renewable and Non-Renewable Energy, and Jet Cutting Systems, Heat Transfer	2/606	2740
Mr Garry Marks Political Economy of Technology, Industry Development Policy, Engineering Education	2/609	2683
Dr Fred Sticher Advanced Kinematics and Dynamics, Instrumentation	2/623	2681
Dr Ron Ward Management generally, Assets Maintenance, Occupational Health and Safety, Engineering Hazards and Risks	2/621	2679
Dr Nong Zhang Vibration Analysis, Turbo Machinery Vibration, Dynamics or Vehicle Powertrain Systems, Vibration and Motor Control	2/608	2662
<i>Adjunct Professor</i>		
Professor John Reizes Computational Fluid Dynamics, Thermodynamics, Heat Transfer, Energy Ethics	2/610	2742
Telecommunications Engineering		
Dr Tim Aubrey Antennas and Propagation, Microwave Engineering	1/2417B	2360
Dr Robin Braun Digital Communications, Information Theory of Coding, Digital Signal Processing, Teletraffic Engineering, Telecommunications Economics	1/2424	2460
Dr Jules Harnett Engineering Mathematics	1/2419	2413

	Location	Telephone
Mr Anthony Kadi Real-time Signal Processing, Ultrasound Signal Processing, Signal Theory, Hardware Design and Construction, Communications Networks	1/2420E	2459
Associate Professor Sam Reisenfeld Communications Systems, Satellite Communication, Information Theory, Modulation, Channel Coding, Synchronisation, Mobile Communications, Wireless Networks, Neural Networks	1/2512B	2448
Dr Ananda (Mohan) Sanagavarapu High Frequency Electromagnetics, Wave Propagation, Microwave Engineering, Mobile Communication	1/2512A	2447
Dr Kumbesan Sandrasegaran Wireless Communication Systems, Knowledge-based Systems, Computer-based Learning, Broadband Residential Access Networks	1/2420D	2428
Professor Warren Yates Signal Processing, Communication System Theory, Packet Radio and Spread Spectrum Communications, Synchronisation Issues in Communications	1/2427	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 in Building 1, room 2516 (level 25) and 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 11 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, telephone (02) 9514 1521.

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

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 will be 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 Introduction to 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 Statistics and Introduction to the Design Process. 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 Behaviour of Structures and Design. 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 BE DipEngPrac, 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 will be 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 \$1,550.

Trevor Buchner Design Prize

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 Structural Analysis and Component Design. The prize has a cash value of \$200.

Compumod Prize in Solid Mechanics

This prize is awarded annually to the student who obtains the highest mark in the subject Engineering Design. The prize consists of a commemorative certificate and a cash award 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 will enable 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, a prize, known as 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 will not be 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 will not be 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) have been a registered student in the Mechanical Engineering degree course during the year for which the award is made; and (ii) have achieved the best performance in the subject Dynamics and Control.

The recipient of the prize in Electrical Engineering shall satisfy the following conditions: (i) 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) 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 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 will not be 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 or more credit points in their last semester will be 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

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 Kaganer 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 Structural Mechanics and Component Design. 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, or, if the Practical Test is not conducted in either semester of the year for which the award is made, the prize will be awarded to the student who has obtained the highest aggregate mark in Surveying. The prize is an instrument chosen by the company.

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 will be invited from eligible candidates by the relevant Program Director. The successful applicant will be 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 will be current at any one time.

Pioneer Concrete (Stage 5) Prize

This prize was established in 1987 by Pioneer Concrete (NSW) Pty Ltd. The prize is awarded annually to the student enrolled in the Civil, or Civil and Environmental, major who achieves, at the first attempt, the highest aggregate in the subject 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 Prizes

The Society of Manufacturing Engineers has supported two prizes in the Faculty since the early 1970s. Over time prize names have changed to reflect course developments. The current prizes are available in the Bachelor of Technology in Manufacturing Engineering, and in the Bachelor of Engineering courses in either Mechanical or Manufacturing Engineering.

Society of Manufacturing Engineers (Bachelor of Technology) Prize

This prize is awarded annually to the student who achieves the highest overall pass in the Bachelor of Technology in Manufacturing Engineering. The prize is a cash award of \$200 together with copies of the publication *Manufacturing Engineering* and one year's free membership of the Society.

Society of Manufacturing Engineers (Stage 8) Prize

This prize is awarded annually to the student enrolled in the Mechanical Engineering or Manufacturing Engineering degree course who obtains the highest mark in the subject 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 will not be awarded if no candidate reaches a level acceptable to the Faculty Board in Engineering. The recipient shall satisfy the following conditions: (i) have been an enrolled student in the Computer Systems Engineering major during the entire calendar year for which the award is made; and (ii) have the highest mark in the subject Engineering Internship Review 2.

In selecting the prize winner, account is taken of industrial experience log books, reports, submissions from employers, and any other relevant material, and 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 scholarships

Availability

Engineering Co-operative scholarships will be awarded in 2001 to students who are successful candidates at the 2000 NSW Higher School Certificate examinations (or equivalent) and who are either Australian citizens or Permanent Australian Residents. Awards will be made only to young 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 Institute of Commerce; 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 2001 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 2001 may be available for longer periods.

An initial payment of 10 per cent of the total annual stipend will be made at the time of enrolment. This will be followed by fortnightly payments commencing during the second week of the Autumn semester 2001 and concluding at the end of the Spring semester 2001 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 will be selected jointly by the University and Scholarship sponsors on the basis of a combination of academic achievements, 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 will be strong and a UAI of approximately 97 will be required for success. It will also be 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 28 September. Applicants who are short-listed will be required to attend an interview in late November or early December. Other than in exceptional circumstances, Scholarships will be awarded only to applicants able to personally attend the interview.

Conditions of award

Conditions of award applying to individual scholarships will be consistent with this information, and will be 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 scholarship, to be known as the George J Haggarty Civil Engineering Scholarship, is aimed primarily at country-based students who are about to start a sandwich course. Preference will be 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 will be offered occasionally as funds permit, the amount to be determined from time to time. The grant will be between \$1,000 and \$1,200.

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, Electrical, Mechanical, 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 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/Diploma in Engineering Practice; Bachelor of Engineering/Bachelor of Science; and Bachelor of Engineering/Bachelor of Business.

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)*
\$7,650 per semester (international)
-

Introduction

The program leading to the combined award of Bachelor of Engineering and Diploma in Engineering Practice is a comprehensive preparation for careers in the professional practice of engineering. The program comprises eight semesters of full-time study, and at least two internships (24-week periods of experience gained in the engineering industry), or other authentic workplace settings.

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 professional engineering internship by linking theory and application. The combined degree Bachelor of Engineering, Bachelor of Business also has a practice focus and a workplace-experience component, and students can choose to complete the Diploma in Engineering Practice by undertaking further work and study.

Students who have more extensive and advanced experience of engineering internship than would normally be attained in two six-month periods may be eligible to transfer to the Graduate Certificate in Engineering Practice, described in a later section.

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 have been 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.

A national Review of Engineering Education, commissioned by leading Australian engineering bodies, conducted widespread consultations during 1995 and 1996 in industry and business, in universities, among high-school and university students, and in the community generally. Its report, published in late 1996, expressed great concern at the narrow focus of many engineers and many engineering courses, and urged the engineering profession to develop a more outgoing culture. It highlighted the need expressed by employers for graduates with strongly developed lateral thinking, innovation, communication, interpersonal and networking skills, able to engage with non-technical professions and with environmental, economic and community issues. It strongly recommended a broader approach to engineering education, with a focus on professionalism and social responsibility as well as technical excellence. The same views have been expressed by the Australian Business/Higher Education Round Table, and by similar bodies and reviews of engineering education in many other countries.

The UTS program is designed to give full expression to these new directions, and to equip graduates with the skills and attributes needed for professional practice and professional leadership in the coming century. 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 life-long 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 full-time academic course can match.

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

Engineering, Computer Systems Engineering, Electrical Engineering, Mechanical Engineering, Software Engineering, Telecommunications Engineering, and Construction Engineering (subject to approval). 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.

Three associated courses are also available. One combines the BE DipEngPrac with a Bachelor of Arts in International Studies. Another combines the BE with a Bachelor of Science and the third combines the BE with a Bachelor of Business. These are described in a later section, together with the Graduate Certificate in Engineering Practice.

Attendance patterns and course duration

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 2001 under General Information for exact dates.

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.

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, and usually two afternoons, as well as evenings.

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.

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.

Cooperative education in action

While each student is responsible for finding suitable industrial experience to meet the requirements of the program, the Faculty's Industrial Liaison staff will help with information and advice. It is not necessary for a student to have arranged a job before enrolling in the program.

For students seeking employment in particular semesters (the sandwich pattern), arrangements typically fall into three categories:

- **Cadetships** for student engineers are made available by some employers. Some cadets are selected by employers on the basis of HSC results and are then directed to study engineering at UTS. Others are selected after completing the early stages of their course at UTS. Cadets are usually paid while studying during their academic semesters as well as during periods of work experience. A cadet would work for the same employer on each internship. Some cadetships are also available for part-time students.
- **Sponsorships** tend to be less formal understandings between an employer and a student, to the effect that regular employment will be offered in each internship, subject to work availability and satisfactory performance in the job. Salary is usually paid only during the internship.
- **Freelance** employment means that the student seeks a new position in each successive industrial experience semester, usually with a different employer.

Some students prefer to be continuously employed for the whole duration of the degree program (the part-time pattern). They usually have a job before commencing their studies, although they may change their employment during their progression through the course – often to a more senior position.

The overall requirements of the program are the same for all students, in relation both to the academic curriculum and to the recognition of work experience. Students may adjust their attendance and progression arrangements to suit employment opportunities and personal circumstances.

Industrial Liaison Unit

The Industrial Liaison Unit 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 Industrial Liaison Unit in the semester preceding their intended period of work.

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 have always been able to apply to IEAust for recognition of their undergraduate work experience towards professional registration. Until now, this has been assessed on a case-by-case basis.

UTS expects to negotiate formal IEAust recognition of the new BE DipEngPrac in such a way that graduates will receive full credit for their work experience towards NPER-3, without the need for this experience to be re-assessed by the Institution. These negotiations are in train but are not complete at the time of printing. It is hoped that the resulting agreement will be of significant advantage to UTS Engineering

graduates. The Graduate Certificate in Engineering Practice, described below, further extends this advantage.

Admission to the program

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.

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 yet meet the requirements for entry to degree programs. This program is offered through the Insearch Institute of Commerce, 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, and to consider but not guarantee applications from students who have satisfactorily completed the program but have achieved a WAM of less than 60.

Entry from 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 upon 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 BE DipEngPrac is taught on the assumption that students have competencies equivalent to 2-unit English, 3-unit Mathematics, and 2-unit Physics. Some bridging courses are available and are mentioned below.

For the BE BA DipEngPrac, some background in one of Chinese (Mandarin), French, German, Indonesian, Italian, Japanese, Spanish or Thai is an advantage. Places in this program are very limited and selection is by interview as well as UAI.

Entry from TAFE qualifications or tertiary studies

UTS recognises certain 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
- awards, or partial completion of degree programs, at recognised overseas universities.

Selection will depend 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 school leavers (see Entry from NSW Higher School Certificate above). 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 HSC 3-unit Mathematics, or who do not feel confident with this material, are encouraged to contact the Faculty's Undergraduate 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.

Admission with 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 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 BE DipEngPrac. The level of advanced standing will depend 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 BE studies

Students with partially completed studies in a BE course at another Australian university, accredited by the Institution of Engineers, Australia, who are admitted to a UTS BE course, will be guaranteed full proportional credit for up to 50 per cent of the academic requirements for the degree. This will be 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 RPL

The Faculty will examine applications for advanced standing from entrants in all other circumstances on a case-by-case basis. This may include recognition of prior learning (RPL) 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 Practice 1 and 48122 Engineering Practice Review 1.

Candidates for such exemption are advised to consider transfer to the Graduate Certificate in Engineering Practice.

In no circumstances will exemption be 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.

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 BE DipEngPrac. Refer to the Endowments, prizes and scholarships section for details.

Graduation with Honours

The BE DipEngPrac and BE GradCertEngPrac may be awarded with first or second class Honours for meritorious performance in the course as a whole.

Additional publications

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

www.eng.uts.edu.au

COURSE DESCRIPTION

Programs lead to the combined award of Bachelor of Engineering and Diploma in Engineering Practice (or Graduate Certificate 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, Computer Systems Engineering, Electrical Engineering, Mechanical Engineering, Software Engineering, Telecommunications Engineering, and Construction Engineering (subject to approval). 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, however, to 'General degree without major' in this handbook).

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.

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: 60cp
- Engineering Practice Program: 12cp, plus 48 weeks of approved internship
- Fields of practice: 90, 96 or 102cp, depending on Major
- Electives: 24 or 30cp, depending on Major
- Capstone Project: 6 or 12cps, 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 will need to spend at least nine learning hours, 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 later in this handbook.

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 internship 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
48220	Informatics
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.

Some courses and/or majors have an elective component 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 and double degrees have no electives. The BE GradCertEngPrac requires that 12 credit points of the electives be drawn from a restricted set of graduate engineering subjects.

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.

Sub-majors and their availability

Some of the sub-majors currently available are shown in the following table.

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	Not 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
Software Engineering	Computer Systems, Telecommunications, Electrical
Statistics	All
Structures	Civil
Telecommunications	All, except Telecommunications
Women's Studies	All
Writing	All

Note: For further information, consult the following website: www.eng.uts.edu.au/enrol

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 Liaison staff assist students in securing suitable work placements and in establishing cooperative programs with industry and the community.

The Engineering Practice Program comprises:

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

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 the program director of the major (if any) in which the student intends to graduate, 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 internship.

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.

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 internship. 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.

Such a personal program 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 program above (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 will determine, 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.

MAJORS

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.

The major is designed to develop technical skills, experience and confidence in engineering analysis, problem identification and problem solving; and to provide a consistent focus that engineering is a mix of technical skill, logical reasoning, common sense, judgment and the management of activities and people. It provides a thorough foundation in applied engineering science and progressively develops 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 42 for a list of available sub-majors.

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. Such 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 minimising 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

Civil Engineering major – standard program

Sem 1	48210 Engineering for Sustainability (core)	33130 Mathematical Modelling 1 (core)	68037 Physical Modelling (core)	48310 Introduction to Civil Engineering (fields of practice)	P O R T F O L I O
Sem 2	48220 Informatics (core)	33230 Mathematical Modelling 2 (core)	48321 Statics and Introduction to Design Process (fields of practice)	48320 Surveying (fields of practice)	
Sem 3	48230 Engineering Communication (core)	60101 Chemistry and Materials Science (fields of practice)	48331 Mechanics of Solids (fields of practice)	48330 Soil Behaviour (fields of practice)	
Sem 4	Engineering Internship (may be taken in Semesters 3 or 4)				
Sem 5	48240 Uncertainties and Risks in Engineering (core)	48641 Fluid Mechanics (fields of practice)	48341 Structural Mechanics and Component Design (fields of practice)	48340 Construction (fields of practice)	
Sem 6	48250 Engineering Economics and Finance (core)	48352 Construction Materials (fields of practice)	48351 Structural Analysis and Component Design (fields of practice)	48350 Environmental and Sanitation Engineering (fields of practice)	
Sem 7	48260 Engineering Management (core)	48362 Hydraulics and Hydrology (fields of practice)	48361 Behaviour of Structures and Design (fields of practice)	48360 Geotechnical Engineering (fields of practice)	
Sem 8	Engineering Internship (may be taken in Semesters 6–9)				
Sem 9	48270 Technology Assessment (core)	48370 Transport in the Environment (fields of practice)	Sub-major/electives	Sub-major/electives	
Sem 10	Capstone Project	48380 Civil and Environmental Design (fields of practice)	Sub-major/electives	Sub-major/electives	

Engineering Internship shown in Semesters 4 and 8 are for illustration only.

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:

- 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
- 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 will 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 42 for a list of available sub-majors.

Civil and Environmental Engineering major – standard program

Sem 1	48210 Engineering for Sustainability (core)	60101 Chemistry and Materials Science (fields of practice)	91150 Biology and Ecology (fields of practice)	48310 Introduction to Civil Engineering (fields of practice)	P O R T F O L I O
Sem 2	48220 Informatics (core)	33130 Mathematical Modelling 1 (core)	68037 Physical Modelling (core)	48820 Introduction to Environmental Engineering (fields of practice)	
Sem 3	48230 Engineering Communication (core)	33230 Mathematical Modelling 2 (core)	48321 Statics and Introduction to Design Process (fields of practice)	48340 Construction (fields of practice)	
Sem 4	Engineering Internship (may be taken in Semesters 3 or 4)				
Sem 5	48240 Uncertainties and Risks in Engineering (core)	48641 Fluid Mechanics (fields of practice)	48331 Mechanics of Solids (fields of practice)	48840 Water Supply and Wastewater Engineering (fields of practice)	
Sem 6	48250 Engineering Economics and Finance (core)	48330 Soil Behaviour (fields of practice)	48352 Construction Materials (fields of practice)	48850 Environmental Planning and Law (fields of practice)	
Sem 7	48260 Engineering Management (core)	48362 Hydraulics and Hydrology (fields of practice)	48341 Structural Mechanics and Component Design (fields of practice)	48860 Pollution Control and Waste Management (fields of practice)	
Sem 8	Engineering Internship (may be taken in Semesters 6–9)				
Sem 9	48270 Technology Assessment (core)	48351 Structural Analysis and Component Design (fields of practice)	Sub-major/electives	Sub-major/electives	
Sem 10	Capstone Project	48370 Transport in the Environment (fields of practice)	Sub-major/electives	Sub-major/electives	

Engineering Internship shown in Semesters 4 and 8 are 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 rationale for the CSE major is 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 the employment rate of practically 100 per cent among graduates of the old CSE degree.

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 can often work also 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-solving, 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 42 for a list of available sub-majors.

Computer Systems Engineering major – standard program

Sem 1	48210 Engineering for Sustainability (core)	33130 Mathematical Modelling 1 (core)	68037 Physical Modelling (core)	48510 Introduction to Electrical Engineering (fields of practice)	P O R T F O L I O
Sem 2	48220 Informatics (core)	33230 Mathematical Modelling 2 (core)	48610 Introduction to Mechanical Engineering (fields of practice)	48520 Electronics (fields of practice)	
Sem 3	48230 Engineering Communication (core)	48430 Software Development (fields of practice)	48531 Electromechanical Systems (fields of practice)	48530 Circuit Analysis (fields of practice)	
Sem 4	Engineering Internship (may be taken in Semester 3 or 4)				
Sem 5	48240 Uncertainties and Risks in Engineering (core)	48440 Software Engineering (fields of practice)	48441 Introductory Digital Systems (fields of practice)	Sub-major/electives	
Sem 6	48250 Engineering Economics and Finance (core)	48450 Operating Systems (fields of practice)	48451 Advanced Digital Systems (fields of practice)	Sub-major/electives	
Sem 7	48260 Engineering Management (core)	48540 Signals and Systems (fields of practice)	48740 Communications Networks (fields of practice)	Sub-major/electives	
Sem 8	Engineering Internship (may be taken in Semester 6-9)				
Sem 9	48270 Technology Assessment (core)	48570 Data Acquisition and Distribution (fields of practice)	48470 Computer Systems Analysis (fields of practice)	Sub-major/electives	
Sem 10	Capstone Project	Capstone Project	48480 Computer Systems Design (fields of practice)	Sub-major/electives	

Engineering Internship shown in Semesters 4 and 8 are for illustration only.

Construction Engineering major¹

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

The Construction Engineering major prepares you to work in the professional disciplinary area of Construction Engineering and develops your 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 provider 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 rest of 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 to you. Towards the later stages of the course, sub-majors such as

¹ Subject to approval.

Construction Engineering major – standard program

Sem 1	33130 Mathematical Modelling 1 (core)	4xxxx Construction Management 1A (fields of practice)	4xxxx Construction Management 2A (fields of practice)	48310 Introduction to Civil Engineering (fields of practice)	P O R T F O L I O
Sem 2	33230 Mathematical Modelling 2 (core)	68037 Physical Modelling (core)	4xxxx Construction Management 2S (fields of practice)	48320 Surveying (fields of practice)	
Sem 3	48220 Informatics (core)	60101 Chemistry and Materials Science (fields of practice)	48340 Construction (fields of practice)	48321 Statics and Introduction to Design Process (fields of practice)	
Sem 4	Engineering Internship (may be taken in Semesters 3 or 4)				
Sem 5	48230 Engineering Communication (core)	48330 Soil Behaviour (fields of practice)	48641 Fluid Mechanics (fields of practice)	48331 Mechanics of Solids (fields of practice)	
Sem 6	48240 Uncertainties and Risks in Engineering (core)	48850 Environmental Planning and Law (fields of practice)	48352 Construction Materials (fields of practice)	48341 Structural Mechanics and Component Design (fields of practice)	
Sem 7	48250 Engineering Economics and Finance (core)	4xxxx Construction Management 3A (fields of practice)	4xxxx Construction Management 4A (fields of practice)	48351 Structural Analysis and Component Design (fields of practice)	
Sem 8	48360 Geotechnical Engineering (fields of practice)	4xxxx Construction Management 3S (fields of practice)	4xxxx Construction Management 4S (fields of practice)	Sub-major/electives	
Sem 9	Engineering Internship (may be taken in Semesters 6–9)				
Sem 10	Capstone Project	Sub-major/electives	Sub-major/electives	Sub-major/electives	

Engineering Internship shown in Semesters 4 and 9 are for illustration only.

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 your critical, analytical and evaluative skills and your ability to communicate your 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 work place. 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 42 for a list of available sub-majors.

Electrical Engineering major

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

There have been few bigger benefits to humankind than the supply of electricity to residential, commercial and industrial sites. Recent advances in electronics and micro-electronics have also 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.

The new generation of electrical engineers will be much more attuned to social and environmental sustainability. They will 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, devices for biomedical technology, etc.

Electrical Engineering major – standard program

Sem 1	48210 Engineering for Sustainability (core)	33130 Mathematical Modelling 1 (core)	68037 Physical Modelling (core)	48510 Introduction to Electrical Engineering (fields of practice)	P O R T F O L I O
Sem 2	48220 Informatics (core)	33230 Mathematical Modelling 2 (core)	48610 Introduction to Mechanical Engineering (fields of practice)	48520 Electronics (fields of practice)	
Sem 3	48230 Engineering Communication (core)	48430 Software Development (fields of practice)	48531 Electromechanical Systems (fields of practice)	48530 Circuit Analysis (fields of practice)	
Sem 4	Engineering Internship (may be taken in Semester 3 or 4)				
Sem 5	48240 Uncertainties and Risks in Engineering (core)	68038 Advanced Mathematics and Physics (fields of practice)	48441 Introductory Digital Systems (fields of practice)	48540 Signals and Systems (fields of practice)	
Sem 6	48250 Engineering Economics and Finance (core)	48550 Electrical Energy Technology (fields of practice)	48451 Advanced Digital Systems (fields of practice)	48551 Advanced Electronics (fields of practice)	
Sem 7	48260 Engineering Management (core)	48560 Analogue and Digital Control (fields of practice)	48561 Power Electronics (fields of practice)	Sub-major/electives	
Sem 8	Engineering Internship (may be taken in Semester 6–9)				
Sem 9	48270 Technology Assessment (core)	48570 Data Acquisition and Distribution (fields of practice)	Sub-major/electives	Sub-major/electives	
Sem 10	Capstone Project	Capstone Project	Sub-major/electives	Sub-major/electives	

Engineering Internship shown in Semesters 4 and 8 are for illustration only.

Graduates of the major will work in numerous challenging areas: electronic and micro-electronic 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 disabled people, low-cost efficient hydro-electric systems for villages in third-world 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 42 for a list of available sub-majors.

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 usable 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; and 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 will 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 42 for a list of available sub-majors.

Mechanical Engineering major – standard program

Sem 1	48210 Engineering for Sustainability (core)	33130 Mathematical Modelling 1 (core)	68037 Physical Modelling (core)	48610 Introduction to Mechanical Engineering (fields of practice)	P O R T F O L I O
Sem 2	48220 Informatics (core)	33230 Mathematical Modelling 2 (core)	48621 Manufacturing Engineering (fields of practice)	48620 Fundamentals of Mechanical Engineering (fields of practice)	
Sem 3	48230 Engineering Communication (core)	60101 Chemistry and Materials Science (fields of practice)	48331 Mechanics of Solids (fields of practice)	48510 Introduction to Electrical Engineering (fields of practice)	
Sem 4	Engineering Internship (may be taken in Semester 3 or 4)				
Sem 5	48240 Uncertainties and Risks in Engineering (core)	48641 Fluid Mechanics (fields of practice)	48640 Machine Dynamics (fields of practice)	48642 Strengths of Engineering Materials (fields of practice)	
Sem 6	48250 Engineering Economics and Finance (core)	48651 Thermodynamics (fields of practice)	48531 Electromechanical Systems (fields of practice)	48650 Mechanical and Manufacturing Design (fields of practice)	
Sem 7	48260 Engineering Management (core)	48660 Dynamics and Control (fields of practice)	Restricted Choice subject 1' (fields of practice)	Restricted Choice subject 2' (fields of practice)	
Sem 8	Engineering Internship (may be taken in Semesters 6–9)				
Sem 9	48270 Technology Assessment (core)	Sub-major/electives	Sub-major/electives	48670 Engineering Design (fields of practice)	
Sem 10	Capstone Project	Sub-major/electives	Sub-major/electives	Sub-major/electives	

¹ Restricted choice subjects: any two from the following – Energy Applications, Mechanics Applications, Advanced Manufacturing. Engineering Internship shown in Semesters 4 and 8 are 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 our lifestyle. 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 will be given the bases to be able to adapt and learn new discipline areas as they emerge.

Technical skills will be developed in programming, analysis, design, testing, and specification of complex real-time software systems. These will be 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 will 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 42 for a list of available sub-majors.

Software Engineering major – standard program

Sem 1	48220 Informatics (core)	33130 Mathematical Modelling 1 (core)	68037 Physical Modelling (core)	48510 Introduction to Electrical Engineering (fields of practice)	P O R T F O L I O
Sem 2	48210 Engineering for Sustainability (core)	33230 Mathematical Modelling 2 (core)	48520 Electronics (fields of practice)	48430 Software Development (fields of practice)	
Sem 3	48230 Engineering Communication (core)	31514 Computing Theory (fields of practice)	48441 Introductory Digital Systems (fields of practice)	31425 Principles of Software Development B (fields of practice)	
Sem 4	Engineering Internship (may be taken in Semester 3 or 4)				
Sem 5	48240 Uncertainties and Risks in Engineering (core)	31429 Procedural Programming (fields of practice)	48450 Operating Systems (fields of practice)	Elective	
Sem 6	48250 Engineering Economics and Finance (core)	48440 Software Engineering (fields of practice)	31777 Human-Computer Interaction (fields of practice)	Elective	
Sem 7	48075 Engineering Management (core)	31434 Database Design (fields of practice)	48740 Communication Networks (fields of practice)	Elective	
Sem 8	Engineering Internship (may be taken in Semesters 6-9)				
Sem 9	48270 Technology Assessment (core)	31931 Software Quality Assurance (fields of practice)	48475 Software System Analysis (fields of practice)	Elective	
Sem 10	Capstone Project	Capstone Project	48485 Software Systems Design (fields of practice)	Elective	

Engineering Internship shown in Semesters 4 and 8 are 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 multinational to small home businesses have recognised the critical role that effective use of communications and information technologies will play 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 ability to optimise the network interfaces of equipment at the 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

Telecommunications Engineering major – standard program

Sem 1	48210 Engineering for Sustainability (core)	33130 Mathematical Modelling 1 (core)	68037 Physical Modelling (core)	48510 Introduction to Electrical Engineering (fields of practice)	P O R T F O L I O
Sem 2	48220 Informatics (core)	33230 Mathematical Modelling 2 (core)	48720 Introduction to Telecommunications Engineering (fields of practice)	48520 Electronics (fields of practice)	
Sem 3	48230 Engineering Communication (core)	48430 Software Development (fields of practice)	48730 Authentication and System Security (fields of practice)	48530 Circuit Analysis (fields of practice)	
Sem 4	Engineering Internship (may be taken in Semester 3 or 4)				
Sem 5	48240 Uncertainties and Risks in Engineering (core)	48440 Software Engineering (fields of practice)	48540 Signals and Systems (fields of practice)	48441 Introductory Digital Systems (fields of practice)	
Sem 6	48250 Engineering Economics and Finance (core)	48771 Communication Theory (fields of practice)	48770 Signal Processing (fields of practice)	Sub-major/electives	
Sem 7	48260 Engineering Management (core)	48740 Communications Networks (fields of practice)	48780 Mobile Communications (fields of practice) or xxxxx Telecommunications Channels	Sub-major/electives	
Sem 8	Engineering Internship (may be taken in Semesters 6–9)				
Sem 9	48270 Technology Assessment (core)	48450 Operating Systems (fields of practice)	48750 Network Planning and Management (fields of practice)	Sub-major/electives	
Sem 10	Capstone Project	79371 Legal Issues in Telecommunications (fields of practice)	Sub-major/electives	Sub-major/electives	

Engineering Internship shown in Semesters 4 and 8 are for illustration only.

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, and both Mobile Communications and the Capstone Project explore 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.

The major emphasises the learning potential of failure. 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 42 for a list of available sub-majors.

Bachelor of Engineering

- ◆ UTS course code: E007
 - ◆ Testamur title: Bachelor of Engineering
 - ◆ Abbreviation: BE
 - ◆ Course fee: HECS (local)
\$7,650 per semester (international)
-

This course is identical to the BE DipEngPrac 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.

The degree has the same recognition as the BE DipEngPrac, provided graduates have at least 12 weeks of industrial experience in an equivalent setting.

Course program

Students in the Bachelor of Engineering undertake the program as outlined in the Bachelor of Engineering/Diploma in Engineering Practice (page 34) without the Engineering Practice Program component.

Bachelor of Engineering Science

- ◆ UTS course code: E006
 - ◆ Testamur title: Bachelor of Engineering Science
 - ◆ Abbreviation: BEngSc
 - ◆ Course fee: HECS (local)
\$7,650 per semester (international)
-

This course is a shortened version of the BE (E007). Students complete 75 per cent of the BE subjects and graduate after three years.

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

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

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

Bachelor of Engineering Science – Aerospace Operations major

Sem 1	48210 Engineering for Sustainability	33130 Mathematical Modelling 1	68037 Physical Modelling	48610 Introduction to Mechanical Engineering
Sem 2	48220 Informatics	33230 Mathematical Modelling 2	48401 Aerospace Operations 1	48620 Fundamentals of Mechanical Engineering
Sem 3	48230 Engineering Communication	60101 Chemistry and Materials Science	48402 Aerospace Operations 2	48402 Aerospace Operations 2
Sem 4	48240 Uncertainties and Risks in Engineering	48641 Fluid Mechanics	48640 Machine Dynamics	49104 Aerospace Maintenance and Management
Sem 5	48250 Engineering Economics and Finance	48352 Construction Materials (fields of practice)	48351 Structural Analysis and Component Design (fields of practice)	48350 Environmental and Sanitation Engineering (fields of practice)
Sem 6	48260 Engineering Management	48362 Hydraulics and Hydrology (fields of practice)	48361 Behaviour of Structures and Design (fields of practice)	48360 Geotechnical Engineering (fields of practice)

Bachelor of Engineering Science – Civil Engineering major

Sem 1	48210 Engineering for Sustainability	33130 Mathematical Modelling 1	68037 Physical Modelling	48310 Introduction to Civil Engineering
Sem 2	48220 Informatics	33230 Mathematical Modelling 2	48321 Statics & Introduction to Design Process	48320 Surveying
Sem 3	48230 Engineering Communication	60101 Chemistry and Materials Science	48331 Mechanics of Solids	48330 Soil Behaviour
Sem 4	48240 Uncertainties and Risks in Engineering	48641 Fluid Mechanics	48341 Structural Mechanics and Component Design	48340 Construction
Sem 5	48250 Engineering Economics and Finance	48352 Construction Materials	48351 Structural Analysis and Component Design	48350 Environmental and Sanitation Engineering
Sem 6	Elective	Elective	Elective	Elective

Bachelor of Engineering Science – Civil and Environmental Engineering major

Sem 1	48210 Engineering for Sustainability	60101 Chemistry and Materials Science	91150 Biology and Ecology	48310 Introduction to Civil Engineering
Sem 2	48220 Informatics	33130 Mathematical Modelling 1	68037 Physical Modelling	48820 Introduction to Environmental Engineering
Sem 3	48230 Engineering Communication	33230 Mathematical Modelling 2	48321 Statics and Introduction to Design Process	48340 Construction
Sem 4	48240 Uncertainties and Risks in Engineering	48331 Mechanics of Solids	48840 Water Supply and Wastewater Engineering	48641 Fluid Mechanics
Sem 5	48250 Engineering Economics and Finance	48330 Soil Behaviour	48352 Construction Materials	48850 Environmental Planning and Law
Sem 6	Elective	Elective	Elective	Elective

Bachelor of Engineering Science – Computer Systems major

Sem 1	48210 Engineering for Sustainability	33130 Mathematical Modelling 1	68037 Physical Modelling	48510 Introduction to Electrical Engineering
Sem 2	48220 Informatics	33230 Mathematical Modelling 2	48610 Introduction to Mechanical Engineering	48520 Electronics
Sem 3	48230 Engineering Communication	48430 Software Development	48531 Electromechanical Systems	48530 Circuit Analysis
Sem 4	48240 Uncertainties and Risks in Engineering	48440 Software Engineering	48441 Introductory Digital Systems	Elective
Sem 5	48250 Engineering Economics and Finance	48450 Operating Systems	48451 Advanced Digital Systems	Elective
Sem 6	48540 Signals & Systems	48740 Communication Networks	Elective	Elective

Bachelor of Engineering Science – Electrical Engineering major

Sem 1	48210 Engineering for Sustainability	33130 Mathematical Modelling 1	68037 Physical Modelling	48510 Introduction to Electrical Engineering
Sem 2	48220 Informatics	33230 Mathematical Modelling 2	48610 Introduction to Mechanical Engineering	48520 Electronics
Sem 3	48230 Engineering Communication	48430 Software Development	48531 Electromechanical Systems	48530 Circuit Analysis
Sem 4	48240 Uncertainties and Risks in Engineering	68038 Advanced Mathematics and Physics	48441 Introductory Digital Systems	48540 Signals and Systems
Sem 5	48250 Engineering Economics and Finance	48550 Electrical Energy Technology	48451 Advanced Digital Systems	48551 Advanced Electronics
Sem 6	Elective	Elective	Elective	Elective

Bachelor of Engineering Science – Mechanical Engineering major

Sem 1	48210 Engineering for Sustainability	33130 Mathematical Modelling 1	68037 Physical Modelling	48610 Introduction to Mechanical Engineering
Sem 2	48220 Informatics	33230 Mathematical Modelling 2	48621 Manufacturing Engineering	48620 Fundamentals of Mechanical Engineering
Sem 3	48230 Engineering Communication	60101 Chemistry and Materials Science	48331 Mechanics of Solids	48510 Introduction to Electrical Engineering
Sem 4	48240 Uncertainties and Risks in Engineering	48641 Fluid Mechanics	48640 Machine Dynamics	48642 Strength of Engineering Materials
Sem 5	48250 Engineering Economics and Finance	48651 Thermodynamics	48531 Electromechanical Systems	48650 Mechanical and Manufacturing Design
Sem 6	Elective	Elective	Elective	Elective

Bachelor of Engineering Science – Software Engineering major

Sem 1	48220 Informatics	33130 Mathematical Modelling 1	68037 Physical Modelling	48510 Introduction to Electrical Engineering
Sem 2	48210 Engineering for Sustainability	33230 Mathematical Modelling 2	48430 Software Development	48520 Electronics
Sem 3	48230 Engineering Communication	34129 Procedural Programming	31425 Principles of Software Development	48510 Introduction to Electrical Engineering
Sem 4	48240 Uncertainties and Risks in Engineering	31514 Computing Theory	48450 Operating Systems	Elective
Sem 5	48250 Engineering Economics and Finance	48440 Software Engineering	31862 Principles of Human Computer Interaction	Elective
Sem 6	31434 Database Design	48740 Communications Networks	Elective	Elective

Bachelor of Engineering Science – Telecommunications Engineering major

Sem 1	48210 Engineering for Sustainability	33130 Mathematical Modelling 1	68037 Physical Modelling	48510 Introduction to Electrical Engineering
Sem 2	48220 Informatics	33230 Mathematical Modelling 2	48720 Introduction to Telecommunications Engineering	48520 Electronics
Sem 3	48230 Engineering Communication	48430 Software Development	48730 Authentication and System Security	48530 Circuit Analysis
Sem 4	48240 Uncertainties and Risks in Engineering	48440 Software Engineering	48441 Introductory Digital Systems	48540 Signals and Systems
Sem 5	48250 Engineering Economics and Finance	31514 Computing Theory	48770 Signal Processing	48740 Communications Network
Sem 6	Elective	Elective	Elective	Elective

COMBINED DEGREE COURSES

Bachelor of Engineering, Graduate Certificate in Engineering Practice

- ◆ *Course code: E004*
- ◆ *Testamur title: Bachelor of Engineering
Graduate Certificate in Engineering Practice*
- ◆ *Abbreviation: BE*
- ◆ *Course fee: HECS (local)
\$7,650 per semester (international)*

Students enrolled in the BE DipEngPrac, who have more extensive and advanced experience of engineering internship than would normally be attained in two six-month periods or internship, may be eligible to transfer to the combined award of BE and Graduate Certificate in Engineering Practice.

This opportunity would normally become available on completion of the first period of enrolled internship, 48110 Engineering Practice 1, and the associated review subject, 48122 Engineering Practice Preview 1. During these subjects, a student may have demonstrated a level of experience, work-based competency and professional formation equal to (or beyond) that required for the Diploma in Engineering Practice – that is, the level required in 48130 Engineering Practice 2 and 48142 Engineering Practice Preview 2. For this to be possible, students would normally have to have been employed for a substantial period in an organisation that allowed them to practise at professional or near-professional level. In this event, the student would be invited to enrol for their second period of recognised work experience in the subject Professional Experience, and to undertake the associated review subject Professional Review.

These subjects support learning during advanced workplace experiences at professional level. They assist development as a professional engineer by evaluating employment and practice-related issues, developing high-level communication, documentation and review skills, and facilitating preparation of the candidate's personal portfolio for assessment of competencies towards professional registration.

The award of Graduate Certificate in Engineering Practice requires completion of:

48121	Engineering Practice Preview 1	3cp
	<i>or</i>	
48141	Engineering Practice Preview 2	3cp
48110	Engineering Practice 1 (Minimum 22 weeks' work experience)	0cp
	<i>or</i>	
48130	Engineering Practice 2 (Minimum 22 weeks' work experience)	0cp
48122	Engineering Practice Review 1	3cp
	<i>or</i>	
48142	Engineering Practice Review 2	3cp
48150	Professional Experience (Minimum 22 weeks' work experience)	0cp
48160	Professional Review	tba

plus

two subjects, totalling 12 credit points, from an approved list of postgraduate Engineering subjects – these would normally be undertaken as part of the Electives component

and

all other requirements for the award of BE DipEngPrac.

Again, UTS expects to negotiate with the Institution of Engineers, Australia, full credit for the Graduate Certificate towards NPER-3 registration (refer to Professional Recognition in the section describing the BE DipEngPrac).

A student who has been admitted to UTS with advanced standing engineering practice, and who has not been required to enrol in Engineering Practice 1 and Engineering Practice Preview 1, should seek advice from the Associate Dean, Undergraduate Programs or from the Program Head of the Engineering Practice Program.

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)
\$7,650 per semester (international)

Offered jointly by the Faculty of Engineering and the University's Institute for International Studies, this program leads to the combined degrees of Bachelor of Engineering/Bachelor of Arts in International Studies, and the Diploma in Engineering Practice. All majors in the BE DipEngPrac are also available in this combined degree, refer to page 44.

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.

The program links the BE DipEngPrac with the study of a language and culture other than English. The Institute for International Studies makes the arrangements for students to spend two semesters of In-country Study at an institution of higher education in the country of their major. The cost 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 otherwise have been allocated towards the student's tuition and travel will be 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.

In second and third year, students undertake extensive preparation in the language and culture of the country they will visit for their In-country Study. The first semester is spent

BE (any major), BA in International Studies, DipEngPrac – standard program

Sem 1	48210 Engineering for Sustainability	33130 Mathematical Modelling 1	68037 Physical Modelling 1	Fields of practice subject	P O R T F O L I O
Sem 2	48220 Informatics	33230 Mathematical Modelling 2	Fields of practice subject	Fields of practice subject	
Sem 3	Fields of practice subject	Fields of practice subject	50140 Comparative Social Change (8cp)	971xxx Language and Culture 1 (8cp)	
Sem 4	Engineering Internship			972xxx Language and Culture 2 (8cp)	
Sem 5	48240 Uncertainties and Risks in Engineering	Fields of practice subject	Fields of practice subject	973xxx Language and Culture 3 (8cp)	
Sem 6	Fields of practice subject	Fields of practice subject	976xxx Contemporary Society (8cp)	974xxx Language and Culture 4 (8cp)	
Sem 7	977xxx In-country Study 1 (24cp)				
Sem 8	978xxx In-country Study 2 (24cp)				
Sem 9	48250 Engineering Economics and Finance	Fields of practice subject	Fields of practice subject	Fields of practice subject	
Sem 10	Engineering Internship				
Sem 11	48075 Engineering Management	Fields of practice subject	Fields of practice subject	Fields of practice subject	
Sem 12	Capstone Project	Fields of practice subject			

Note: All subjects are 6 credit points unless otherwise stated. Core 8 (48cp); Majors – International Studies (90cp); Capstone (6cp); Engineering Practice 2 (12cp); and Bachelor of International Studies (96cp).

studying the language and culture of the host country. In the second semester students continue their language and culture studies, and if their language proficiency is adequate, they undertake study in cultural subjects at the host university.

Each student in the program spends a full year of studying at a university overseas, normally in their fourth year of enrolment.

Some students also 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.

Admission

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.

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

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

Attendance and 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.

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 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. Engineering and International Studies are interwoven throughout the program, and the combined degree is awarded on completion. It is not possible to take the BA 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 BE DipEngPrac.

In second and third year, the program includes a sequence of four preparatory subjects in the Language and Culture of the country selected by each student. The overseas year includes further intensive exposure to the language and the culture of their selected specialisation at a host university. UTS has partner universities and industry contacts in several countries, and is steadily extending the network.

For the purpose of calculating HECS, the course is deemed equivalent to five years of full-time academic study. No tuition fees are payable to overseas universities.

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

In the International Studies Program, students focus on one of the following countries or majors: Argentina, Chile, China, France, Germany, Indonesia, Italy, Japan, Malaysia, Mexico, Russia, Spain and Thailand. The availability of the Russian major is currently being reviewed. 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 Greece, Hong Kong, Korea, Poland, Taiwan and Vietnam.

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 would need 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.

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)
\$7,650 per semester (international)

This five-year program, offered jointly by the Faculty of Engineering and the Faculty of Business, leads to a double degree (two testamurs): Bachelor of Engineering/Bachelor of Business. Admission to the course gives students the right to undertake the engineering degree in any of the majors on offer (presently Civil, Civil and Environmental, Computer Systems, Electrical, Environmental Systems, Mechanical, Software or Telecommunications) and similarly the business degree with any major (Accounting, Banking, Finance, Information Technology, International Business, Management, Marketing, Sports Management, and Tourism).

The purpose of the course is to provide students willing to take on the challenge of a five-year program 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 integrated into the engineering academic program through the subjects 48122 Engineering Practice Preview 1, 48110

Engineering Practice 1 and 48122 Engineering Practice Review 1. Students will, if they wish, be able to gain the award BE BBus DipEngPrac by undertaking one further semester of integrated work experience. 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.

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.

BE (any major), BBus (any major) – standard program

Sem 1	48210 Engineering for Sustainability	33130 Mathematical Modelling 1	68037 Physical Modelling	48xxx Introduction to	25115 Economics for Business
Sem 2	48220 Informatics	33230 Mathematical Modelling 2	Fields of practice subject ²	Fields of practice subject	
Sem 3	48230 Engineering Communication	24108 Marketing Foundations	79203 Business Law and Ethics	22107 Accounting for Business	
Sem 4	48240 Uncertainties and Risks in Engineering	Fields of practice subject	Fields of practice subject	Fields of practice subject	2xxxx Business core elective 1
Sem 5	48260 Engineering Management	Fields of practice subject	Fields of practice subject	Fields of practice subject	2xxxx Business core elective 2
Sem 6	48121 Engineering Practice Preview 1	Fields of practice subject	Fields of practice subject	2xxxx Business core elective 3	2xxxx Business major 1
Sem 7	Engineering experience semester				
Sem 8	48122 Engineering Practice Review 1	Fields of practice subject	Fields of practice subject	2xxxx Business major 2	2xxxx Business major 3
Sem 9	Fields of practice subject	Fields of practice subject	Fields of practice subject	2xxxx Business major 4	2xxxx Business major 5
Sem 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.

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

- ✦ *Course code: E008*
- ✦ *Testamur title: Bachelor of Engineering
Bachelor of Business
Diploma in Engineering Practice*
- ✦ *Abbreviation: BE BBus DipEngPrac*
- ✦ *Course fee: HECS (local)
\$7,650 per semester (international)*

This course 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. The standard course can be completed in five-and-a-half years. The BE BBus DipEngPrac program requires a total of 252 credit points of academic subjects, including the engineering internship component.

Bachelor of Engineering, Bachelor of Science

- ✦ *Course code: N012*
- ✦ *UAC code: 609360*
- ✦ *Testamur titles: Bachelor of Engineering
in (name of engineering major)
Bachelor of Science in
(name of science major)*
- ✦ *Abbreviations: BE BSc*
- ✦ *Course fee: HECS (local)
\$7,250 per semester (international)*

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. This combined degree program (two testamurs) is 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.

This combined degree course enables students to combine a Bachelor of Engineering in any one of the offered majors (Civil, Civil and Environmental, Computer Systems, Construction (subject to approval), Electrical, Mechanical, Software or Telecommunications) with a Bachelor of Science (with a major in Applied Physics, Applied Chemistry, Materials, Earth Science, Biomedical Science, Biotechnology or Environmental Biology).

The course is 240 credit points, 162 of which consist of the non-elective subjects of the Bachelor of Engineering and 78 credit points consisting of subjects from the Faculty of Science (science subjects are dependent on the chosen science major. Students may progress through the course taking subjects in any sequence provided prerequisites are met.

The nominal completion time is five years. The course allows students to graduate with the separate degrees of Bachelor of Engineering or Bachelor of Science, once the requirements of either degree are met.

Bachelor of Engineering, Bachelor of Medical Science

- ◆ UTS course code: N013
- ◆ UAC code: 609370
- ◆ Testamur titles: *Bachelor of Engineering
Bachelor of Medical Science*
- ◆ Abbreviations: *BE BMedSc*
- ◆ Course Director: *Associate Professor
Rod Buckney*
- ◆ Course fee: *HECS (local)
\$7,250 per semester (international)*

This combined degree (two testamurs) is similar to the Bachelor of Engineering/Bachelor of Science course N012. For further details, consult this course and the UTS website.

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

- ◆ Course code: *tba*
- ◆ Testamur titles: *Bachelor of Engineering
in (name of engineering major)
Diploma in Engineering Practice
Bachelor of Science in
(name of science major)*
- ◆ Abbreviations: *BE BSc DipEngPrac*
- ◆ Course fee: *HECS (local)
\$7,250 per semester (international)*

This combined degree 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.

Bachelor of Engineering Science, Bachelor of Laws¹

- ◆ Course code: *tba*
- ◆ Testamur title: *Bachelor of Engineering
in (name of engineering major)
Bachelor of Laws*
- ◆ Abbreviation: *BEngSc LLB*
- ◆ Course fee: *HECS (local)
\$7,650 per semester (international)*

This combined degree 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 every growing demand for legal services in areas in which an in-depth appreciation of complex technical matters by the legal team is essential.

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

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.

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. Although the standard pattern of study takes five-and-half years, most students would be able to complete the course at accelerated rate in five years or less.

¹ Subject to approval.

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 program

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 44 and following).

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
48220	Informatics	6cp

Stage 3 Autumn semester

70311	Law of Tort	8cp
70616	Federal Constitutional Law	8cp
48230	Engineering Communication	6cp
<i>plus</i>		
xxxxx	Subjects taken from field of practice set for chosen major	6cp

Stage 4 Spring semester

70318	Personal Property	4cp
70317	Real Property	8cp
33230	Mathematical Modelling 2	6cp
<i>plus</i>		
xxxxx	Subjects taken from field of practice set for chosen major	6cp

Stage 5 Autumn semester

70417	Corporate Law	8cp
70617	Administrative Law	8cp
48240	Uncertainties and Risks in Engineering	6cp
<i>plus</i>		
xxxxx	Subjects taken from field of practice set for chosen major	6cp

Stage 6 Spring semester

70516	Equity and Trusts	8cp
76xxx	Elective subject 1 (Faculty of Law)	6cp
<i>plus</i>		
xxxxx	Subjects taken from field of practice set for chosen major	12cp

Stage 7 Autumn semester

71216	Law of Evidence	6cp
71005	Practice and Procedure	4cp
<i>plus</i>		
xxxxx	Subjects taken from field of practice set for chosen major	12cp

Stage 8 Spring semester

71116	Remedies	6cp
76xxx	Elective subject 2 (Faculty of Law)	6cp
48250	Engineering Economics and Finance	6cp
<i>plus</i>		
xxxxx	Subjects taken from field of practice set for chosen major	6cp

Stage 9 Autumn semester

76xxx	Elective subject 3 (Faculty of Law)	6cp
76xxx	Elective subject 4 (Faculty of Law)	6cp
<i>plus</i>		
xxxxx	Subjects taken from field of practice set for chosen major	12cp

Stage 10 Spring semester

	Practical Legal Training (PLT)	24cp
<i>or</i>		
	Four Law electives	24cp

Stage 11 Autumn semester

xxxxx	Subjects taken from field of practice set for chosen major	12cp
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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 socio-economic 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 such as the following:

- 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
- Pontificia 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 both 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 introduction to the contemporary societies, politics, economics and culture of the countries of East Asia and South-East Asia, Latin America and Europe that are the areas of specialisation of the Institute. 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.

Further information is available from the 2001 handbook for the Institute for International Studies, or through the Faculty's Director, International Engineering Program.

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 2000, approximately 80 research students and 560 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 and location of facilities

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.

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

For courses in Groundwater Management, please contact

Professor Michael Knight
 room 1715, level 17, Building 1
 telephone (02) 9514 1984
 fax (02) 9514 1985
 email groundwater.management@uts.edu.au
<http://groundwater.ncgm.uts.edu.au/ncgm>

The UPO offices are located in level 7 of 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
 10 a.m. – 5.30 p.m., Monday to Thursday,
 and 10 a.m. – 5 p.m., Friday.

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

UPO Staff

Ms Lyn Smith
 (secondment until May 2001)
 telephone (02) 9514 2606
 fax (02) 9514 2611
 email lyn.smith@uts.edu.au

Ms Kay Johnston
 telephone (02) 9514 2669
 fax (02) 9514 2611
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Ms Lana Venglinsky
 telephone (02) 9514 2624
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 email lane.venglinsky@uts.edu.au

Director, Postgraduate Coursework Program

Associate Professor Tom Anderson
 telephone (02) 9514 2639
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 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

Coordinators, postgraduate coursework programs	Location	Telephone
Control Engineering Associate Professor H T Nguyen	1/2429	2451
Energy Planning and Policy Associate Professor D Sharma	2/521	2422
Engineering Management Associate Professor T Anderson	2/7088	2639
Environmental Engineering Dr P Hazelton	2/512	2661
Groundwater Management Professor M Knight	1/1715	2692
Information Systems Engineering Associate Professor D Lowe	2/7100	2526
Local Government Engineering Mr K J Halstead	2/522	2640
Local Government Management Mr Rob Mellor	1/1714	2595
Manufacturing Engineering and Management Dr G Hong	2/619	2677
Software Engineering Mr J R M Leaney	1/221A	2389
Structural Engineering Professor B Samali	2/511B	2023
Telecommunications Engineering Dr R Braun	1/2424	2460
Water Engineering Dr S Beecham	2/507	2623

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

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 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 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
- 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 our 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
- 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, soils and foundation engineering/science, water engineering, road materials, 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 and earthquake engineering.

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.

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

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.

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.

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.

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.

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

The Faculty of Engineering supports several centres, which also research opportunities in engineering and related fields. These include:

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 and Optus Communications, 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 sub-systems.

Inquiries may be made to:

Associate Professor Sam Reisenfeld
Director, UTS CRCSS Program

Faculty of Engineering
room 1/2512, Building 1, City campus
telephone (+61 2) 9514 2448
fax (+61 2) 9514 2435
email sam.reisenfeld@uts.edu.au

Dr Ananda Mohan Sanagavarapu
(nee Ananda S Mohan)
Telecom Group, Faculty of Engineering
University of Technology, Sydney
Building 1, City campus

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

University Centre for Electro-Mechanical Systems and Power Electronics

The group 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)
- 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
- 40kW brushless motor controllers and battery chargers for 105-seat hybrid electric ferry.

Inquiries should be directed to:

Dr Joe Zhu
 Director, Academic Programs, CEMPE
 Faculty of Engineering
 room 1/1823, City campus
 telephone (+61 2) 9514 2318
 fax (+61 2) 9514 2435
 email joe.zhu@uts.edu.au
 www.eng.uts.edu.au/~joe/

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:

Dr Joe Zhu
 Director, Academic Programs, CEMPE
 Faculty of Engineering
 telephone (+612) 9514 2318
 fax (+612) 9514 2435
 email joe.zhu@uts.edu.au
 www.phys.murdoch.edu.au/acre/

Centre for Built Infrastructure Research

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 existing 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 should be directed to:

Professor Bijan Samali
 room 2/511B, City Campus
 telephone (+61 2) 9514 2023
 fax (+61 2) 9514 2633
 email bijan.samali@uts.edu.au
 www.cbir.uts.edu.au

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, neurological disorder and cancer.

Inquiries may be made to:

Associate 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 will concentrate 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
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

Key Faculty Research Strength in Intelligent Transport Systems

The research plan for the centre has three key research beacons focused on the ultimate goal of developing technologies for Integrated Traveller Services and Control Systems. The beacons, Integrated Positioning/Communications Systems, Advanced Traveller Services, 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/

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 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:

Dr 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

National Centre for Groundwater Management

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
room 1715, Building 1, City campus
telephone (+61 2) 9514 1984
fax (+61 2) 9514 1985
email groundwater.management@uts.edu.au
<http://groundwater.ncgm.uts.edu.au/ncgm/>

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
room 1714, Building 1, City campus
telephone (+61 2) 9514 1689
fax (+61 2) 9514 2274
email graham.sansom@uts.edu.au
www.clg.uts.edu.au/index.html

Australian Graduate School of Engineering Innovation (AGSEI)

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, multi-disciplinary 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, 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 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
room 1230, Building 1, City campus
telephone (+61 2) 9514 2224
fax (+61 2) 9514 2219
email gbs@phys.uts.edu.au

Institute for Coastal Resource Management

Inquiries should be made directly to the Faculty of Science.

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 \$200 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.

Applications for admission

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 Diplomas 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 will be accepted at any time and applicants advised of a decision soon after.

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 of the time they hope to commence their research, following discussion of research possibilities with potential supervisors. Please 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 will be determined principally on the basis of information supplied in the application.

Applications must be submitted to UTS Student Info & Admin Centre, refer to page 6 of this handbook for contact details.

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 2001. 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 will be 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 6 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 will not be 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: freecall 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 2001 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.

Charges and fees

Service fees

All students are required to pay compulsory student service fees. For further information, see page 7 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. Currently, some students studying for higher degrees by research are exempt from these requirements.

Students admitted to the Faculty of Engineering in 2001 will be required to pay course fees, according to a schedule which will be available late in 2000. 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 2000 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.

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 Charges.

Information for 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 2001 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

Students wishing to undertake full-time study leading to the award of a Master's or PhD degree may be eligible for a scholarship at UTS. Scholarships available are listed below:

Scholarships for research programs

- Australian Postgraduate Award (Research)
- University Doctoral Research Scholarship
- R L Werner Postgraduate Research Scholarship

Scholarships for study overseas

Please contact the UTS Graduate School.

Overseas Postgraduate Research Scholarship Scheme

Citizens from all overseas countries (excluding New Zealand) are eligible. Further information and application forms are available from the International Programs Office. Further information may be obtained from the Postgraduate Studies and Scholarships Office, University Graduate School.

Semester patterns

The Academic Year of the University for 2001 is divided into two main semesters:

- Autumn: 5 March – 15 June
- Spring: 30 July – 9 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 UPO in April for initial advice.

Research candidates may commence their studies at any time during the year.

Enrolment

Enrolment for postgraduate programs involving coursework takes place in February for the Autumn semester, and in July for the 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.

Attendance and academic credit

Attendance patterns for postgraduate coursework degrees in any year will 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. 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.

Duration of courses

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 four semesters' duration on a full-time basis, or six 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 degree 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 governing the courses

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 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.

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.

Advanced standing

Advanced standing is granted in accordance with the University rules described in the *2001 UTS Calendar*. 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 will not normally be 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 UPO, together with supporting documentation including relevant subject syllabi.

Advice will be 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.

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: HECS exempt¹ (local)
\$7,500 per semester (international)*

The degree of Doctor of Philosophy 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 from 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.

Duration and candidature

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. 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.

¹ Under current policies, Australian-resident candidates commencing a UTS doctoral course through the Faculty of Engineering in 2001 will be exempt from HECS payments for studies completed in minimum time.

Students permitted to extend their candidature beyond the maximum time may be required to pay a fee to the University.

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.

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 3.5.7.

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.

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. 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*.

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

In addition to the completed application form and supporting documentation, applicants must submit a covering letter indicating (a)

why they wish to undertake the program and (b) the names, addresses and telephone numbers of two professional referees. The application and/or the letter must indicate (c) the proposed research topic and (d) 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 (e) any evidence of ability to conduct research and to complete a substantial project.

For part-time candidature, the application must also include (f) a statement from the applicant's employer, indicating the level of the employer's support for the application, and (g) 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 will not be accepted.

Applications for PhD candidature are accepted at any time and are not subject to set closing dates (although their acceptance may be subject to admission quotas and to resource availability).

Research areas – inquiries

Initial inquiries 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

Associate Professor Rod Belcher
Associate Dean Research and Development
room 2/511, level 5, Building 2
telephone (+61 2) 9514 2423
fax (+61 2) 9514 2633
email rod.belcher@uts.edu.au

Civil and Structural Engineering

Professor Bijan Samali
room 2/511B, level 5, Building 2
telephone (+61 2) 9514 2023
fax (+61 2) 9514 2633
email bijan.samali@uts.edu.au

Computer Systems Engineering

Dr Kit-Ka Fung
room 1/2225, level 22, Building 1
telephone (+61 2) 9514 2394
fax (+61 2) 9514 2435
email kkf@eng.uts.edu.au

Electrical Engineering

Dr Joe Zhu
room 1/1823, level 18, Building 1
telephone (+61 2) 9514 2318
fax (+61 2) 9514 2435
email joe.zhu@uts.edu.au

Engineering Practice Management

Associate Professor Deepak Sharma
telephone (+61 2) 9514 2422
fax (+61 2) 9514 2633
email deepak.sharma@eng.uts.edu.au

Environmental Engineering

Dr Prasanthi Hagare
room 2/520, level 5, Building 2
telephone (+61 2) 9514 1952
fax (+61 2) 9514 2633
email prasanthi.hagare@uts.edu.au

Mechanical and Manufacturing Engineering

Dr Guang Hong
room 2/619, level 6, Building 2
telephone (+61 2) 9514 2677
fax (+61 2) 9514 2633
email guang.hong@uts.edu.au

Telecommunications Engineering

Dr Ananda Mohan Sanagavarapu
room 1/2512A
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
room 1/1715, level 17, Building 1
telephone (+61 2) 9514 1984
fax (+61 2) 9514 1985
email groundwater.management@uts.edu.au
<http://groundwater.ncgm.uts.edu.au/ngcm/>

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, Scholarships and
 Industrial Liaison
 Office of the Associate Dean
 Research and Development
 room 511, level 6, Building 2
 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: HECS (local)
 \$7,500 per semester (international)*

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.

For Master's students there will be 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 will be conducted in accordance with University Rule 3.4.15.

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.

Duration and candidature

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. For full-time candidates, the program is normally of at least four semesters' duration from the time of registration as a Master's degree candidate. For part-time candidates, duration is normally at least six semesters. Candidates who are specially qualified in the relevant discipline may be allowed to complete the program in less than the minimum time.

Admission requirements

To qualify for admission to candidature for 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*.

Research areas – inquiries

Initial inquiries may be made with the:

Administrative Officer
 Research, Scholarships and
 Industrial Liaison
 Office of the Associate Dean
 Research and Development
 room 511, level 6, Building 2
 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 78).

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 will be allowed to enrol when places are available.

Master of Engineering Management

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- ◆ *Course code: EP85*
 - ◆ *Testamur title: Master of Engineering Management*
 - ◆ *Abbreviation: MEM*
 - ◆ *Course fee: \$9,600 (local)
\$7,000 per semester (international)*
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The Master of Engineering Management program places a greater emphasis on the interface between technology and management than does the traditional MBA. Whilst 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.

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 to the 2001 handbook for the Faculty of Business.

Duration

The course requires 48 credit points of study. The program is structured for evening attendance, block attendance or distance mode. Extra intensive classes may be held in the university breaks. 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.

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.

Course structure

Core

A minimum of 36 credit points must be completed from the following subjects:

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

Electives

The remaining 6–12 credit points of electives may be completed from the following:

49050	Graduate Project	12cp
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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.

UTS subjects are generally presented in the evenings. Apart from 49004, all the subjects named above are available in distance mode if requested.

MBA (Engineering Management and Policy)

The Faculty of Business, in cooperation with the Faculty of Engineering offers a version of the MBA suitable for engineering managers. It is structured in the following way:

Business Administration Core

21718	Organisation Analysis and Design	6cp
21813	Managing People	6cp
25706	Economics for Management	6cp
22747	Accounting for Managerial Decisions	6cp
24734	Managerial Marketing	6cp
25742	Financial Management	6cp
21720	Employment Relations	6cp
21715	Strategic Management	6cp

Engineering Management and Policy major – any eight of the following subjects

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

This degree may be entered directly through the Faculty of Business or after completing a Faculty of Engineering MEM or 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.

Master of Environmental Engineering Management

- ◆ *Course code: EP89*
- ◆ *Testamur title: Master of Environmental Engineering Management*
- ◆ *Abbreviation: MEEM*
- ◆ *Course fee: \$9,600 (local)
\$7,000 per semester (international)*

The Master of Environmental Engineering Management 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.

Duration

The course requires 48 credit points of study. The program is structured for evening attendance, block attendance or distance mode. 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.

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.

Course structure

Group A

A minimum of 36 credit points must be completed 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

A minimum of 12 credit points must be completed 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

The Graduate Certificate in Environmental Engineering and Management consists of subjects 49121, 49122, 49123 and 49124.

Master of Engineering in Groundwater Management

- ◆ *Course code: E057*
- ◆ *Testamur title: Master of Engineering in Groundwater Management*
- ◆ *Abbreviation: ME*
- ◆ *Course fee: HECS (local) \$7,250 per semester (international)*

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.

Duration

The course is structured on a block attendance pattern and laboratory work during Autumn semester and project work during Spring semester. The course is offered on a full-time and part-time basis.

The course is also available in distance mode which has an additional residential component.

Admission requirements

Applicants must possess a degree in engineering from UTS or an equivalent qualification. Applicants are required to submit a curriculum vitae.

Course structure

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
	Elective 1	6cp
	Elective 2	6cp

Semester 2 – Spring

44152	Groundwater Engineering Project F/T	24cp
44156	Groundwater Engineering Project P/T	12cp

Electives available

66018	Groundwater Geophysics	6cp
66025	Contaminated Site Management	6cp
	An approved subject offered elsewhere	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) \$6,000 per semester (international)*

This course is designed for students working in the area of groundwater resource management.

Duration

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 distance mode and has a similar residential component to the Master's course.

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.

Course structure

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
	Elective 1	6cp
	Elective 2	6cp

Semester 2 – Spring

44153	Groundwater Engineering Project F/T	12cp
44157	Groundwater Engineering Project P/T	6cp

Electives

As for Master of Engineering in Groundwater Management course.

Attendance

The course is offered on a block or distance mode attendance pattern and students may extend their enrolment over more than one year.

Graduate Certificate in Environmental Engineering Management

- ◆ *Course code: EP54*
- ◆ *Testamur title: Graduate Certificate in Environmental Engineering and Management*
- ◆ *Abbreviation: none*
- ◆ *Course fee: \$4,800 (local)
\$7,000 per semester (international)*

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 will develop a background and competence in environmental management.

More specifically, it will develop an awareness of understanding the human impact on the environment with respect to waste minimisation and water quality management. It will develop professional skills required to work as part of an integrated team responsible for environmental planning and management.

Duration

This course is offered on a block attendance pattern of study or by distance. The normal attendance pattern is based on two subjects per semester requiring a minimum of two semesters to complete the course.

Admission requirements

Normal educational qualification for admission is a Bachelor's degree in engineering, science, design, architecture, building, surveying or planning. Equivalent qualifications will be considered on their merits.

Provisional admission for graduates from disciplines other than those above will be available provided their education contained an adequate introduction to mathematics and physical sciences.

Articulation with Master's program

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.

Course structure

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

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.

Graduate Certificate in Engineering Management

- ◆ *Course code: EP57*
 - ◆ *Testamur title: Graduate Certificate in Engineering Management*
 - ◆ *Abbreviation: none*
 - ◆ *Course fee: \$4,800 (local)
\$7,000 per semester (international)*
-

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.

Duration

The course requires 24 credit points of study. Subjects may be taken in the evening or by distance mode over one or two semesters.

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.

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 BE 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.

Course structure

Twenty-four credit points of study is required. A minimum of 18 credit points comes from the core of the MEM and the remainder from the core or electives.

COURSEWORK AWARDS – GENERAL

An extensive range of coursework programs is available through the Faculty, leading to the general awards of Master of Engineering (by coursework), Master of Technology, Master of Engineering Practice, Graduate Diploma in Engineering, and Graduate Certificate in Engineering.

Master of Engineering (by coursework)

- ✦ *Course code: EP81*
- ✦ *Testamur title: Master of Engineering*
- ✦ *Abbreviation: ME*
- ✦ *Course fee: \$12,000 (local)
\$5,833 per semester (international)*

Course aims

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 or Graduate Diploma) to a Master's level award.

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.

The credit point requirement for course completion is 60 credit points (see below).

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 BE degree at UTS.

Applications for admission by internal transfer of candidature from a Graduate Certificate or Graduate Diploma in Engineering 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.

Degree requirements and 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 will be recognised on the candidate's academic record.

Subjects selected shall be 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 50 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 shall generally be 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 will lie within the range 18–24 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 shall be 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 24 credit points.

Program and subject availability

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 UPO.

Subjects offered by the Faculty of Engineering available to ME 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 UPO 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, will normally be granted in circumstances where an equivalent subject is not available through UTS.

Prior to undertaking the Graduate Project, each candidate will be required to submit a comprehensive project definition, as a basis from which the objectives and scope of the work will be agreed, together with the credit point value to be given to the project.

Assessment

The award of the degree will be ungraded.

In existing UTS subjects, assessment procedures will be as already established or as modified by the appropriate authority from time to time.

Emphasis will be placed where appropriate on self-directed experiential learning and criterion-referenced assessment in the development and review of the Faculty's postgraduate subjects.

Supervision of Graduate Project

Responsibility for supervision of the Graduate Project for the degree will rest 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 will 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 UPO.

Master of Technology

- ◆ *Course code: EP71*
- ◆ *Testamur title: Master of Technology*
- ◆ *Abbreviation: MTech*
- ◆ *Course fee: \$12,000 (local)
\$5,833 per semester (international)*

Course aims

The course provides a qualification at Master's level, in engineering or engineering-related areas, for persons professionally qualified as engineering technologists or as practitioners in fields related to engineering. It also provides a qualification at Master's level in areas combining engineering with another discipline.

The course offers program flexibility combined with opportunities for articulation from a sub-master's (Graduate Certificate/Graduate Diploma) to a Master's level award. Each individual program should be designed to build on the candidate's previous qualifications and experience, either to develop a particular field of technology in depth or to explore relationships and interdependencies between technology, engineering, and other disciplines and professions. The completion of subjects and project work at advanced level is central to these objectives.

In some individual cases, the course may provide opportunity to satisfy the educational requirements set by the Institution of Engineers, Australia, for registration as a professional engineer. In this regard, detailed advice should be sought before enrolment.

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.

Admission requirements

An applicant for admission to candidature for the Master of Technology degree shall either:

1. hold the degree of Bachelor of Engineering from UTS or the New South Wales Institute of Technology, or
2. hold a Bachelor or Honours degree from UTS or NSWIT, requiring four years' full-time study for completion, in a cognate discipline (such as Applied Science, Computing Building), or
3. hold a Bachelor or Honours degree or equivalent from another higher education institution, deemed to be equivalent to 1 or 2 above.

and shall have a minimum of three years practical experience, at a level commensurate with the above qualifications, in capacities that have involved close contact with engineering.

Applicants who have completed a first degree requiring less than four years' full-time study are required to undertake a period of academic preparation, equivalent to the requirements applying to the award of a Graduate Diploma. Prior learning from continuing professional education, professional experience and professional achievement is taken into account.

In selection for places, preference will be given to applicants who can show that their chosen program of study will assist them in furthering a demonstrable employment responsibility or career objective.

Applications for admission by internal transfer of candidature from a Graduate Certificate or Graduate Diploma in Engineering may be considered, following completion of subjects totalling at least 18 credit points at a level of performance approved by the Faculty Board in Engineering as evidence of ability to undertake Master's candidature.

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.

Degree requirements and course structure

A candidate for the degree shall complete coursework subjects and a major individual project totalling 60 credit points.

The program of study of each candidate shall have regard to the purpose and coherence of subject selection and the integration of course and project work.

Subjects selected shall be 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 50 per cent of total credit points must be completed through subjects offered and a Graduate Project supervised by the Faculty of Engineering at 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 shall generally be from among those designated as postgraduate and shall include as a minimum postgraduate subjects totalling 48 credit points. 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.

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 will lie within the range 18–24 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 shall be determined by the Faculty Board in Engineering.
- Postgraduate subjects offered by the faculties 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 24 credit points.

Program and subject availability

The Faculty offers program majors in specialised fields. These may change from time to time in number or available areas of study. Program selection is not confined to these majors.

Programs are available in fields relating to each of the Faculty's main discipline areas and its associated 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.

Subjects offered by the Faculty of Engineering available to MTech 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 in respect of these, and of subjects offered by other institutions, may be directed in the first instance to the UPO 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, will normally be granted in circumstances where an equivalent subject is not available through UTS.

Prior to undertaking the Graduate Project, each candidate will be required to submit a comprehensive project definition, as a basis from which the objectives and scope of the work will be agreed, together with the credit point value to be given to the project.

Assessment

The award of the degree will be ungraded.

In existing UTS subjects, assessment procedures will be as already established or as modified by the appropriate authority from time to time.

Emphasis will be placed where appropriate on self-directed experiential learning and criterion-referenced assessment in the development and review of the Faculty's postgraduate subjects.

Supervision of Graduate Project

Responsibility for supervision of the Graduate Project for the degree will rest 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 will 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 UPO.

Master of Engineering Practice

- ◆ *Course code: EP86*
- ◆ *Testamur title: Master of Engineering Practice*
- ◆ *Abbreviation: MEP*
- ◆ *Course fee: \$16,560¹ (local)²*

Course aims

The course provides opportunity, through cooperative education, for practising engineers to extend in depth and breadth the knowledge gained through their undergraduate studies and initial professional experience. Individual course programs are selected from the range of postgraduate subjects offered by the Faculty of Engineering at UTS, other faculties at UTS, and other institutions approved by the Academic Board.

Each program must be designed to enhance capability in the professional practice of engineering, and understanding of the context in which engineering is practised. It must relate to a real industrial or professional setting, normally that of the enterprise in which the candidate is employed; to the other professions which form the overall enterprise; and to the contribution of engineering to the enterprise and to the social and economic context in which it operates. A program may, but need not, include in-depth extension of technological knowledge; but this alone will not be sufficient.

¹ Fees for subjects undertaken through the Australian Graduate School of Engineering Innovation Ltd (AGSEI) are payable to AGSEI, at levels determined by AGSEI.

² This course is not offered to international students.

Attendance and duration

Attendance may be on a full-time or part-time basis. Classes are usually held in the evenings, in block and/or distance mode.

The nominal duration of the course is three years' part-time or one-and-a-half years' full-time.

Admission requirements

An applicant for admission to candidature for the Master of Engineering Practice shall either:

1. be a graduate in engineering of the University of Technology, Sydney or the New South Wales Institute of Technology, or
2. hold a degree or equivalent from another higher education institution, deemed to be equivalent to the Bachelor of Engineering degree of UTS.

In addition, applicants will normally be expected to demonstrate experience in the practice of engineering that meets the requirements, as laid down from time to time, for corporate membership of the Institution of Engineers, Australia. A minimum of two years of relevant work experience is required. In selection for places, preference will be given to applicants who can show that their chosen program of study will assist them in furthering a demonstrable employment responsibility or career objective.

Applications for admission by internal transfer of candidature from a Graduate Certificate or Graduate Diploma in Engineering may be considered, following completion of subjects totalling at least 24 credit points at a level of performance approved by the Faculty Board in Engineering as evidence of ability to undertake a Master's candidature.

Degree requirements and course structure

A candidate for the degree shall complete coursework subjects and a major project totalling not less than 72 credit points.

The program of study for each candidate shall relate to the practice of engineering at an experienced professional level and shall have regard to the purpose and coherence of subject selection, the integration of course and project work, and the inclusion of substantial elements of interaction with professional practice.

Subjects selected shall be drawn from those offered by the Faculty of Engineering of UTS, other faculties of UTS, and other providers as

noted below. Not less than 24 credit points must be completed through subjects offered and/or project work supervised by the Faculty of Engineering of UTS. The major project must be supervised by a Principal Supervisor who is a member or adjunct member of staff of the Faculty of Engineering of UTS.

Subjects shall generally be 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

The following provisions are additional to the University's normal Advanced Standing provisions.

Subjects taken through any faculty of UTS are credited towards the degree at their normal credit point values established by the University. Credit to be granted for subjects taken through providers other than UTS is determined by the Faculty Board in Engineering.

Postgraduate subjects offered by the faculties of engineering of The University of Sydney and the University of New South Wales may be credited towards the degree to a maximum value of 36 credit points.

Subjects offered by the Australian Graduate School of Engineering Innovation Limited (AGSEI) may be credited towards the degree to a maximum value of 48 credit points, provided that:

1. AGSEI has current recognition by the Academic Board of UTS as a suitable provider (such recognition is current in 2001), and
2. the Faculty Board in Engineering of UTS has approved each AGSEI subject unit concerned, and the arrangements for any project work.

The Academic Board may from time to time accredit other providers, and the Faculty Board in Engineering may accredit their programs, in a similar way.

Subject availability

Subjects offered by the Faculty of Engineering and other faculties of UTS, and available for inclusion in programs of study within the Master of Engineering Practice course, are

published in the respective faculty handbooks. Inquiries in respect of subjects and project work offered by other institutions may be directed in the first instance to the UPO in the Faculty of Engineering.

Program selection

Each candidate's program of study is determined in consultation with an academic adviser, and requires the approval of the Director, Postgraduate Coursework Programs, or other person designated by the Faculty Board in Engineering. Approval must include arrangements for project supervision.

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 philosophy of the course is one of cooperative education. Programs should maximise opportunity for industrially reinforced learning, based on adaptation and application of material provided through coursework. From time to time, the Faculty may introduce new subjects based upon existing postgraduate subjects but including an applications project for which additional credit may be appropriate.

The Director, Postgraduate Coursework Programs – or a candidate's academic adviser – will consult with other faculties to identify subjects offered by them that may relate to the practice of engineering and to the interfaces between engineering and other disciplines. In programs involving areas of advanced engineering technology, and subject to the requirement for cohesion within each program and to the overall aims of the course, candidates will be encouraged to consider the value of subjects offered by other universities which complement those available at UTS.

Prior to undertaking the major project, each candidate will be required to submit a comprehensive project definition, as a basis from which the objectives and scope of the work will be agreed together with the credit point value to be given to the project.

Assessment

The award of the degree will be ungraded.

In existing UTS subjects, assessment procedures will be those normally applying to each subject.

In new subjects developed for the Master of Engineering Practice course, assessment will accord with the range of standard UTS practice

but will allow for employer moderation where a component of the assessed work has been undertaken in an employment situation. In these circumstances, assessment practices consistent with self-directed experiential learning will be adopted.

Special regard will be paid to the encouragement and recognition of team work in selected subjects, particularly those of a cross-disciplinary nature. Where team activity is subject to assessment, the approach used will seek to ensure that each individual contribution is properly identified.

Candidates will be required to prepare and submit an individual written report for their major project, and to present and defend its findings in a seminar, preferably involving employer participation. In subjects offered by other institutions, the assessment practices will be as established by those institutions. In deciding whether to approve a subject offered by another institution for credit towards the degree, the Faculty Board in Engineering will have regard to the method of assessment.

Supervision of major projects

Responsibility for supervision of the major project for the degree will rest with the Director, Postgraduate Coursework Programs.

As noted, the major 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 encouraged, and will require formal co-supervisory arrangements.

Graduate Certificate in Engineering

(presented in work-based learning mode)

- ◆ Course code: EP58
- ◆ Testamur title: Graduate Certificate in Engineering
- ◆ Abbreviation: none
- ◆ Course fee: Sponsored¹ (local)

Graduate Diploma in Engineering

(presented in work-based learning mode)

- ◆ Course code: EP65
- ◆ Testamur title: Graduate Diploma in Engineering
- ◆ Abbreviation: GradDipE
- ◆ Course fee: Sponsored¹ (local)

Master of Engineering Practice

(presented in work-based learning mode)

- ◆ Course code: EP90
- ◆ Testamur title: Master of Engineering Practice
- ◆ Abbreviation: MEP
- ◆ Course fee: Sponsored¹ (local)

The aims of these articulated courses and the regulations applying to them are generally similar to those described above for the conventional Master of Engineering Practice. The Master of Engineering Practice is a 72 credit point course, the Graduate Diploma is 45 credit points and the Graduate Certificate is 24 credit points. Candidates for these degrees will not normally apply as individuals but as part of a cohort sponsored by their organisation. The course structures are highly flexible and negotiable, and designed to achieve both personal and corporate objectives.

Course structure

The course structure will be flexible. One core unit, Proposal and Portfolio in Engineering, will need to be completed by all students attempting any of the degrees. The Proposal and Portfolio in Engineering provides the details of each individual's proposed award, their Learning Agreement and the evidence

¹ These fees will normally be structured as part of a contract between UTS and the employer.

supporting their claim for recognition of current capability. The Proposal and Portfolio in Engineering component will determine the exact structure of a student's award. While this may be varied during the student's progression to their chosen award, the changes will need to be agreed by the student, the student's academic adviser at UTS, and their workplace supervisor. The academic adviser will be a member of UTS academic staff or a member of AGSEI staff appointed as an academic adviser by UTS. To complete the requirements of the Proposal and Portfolio, prospective students will enrol in a Proposal and Portfolio qualifying course, worth 9 credit points. On successful completion of this course participants will be able to enrol in the Graduate Certificate, Graduate Diploma and Master's Degree, as appropriate, with advanced standing for the Proposal and Portfolio in these awards. Students will also need to complete a Professional Engineering Work Study (PEWS) 1, 2 or 3 of at least 6 credit points to qualify for an award. The PEWS comprises an action research component which is mandatory for all awards.

Details of each award

Graduate Certificate in Engineering

The Graduate Certificate in Engineering will provide foundation studies at postgraduate level and an important entry point for applicants who have not completed an engineering degree but who have had extensive work experience (usually more than five years), and can demonstrate a capacity to successfully participate at graduate level.

The Graduate Certificate is a 24 credit point award, providing an introduction to an area of engineering, agreed between the candidate, the candidate's employer and UTS:AGSEI. It provides an introduction to the field of study and a means of assessing a participant's ability to proceed to further graduate level of study.

The course of study will comprise:

- | | |
|---|--------|
| 1. Credit for Completion of Proposal and Portfolio in Engineering | 9cp |
| 2. Accredited Prior Learning
WBL-based | 0-9cp |
| or Formal subjects | 0-9cp |
| 3. Formal subjects | 0-9cp |
| 4. Professional Engineering
Work Study 1 | 6-15cp |

Total credit points required to complete the award: 24 credit points.

It is noted that WBL Research Methods is not compulsory in the Graduate Certificate.

Graduate Diploma in Engineering

The Graduate Diploma in Engineering comprises 45 credit points which may be made up of the 24 credit points awarded for the Graduate Certificate in Engineering plus an additional 21 credit points of approved learning. The aims of the Graduate Diploma are to develop the individual's capability to perform a high level of analysis and synthesis in an area of engineering learning, agreed between the candidate, the candidate's employer and the Faculty of Engineering supervisor, or the representative of AGSEI operating on the Faculty's behalf.

This course would provide a second important entry point for applicants who have not completed an engineering degree but who have had extensive work experience (usually more than five years), and can demonstrate a capacity to successfully participate at graduate level.

Transfer from the Graduate Certificate in Engineering will require a completion of a new Proposal and Portfolio in Engineering. However, a total of 9 credit points will be accrued for the two awards.

The completed Proposal and Portfolio in Engineering is the trigger for the enrolment of a participant in the Graduate Diploma in Engineering and will also enable the Faculty to plan the staffing requirements generated by the applicant's proposed course of study. The course of study will comprise:

- | | |
|---|--------|
| 1. Credit for Completion of Proposal and Portfolio in Engineering | 9cp |
| 2. Accredited Prior Learning
WBL-based | 0-24cp |
| or Formal subjects | 0-24cp |
| 3. WBL Research methods 1 | 6cp |
| 4. Formal subjects | 0-24cp |
| 5. Professional Engineering
Work Study 1 & 2 | 6-30cp |

Total credit points required to complete the award: 45 credit points.

Master of Engineering Practice

The Master of Engineering Practice will provide advanced studies at postgraduate level and an important entry point for applicants who have completed an undergraduate degree in engineering or a Graduate Certificate or Diploma.

The Master's level program is designed to enable candidates to achieve an advanced level of understanding in a field of study and practice to equip them for the demands and responsibilities of middle to senior management roles in an engineering corporation or consultancy. The precise content of the course will be drawn from an area of engineering learning, agreed between the candidate, the candidate's employer and the Faculty of Engineering supervisor, or the representative of AGSEI operating on the Faculty's behalf. The Master of Engineering Practice comprises 72 credit points which may include the 45 credit points from the Graduate Diploma in Engineering, plus an additional 27 credit points.

Applicants must complete a Proposal and Portfolio in Engineering. A new Proposal and Portfolio in Engineering will be required to progress from the Graduate Certificate in Engineering, or the Graduate Diploma in Engineering, to the Master of Engineering Practice. However a total of 9 credit points will be accrued for the two awards.

The course of study will comprise:

- | | |
|---|---------|
| 1. Credit for Completion of Proposal and Portfolio in Engineering | 9cp |
| 2. Accredited Prior Learning | |
| WBL-based | 0–30cp |
| or Formal subjects | 0–30cp |
| 3. WBL Research methods 1 & 2 | 12cp |
| 4. Formal subjects | 0–30cp |
| 5. Professional Engineering | |
| Work Study 1, 2 and 3 | 21–51cp |

Total credit points required to complete the award: 72 credit points.

Articulation

Articulation between the Graduate Certificate, the Graduate Diploma in Engineering and the Master of Engineering Practice degree will be possible. A new Proposal and Portfolio in Engineering will have to be completed in each case. It is not proposed at this stage to allow candidates to freely move between the Work-Based Learning awards and other postgraduate awards in the Faculty of Engineering. Exceptions are possible with the approval of the Director, Postgraduate Coursework Programs.

The role of the employer

A prospective candidate would normally approach the employer, or be approached by the employer, to seek a place in a Work-Based Learning program. On enrolment in a Qualifying Subject, the applicant would commence preparation of their Proposal and Portfolio in Engineering under the joint guidance of the employer and a representative of the UTS: AGSEI WBL Management Committee. The awards will be jointly administered by the candidate's employer and UTS, or the candidate's employer and AGSEI, (acting on behalf of UTS). UTS would have approval of academic standards and the employer's representatives would approve the general topics of investigation.

Admission requirements

These are identical to those required for the conventional Master of Engineering Practice, Graduate Diploma in Engineering, and Graduate Certificate of Engineering. See Graduate Diploma in Engineering (EP61) and Graduate Certificate in Engineering (EP51).

Master of Engineering Studies

- ◆ *Course code: EP88*
- ◆ *Testamur title: Master of Engineering Studies*
- ◆ *Abbreviation: MESTud*
- ◆ *Course fee: \$9,600 (local)
\$7,000 per semester (international)*

Master of Engineering Studies (Honours)

- ◆ *Course code: EP91*
- ◆ *Testamur title: Master of Engineering Studies (Honours)*
- ◆ *Abbreviation: MESTud(Hons)*
- ◆ *Course fee: \$14,400 (local)
\$7,000 per semester (international)*

The Master of Engineering Studies 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 or expand knowledge boundaries into policy and engineering management areas. The program of study chosen by the student will be framed within a Postgraduate Program major and supervised by an experienced academic in that field.

The Master of Engineering Studies (Honours) is an extension, in the form of a research project, of the program of studies chosen by students. Students who have performed well in the coursework program will be permitted to transfer into the MESTud(Hons) where they will be given the opportunity to complete a research project in their major.

Duration

The MESTud will require two semesters of full-time study or four semesters of part-time study. Those students who wish to take Honours will require at least one further semester to complete the degree.

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. Candidates with a first or second class Honours degree or equivalent require no experience. Otherwise, two years of relevant experience is required.

Course structures

Master of Engineering Studies

Eight graduate subjects are offered by the Faculty of Engineering (48 credit points). Students will normally nominate a major at enrolment which will require the completion of five subjects within a particular Postgraduate Program major as described in this handbook. The major will be 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) group. In addition to the 48 credit points at credit level the candidate will be 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 2001 are listed below:

- 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
- Structural Engineering
- Telecommunications Engineering
- Water Engineering.

Each of these Postgraduate Program Majors is managed by an academic designated by the Director, Postgraduate Coursework Programs, who will advise the student on assumed prior knowledge and a suitable combination of graduate subjects. Where a student transfers to the MESTud(Hons) group, that student will normally be required to have completed 49041 Engineering Research Methodology and to complete the Research Project using the body of knowledge contained in the chosen Graduate Program major.

Graduate Certificate in Engineering

- ◆ *Course code: EP51*
 - ◆ *Testamur title: Graduate Certificate in Engineering*
 - ◆ *Abbreviation: none*
 - ◆ *Course fee: \$4,800 (local)
\$7,000 per semester (international)*
-

Graduate Diploma in Engineering

- ◆ *Course code: EP61*
 - ◆ *Testamur title: Graduate Diploma in Engineering*
 - ◆ *Abbreviation: GradDipE*
 - ◆ *Course fee: \$9,000 (local)
\$6,563 per semester (international)*
-

Course aims

The objective of each of these courses, offered on a Faculty-wide basis, 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 courses 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.

Duration

The Graduate Diploma requires completion of subjects, totalling 45 credit points, and may be taken on a two-semester, full-time basis or on a four-semester, part-time basis.

The Graduate Certificate requires completion of subjects totalling 24 credit points and may be taken on a two-semester, full-time basis or a two-semester, part-time basis.

Admission requirements

An applicant for admission to candidature for a Graduate Certificate or Graduate Diploma 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.

Applicants 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.

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 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. There is opportunity to choose from the broad range of graduate and undergraduate subjects offered by the University's nine faculties, class-size quotas permitting.

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 UPO, 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 will be recognised on the candidate's academic record.

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.

Transfer to Master's degree

Work undertaken under Graduate Diploma or Graduate Certificate enrolment may be credited towards a Master's degree provided the requirements of the Master's degree are met in full. Advanced standing can be obtained for not more than 67 per cent of the credit points required for the Master's (generally 40 credit points maximum).

Completion of the requirements for the Graduate Diploma or 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 (WAM) in completed subjects of at least 60 per cent over 18 credit points.

POSTGRADUATE PROGRAM MAJORS

Postgraduate Majors are available in ME, MTech, MESTud, Graduate Diplomas and 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 2001 program majors are described below. Information on other specialist research areas can be obtained from individual members of academic staff (see section titled Teaching Staff).

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 completing two thirds of the credit points required for a MESTud, a general ME, MTech degree, diploma or certificate from any one of the graduate program majors listed will be entitled to have the name of the major listed in the degree transcript (not the *testamur*). A Graduate Project within the major will be

deemed to contribute the relevant number of credit points towards the two-thirds requirements for listing.

For the Energy Planning and Policy major to be shown on the transcript, students will be required to complete subjects 49021 Evaluation of Infrastructure Investments, 49022 Energy Resources and Technology, 49023 Energy and Environmental Economics, 49024 Energy Modelling and 49029 Environmental Policy for Energy Systems.

For the Information Systems Engineering major to be shown on the transcript, students will be required to complete subjects 49013 Managing Information Technology in Engineering, 49209 Advanced Web Technology, 49210 Website Design and Management.

For the Telecommunications major to be shown on the ME and MTech transcript, students will be required to complete subjects 49201 Integrated Services Networks, 49202 Communication Protocols, 49203 Telecommunications Signal Processing, 49204 Advanced Teletraffic Engineering and 49205 Transmission Systems plus an approved Postgraduate Project in telecommunications.

For those students who have a previous degree which is not electrical or electronics engineering or who feel that they need to improve their mathematics background, we highly encourage that they take 49209 (Advanced Mathematics for Telecommunications). The telecommunications major also has a set of subjects with a 'special topics' delivery mode. These subjects are available only to the Telecommunications major, are limited to small numbers of students (five or less), and are typically taught once every three semesters, but this depends on the availability of the lecturer.

For the Software Engineering major to be shown on the transcript, students will be required to complete 49211 Software Engineering Principles.

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 2001. However, the availability of individual subjects in any year will be influenced by student demand, arrangements with visiting lecturers, scheduling within the University, and policies on class sizes.

Provision has been made in all general award courses for candidates to undertake other (non-engineering postgraduate) subjects with the

approval of an academic adviser. In particular, undergraduate subjects offered by the Faculty may be taken as credit towards all general awards. Candidates who have completed their first degree at another university, or who have been practising for some years without periods of formal study, are strongly recommended to seek academic advice on the appropriateness of including selected undergraduate subjects in their programs.

In addition, opportunities are available in all general courses to undertake other approved subjects offered by other faculties at UTS and other universities.

Postgraduate majors

Control Engineering

49261	Biomedical Instrumentation	6cp
49271	Computer Architecture	6cp
49272	Adaptive and Multivariable Control	6cp
49274	Advanced Robotics	6cp
49275	Neural Networks and Fuzzy Logic	6cp
49276	Sliding Mode Control	6cp

Academic inquiries

Associate Professor H Nguyen, Coordinator
Control Engineering
room 2429, level 24, Building 1
telephone (+61 2) 9514 2451
fax (+61 2) 9514 2435
email htn@eng.uts.edu.au

Energy Planning and Policy

Core subjects (Master's program major) include

49021	Evaluation of Infrastructure Investments	6cp
49022	Energy Resources and Technology	6cp
49023	Energy and Environmental Economics	6cp
49024	Energy Modelling	6cp
49029	Environmental Policy for Energy Systems	6cp

Recommended subjects

49025	Methods for Energy Analysis	3cp
49026	Electricity Sector Planning and Restructuring	6cp
49027	Energy Demand Analysis and Forecasting	6cp
49028	Policy and Planning of Energy Conservation	6cp
49706	Regulatory Economics	6cp
49703	Selected Topics (Energy Pricing)	3cp
49701	Gas Sector Planning	6cp
49702	Gas Distribution Technology and Management	6cp

Academic inquiries

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Energy Planning and Policy
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fax (+61 2) 9514 2633
email deepak.sharma@uts.edu.au

Engineering Management

49001	Judgment and Decision Making	6cp
49002	Project Management	6cp
49003	Economic Evaluation	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
49306	Quality and Operations Management Systems	6cp
49309	Quality Planning and Analysis	6cp

Note: Selected subjects from the Engineering Management concentration can frequently be combined with studies in another program concentration.

Academic inquiries

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Engineering Management
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fax (+61 2) 9514 2633
email tom.anderson@uts.edu.au

Environmental Engineering and Management

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

Academic inquiries

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Environmental Engineering and Management
room 512, level 5, Building 2
telephone (+61 2) 9514 2661
fax (+61 2) 9514 2633
email pam.hazelton@uts.edu.au

100 Postgraduate courses

Groundwater Management

49550	Computing for Groundwater Specialists	0cp
49551	Surface Hydrology and Groundwater	6cp
49555	Groundwater Modelling	6cp
66025	Contaminated Site Management	6cp
66018	Groundwater Geophysics	6cp
66015	Hydrogeochemistry	6cp
66014	Hydrogeology	6cp

Academic inquiries

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fax (+61 2) 9514 1985
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<http://groundwater.ncgm.uts.edu.au/ngcm/>

Information Systems Engineering

49013	Managing Information Technology in Engineering	6cp
49209	Advanced Web Technology	6cp
49210	Website Design and Management	6cp
95561	Multimedia Products and Technology	6cp
95560	Multimedia Industry and Process	6cp
49213	Human-Machine Interfaces and Software Implementation	6cp
49211	Software Engineering Principles	6cp

Academic inquiries

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Information Systems Engineering
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fax (+61 2) 9514 2611
email david.lowe@uts.edu.au

Local Government Engineering

49102	Traffic and Transportation	6cp
49104	Asset Maintenance Management	6cp
49105	Water Supply and Wastewater Management	6cp
49106	Road Engineering Practice	6cp
49107	Storm Runoff Regulation	6cp
49108	Local Government Law	6cp
49121	Environmental Assessment and Planning	6cp

Academic inquiries

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Local Government Engineering
room 522, level 5, Building 2
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fax (+61 2) 9514 2633
email ken.halstead@uts.edu.au

Manufacturing Engineering and Management

49309	Quality Planning and Analysis	6cp
49318	Manufacturing Systems Management	6cp
49002	Project Management	6cp
49306	Quality and Operations Management Systems	6cp
49323	Vibration Analysis: Theory and Applications	6cp
49325	Computer-aided Mechanical Design	6cp
49324	Instrumentation and Condition Monitoring	6cp
49312	Advanced Flow Modelling	6cp
49326	Heat Transfer and Equipment Design	6cp
49322	Airconditioning	6cp

Academic inquiries

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email guang.hong@uts.edu.au

Software Engineering

49211	Software Engineering Principles	6cp
49212	Object-oriented Languages	6cp
49213	Human-Machine Interfaces and Software Implementation	6cp
49214	UNIX and C	6cp
49234	Real-time Object-oriented Software Development	9cp
49217	Software Verification and Validation	6cp
49233	Software Requirements Specification	9cp
49237	Software Quality and Configuration	3cp
49225	Software Project Management	6cp

Subject availability depends on demand.

Academic inquiries

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Software Engineering
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Structural Engineering

49131	Bridge Design	6cp
49132	Stability of Structures	6cp
49133	Steel and Composite Design	6cp
49134	Structural Dynamics and Earthquake Engineering	6cp
49135	Wind Engineering	6cp

49136	Timber in Engineering Design	6cp
49141	Advanced Geomechanics	6cp
49151	Concrete Technology and Practice	6cp
49152	Damage and Repair of Concrete Structures	6cp
49047	Finite Element Analysis	6cp
49137	Railway Engineering	6cp
49150	Prestressed Concrete Design	6cp

Academic inquiries

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email bijan.samali@uts.edu.au

Telecommunications Engineering

49201	Integrated Services Network	6cp
49202	Communication Protocols	6cp
49203	Telecommunications Signal Processing	6cp
49204	Advanced Teletraffic Engineering	6cp
49205	Transmission Systems	6cp
49207	Advanced Concepts in Microwave and Mobile Communications	6cp
49215	Telecommunications Industry Management	6cp
49216	Advanced Mathematics for Telecommunications	6cp
49218	Asynchronous Transfer Mode (ATM) Technology (special topic)	6cp
49219	Emerging Internetworking Protocols (special topic)	6cp
49220	Real-time Signal Processing in Telecommunications (special topic)	6cp
49221	Coding and Coded Modulation (special topic)	6cp
49222	Advanced Digital Modulation Techniques (special topic)	6cp
49223	Satellite Communication Systems (special topic)	6cp
49224	Simulation of Digital Communication Systems (special topic)	6cp
49226	Modem/Codec Design (special topic)	6cp

The 'special topics' delivery mode subjects are available only to Telecommunications major, are limited to small numbers of students (five or less), and are typically taught once every three semesters but this depends on the availability of the lecturer.

Academic inquiries

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fax (+61 2) 9514 2435
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Water Engineering

49107	Storm Runoff Regulation	6cp
49111	Coastal Engineering	6cp
49113	Urban Stormwater Pollution Management	6cp
49114	Statistical Hydrology	6cp
49124	Water Quality Management	6cp
49551	Surface Hydrology and Groundwater	6cp
49555	Groundwater Modelling	6cp

Academic inquiries

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email Simon.Beecham@uts.edu.au

SUBJECT DESCRIPTIONS

44152

Groundwater Engineering Project (M) (FT)

24cp

Postgraduate

44153

Groundwater Engineering Project (GD) (FT)

12cp

Postgraduate

44156

Groundwater Engineering Project (M) (PT)

12cp

Availability: all courses

Postgraduate

44157

Groundwater Engineering Project (GD) (PT)

6cp

Availability: all courses

Postgraduate

Subject Coordinator: Professor M J Knight,

National Centre for Groundwater Management

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
CE, CEE, ME, SE, TE, BE(CE, CEE, ME, TE) BA
Undergraduate

Subject Coordinators: Gerry Ring and 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; 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 CE, CEE, ME, SE, TE, BE(CE, CEE, ME, TE) BA 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 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 CE, CEE, ME, SE, TE, BE(CE, CEE, ME, TE) BA Undergraduate
Subject Coordinators: Gerry Ring and David Eager

Refer to the subject description for 48012 Capstone Project (12cp in one semester). 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
CE, CEE, ME, SE, TE, BE(CE, CEE, ME, TE) BA Undergraduate
Subject Coordinators: Gerry Ring and 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.

48070**Engineering Material**

6cp
BT
Undergraduate

This subject builds on the knowledge of chemistry and materials from the Associate Diploma. It provides students with an understanding of the use of materials in the engineering environment.

Chemistry topics include: electronic structure of the atom, periodic table, chemical bonding, states, stoichiometry, thermochemistry, aqueous solutions, metals, electrochemistry, organic chemistry. Materials Science topics include: properties, behaviour, application and testing of common engineering materials. Particular emphasis will be placed on newer materials, including ceramics and composites. Ferrous and non-ferrous metals and plastics will also be treated. In covering these topics specific applications in industry within design and maintenance will be emphasised.

Assessment: assignments 20 per cent; mid-semester examination 30 per cent; final examination 50 per cent.

48071**Numerical Methods**

6cp
BT
Undergraduate

This subject builds on students' knowledge of mathematics from the Associate 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

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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.

48072

Information Technology

6cp

BT

Undergraduate

This subject aims to familiarise the student with the use of basic software and hardware for computers, especially personal computers, and to start to develop an appreciation of the diverse uses made of computers by engineers. The computer is introduced as an aid to design, communication and as a means for solving engineering problems. The emphasis is on popular personal computer applications and computer-aided design.

Personal computing topics include hardware familiarisation, the operating system, word processing, spreadsheets, databases, visual presentation software and elementary programming.

Computer-aided design (CAD) topics introduce three-dimensional model development as well as the associated documentation and communication of the design. Students explore management issues related to CAD and investigate the role of CAD in the design process and in the overall information needs of an organisation. Practical laboratory sessions incorporate wireframe, surface and solid modelling schemes and demonstrate the power of parametric capability. The combination of practical experience and an understanding of the information and management aspects of CAD, prepare students for making management decisions about CAD.

Assessment: reports 40 per cent; assignments 20 per cent; examinations 40 per cent.

48073

Professional Development

6cp; corequisite(s): 48075 Engineering Management

BT

Undergraduate

This is a core and capstone subject. It has two components: the industrial environment, and a major project.

The industrial component concentrates on people-related aspects of engineering management. The psychology and sociology of small group behaviour are introduced and explored. The subject investigates the engineering sector within Australian industry, covering the following topics: employment analysis, relevant government policies, industrial relations, occupational health and safety, the implications of moving towards ecologically sustainable development.

The major project component involves the preparation by the student of an industry-based project. The project involves an investigation at technologist level giving an opportunity to synthesise knowledge gained in industry with that obtained at UTS by the documentation of a complex work-related problem. The project will include a poster and a seminar presentation.

Assessment: seminar presentation 10 per cent; poster 10 per cent; literature review 20 per cent; major report 50 per cent; class participation 10 per cent.

48074

Engineering Communication and Documentation

6cp; prerequisite(s): 48072 Information Technology

BT

Undergraduate

This subject covers the various aspects of the communication process in an engineering context. Students participate in workshop sessions to develop written, oral and graphic skills. Basic communication theory is used as a foundation for practical work in research techniques, designing and producing letters, reports, discussion papers and other engineering documents. Oral skills are developed through conferences, seminars, interviews, meetings, debates and small group discussions. Students consider documentation as both a process and an outcome and develop management strategies to apply basic communication theories to the development of integrated information systems.

Assessment: oral presentations 30 per cent; research paper 30 per cent; major reports 30 per cent; class participation tasks 10 per cent.

48075**Engineering Management**

6cp; prerequisite(s): 48074 Engineering Communication and Documentation

*BT
Undergraduate*

This subject provides a background in classical management theory. It is a core subject in the Bachelor of Technology program and aims to prepare the student for management positions within Australian industry. The overriding feature is management decision making by the use of examples in the fundamental functions of management, and a study of the management of uncertainty, risk and change.

Topics covered will include planning; organising; leading and controlling; decision making; break-even analysis; return on investment; and inventory control.

Assessment: assignments 30 per cent; presentation and report 20 per cent; major reports 40 per cent; class participation 10 per cent.

48110**Engineering Practice 1**

Ocp; 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
CE, CEE, CSE, ESE, EE, ME, SE, TE, BEBA, BEBBus, BScBE

*ENGINEERING PRACTICE
Undergraduate*

Engineering educators, as well as engineering employers, have long recognised the value of integrating practical experience with academic studies. Engineering Practice 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 Practice 1 provides students with the opportunity to discover engineering workplace culture and to develop their basic technical skills. It is expected that students will gain this level of experience early in their academic program. One semester prior to undertaking the experience students must enrol in the subject 48121 Engineering Practice Preview 1. Students may enrol in Engineering Practice 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.

Material to be taught and learnt: each student's experience will be unique. What is learned will be a function of a number of factors affecting the experience. Employer or host organisations are not expected to provide formal training although some may choose to do so. Instead students are required to become active learners and seek opportunities to fulfil the objectives of this experience module. Students are assisted in this process through Engineering core and field of practice subjects and specifically through Engineering Practice Review 1.

48120**Review of Engineering Practice 1**

*6cp (exemption process)
CE, CEE, CSE, EE, ME, TE, BEBA, BSc BE
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 3cp subjects 48121 and 48122. Students who have completed 44 weeks of industrial experience under the old course can apply for an exemption in this subject as a means of simplifying the transfer to the BE DipEngPrac.

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 – through completing this subject to accelerate their progress in the Dip Eng Prac.

48121**Engineering Practice Preview 1**

*3cp
CE, CEE, CSE, ESE, EE, ME, SE, TE, BEBA, BEBBus, BScBE
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 will 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 will be negotiated from a variety of compulsory and optional assignments, many of which can be incorporated into the student's portfolio. Some tasks include: personal resumé, job application letters, employment interviewing, learning style assessment, learning contracts, ethics case study, industrial relations case study. Assessment will essentially be formative to assist students in achieving an acceptable level. However, students will not be able to undertake Engineering Practice 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

CE, CEE, CSE, ESE, EE, ME, SE, TE, BEBA, BEBBus, BScBE

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 will be unique, all students will benefit from sharing and discussing their experiences. What each individual student learns will be a function of a number of factors affecting their workplace experience. 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 learning contract, report of workplace experience, group review, logbook and portfolio.

48130

Engineering Practice 2

Ocp; prerequisite(s): 48141 Engineering Practice Preview 2

CE, CEE, CSE, ESE, EE, ME, SE, TE, BEBA, BScBE

ENGINEERING PRACTICE

Undergraduate

Engineering Practice 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 Practice 2 expects that students will be advanced in their academic studies and be working closely with engineering professionals in order to extend their understanding of the practice of professional engineering and to apply, test and further develop their technical skills. One semester prior to undertaking the experience students must enrol in the subject 48141 Engineering Practice Preview 2. Students may enrol in Engineering Practice 2 for more than one semester while they are working at this para-professional level; and they need not take additional semesters of Engineering Practice Preview 2. However, they are encouraged to progress to a professional level of engineering practice.

Material to be taught and learnt: each student's experience will be unique. What is learned will be a function of a number of factors affecting the experience. Employer or host organisations are not expected to provide formal training although some may choose to do so. Instead students are required to become active learners and seek opportunities to fulfill the objectives of this experience module. Students are assisted in this process through Engineering core and field of practice subjects and specifically through Engineering Practice Review 2.

48140

Review of Engineering Practice 2

6cp; prerequisite(s): 48120 Review of Engineering Practice 1 plus an additional 24 weeks of engineering practice at a professional level

CE, CEE, CSE, ESE, EE, ME, SE, TE, BEBA, BScBE

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

CE, CEE, CSE, ESE, EE, ME, SE, TE, BEBA, BScBE 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 will 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 will consider the development of professional competencies as required by the Institution of Employers, Australia.

Assessment tasks will be negotiated from a variety of compulsory and optional assignments, many of which can be incorporated into the student's portfolio. Some tasks include: professional resumé, employment and assessment interviewing, learning contracts, ethics case study, industrial relations case study, occupational health and safety case study. Assessment will be formative to assist students in achieving an acceptable level. However, students will not be able to undertake Engineering Practice 2 until they have passed all the compulsory components of Engineering Practice Preview 2.

48142

Engineering Practice Review 2

3cp; prerequisite(s): 48130 Engineering Practice 2

CE, CEE, CSE, ESE, EE, ME, SE, TE, BEBA, BScBE 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 will be unique, all students will benefit from sharing and discussing their experiences. What each individual student learns will be a function of a number of factors affecting their workplace experience. 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 learning contract, report of workplace experience and career episodes, group review, logbook, and portfolio.

48210

Engineering for Sustainability

6cp

CE, CEE, CSE, ESE, EE, ME, SE, TE, BEBA, BEBBus, BScBE

CORE

Undergraduate

Subject Coordinator: 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 will choose one of several module groups based around broad engineering-related themes.

Within these modules, students will be examining the contributions made by engineers in their respective areas, how they were received by and benefited different groups in society, and what impact they had on the environment. Current and historical case studies from our local communities as well as from other parts of the world will be used to illustrate the different ways in which technologies have evolved and have been valued.

The subject is taught by an interdisciplinary team who will present lectures, and facilitate interactive workshops. Assessment includes individual reflective writing, case study reports, and team-based poster presentation. In each of these assessment tasks, students are assessed both for their learning of key content material and academic skills such as critical reading and analysis, and academic writing and presentation.

48220

Informatics

6cp

CE, CEE, CSE, ESE, EE, ME, SE, TE, BEBA, BEBBus, BScBE

CORE

Undergraduate

Subject Coordinator: Martin Evans

The objectives of this subject are: to develop a deep understanding of the types of engineering problems which can benefit from the use of information and computational tools; to identify these benefits, the types of tools and their appropriateness, strengths and limitations; to develop an understanding of the application of, and specific skills in applying, informatics tools to engineering problems (and in particular in the areas of utilising information, oral and written communication, teamwork, resource management, design processes); and to develop maturity with respect to critical thinking and professional ethics.

Topics include: consideration of issues related to informatics tools and categories of informatics tools, types of problems which can benefit from these tools, benefits of using tools, limitation of tools, relevance of tools to

different types of problems; consideration of issues related to using tools to identify, structure, conceptualise, visualise, articulate, and reason about engineering problems; consideration of issues related to how tools relate to the culture of engineering, engineering ethics, and critical thinking; specific skills in computer programming fundamentals, and a specific programming language; skills in using operating systems, written and oral communication software, spreadsheets, Internet tools, mathematical modelling tools, databases, teamwork tools, and project management tools.

48230

Engineering Communication

6cp; prerequisite(s): 48220 Informatics CE, CEE, CSE, ESE, EE, ME, SE, TE, BEBA, BEBBus, BScBE

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): 48220 Informatics; 33230 Mathematical Modelling 2

CE, CEE, CSE, ESE, EE, ME, SE, TE, BEBA, BEBBus, BScBE

CORE

Undergraduate

Subject Coordinator: Jim Irish

The objectives of this subject are: to develop in students a critical understanding of ideas concerning decision making under risk, uncertainty, ignorance and indeterminacy (and an appreciation that each person and group

has knowledge, attitudes and beliefs about risk and uncertainty which, to the individual or group, are 'rational'); to explore the contexts in which experts, including professional engineers, manipulate problems involving risk and uncertainty; to develop a critical appreciation of the uncertainties and subjectivities inherent in modelling; and to equip students with the ability to select and apply appropriate statistical tools, to acquire additional statistical competencies, and to understand their strengths and limitations.

Topics include:

Decision making under risk, uncertainty, ignorance or indeterminacy – history of decision making under risk, uncertainty, etc.; cultural approaches to risk and uncertainty (approaches which emphasise the plurality of rationalities); the modern dependence on or fascination with quantification; historical origins of statistics and risk analysis; new approaches to negotiating risk and uncertainty decisions: the primacy of open process, trust, and valuing contextual knowledge over quantitative risk estimates; the sociology of knowledge; case studies concerning, for example, Chernobyl, lawyers' approaches to knowledge, and probabilistic knowledge; communicating and negotiating uncertainty and risk.

Formal definitions of risk, uncertainty, indeterminacy and ignorance – connections to risk management and to sustainability, especially the Precautionary Principle; connections to communication, safety, reliability, quality, investment risk, measurement, and system performance evaluation; sources of errors; limitations of models as predictive tools; risk transfer, risk modification, and risk avoidance.

The role of formal methods of handling risk and uncertainty – standards, codes, and expert or professional knowledge in resolving risk or uncertainty, particularly in engineering and related professions; how models are constructed and used as the basis for codes and standards; examples and connections to the fields of practice/programs; the complexity of engineering decisions and the reductionist approach to classifying problems; ensuring predictability, quality and reliability in the face of the random perturbations and uncertainties inherent in systems.

Techniques for modelling and analysing uncertainties and risks – in order to be able to examine some hypotheses about risk and uncertainty, appreciation of the process of and

mastery of some of the skills for modelling and analysis will be developed, including: different classifications of mathematical models and modelling methods, e.g. stochastic, deterministic, mixed stochastic-deterministic, parametric, black box, simulation; linear, nonlinear, lumped parameter, distributed parameter; static, dynamic; regression and correlation analysis; choice of variables and relationships to model; sources of uncertainty propagation in models, e.g. measurement uncertainties, propagation of computational errors, system noise and disturbances, unmodelled variables, non-quantifiable variables and effects; measures of certainty and uncertainty in models, e.g. robustness, confidence intervals, statistical inference based on hypothesis testing; mechanisms for minimising effects of uncertainties in models and systems, e.g. feedback, filters, and redundancy; model verification, e.g. tests of goodness of fit; model validation, e.g. statistical forecasting; how decisions are made under uncertainty; different approaches to documenting and communicating the results of statistical modelling and decision making.

48250

Engineering Economics and Finance

bcp; prerequisite(s): 48110 Engineering Practice 1; 48240 Uncertainties and Risks in Engineering

CE, CEE, CSE, ESE, EE, ME, SE, TE, BEBA, BScBE

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 micro economic theories in the context of engineering practice, ethics and sustainability; to acquire skills in determining the appropriate use and limitations of various economic and financial models and techniques used to define/manage/analyse engineering activities; to develop competence in identifying and working through the economic and financial aspects of an engineering project/case study; to become aware of the impact of various economic and financial models and techniques on the social and technical dimensions of engineering activity; to integrate economic and financial understanding and fields of practice specialist knowledge in project-based/case study work.

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Topics include: a basic understanding of macroeconomics, microeconomics and environmental economics; awareness of the philosophies underpinning economics, and terms and methods used by economists and accountants; analysis of engineering economic models including cost-benefit analysis, multiple-objective analysis etc; skills in assessing and using accounting and financial concepts especially in the context of small business but also including awareness of management accounting.

48260

Engineering Management

6cp; prerequisite(s): 48122 Engineering Practice Review 1 or 48120 Review of Engineering Practice 1; 48240 Uncertainties and Risks in Engineering
CE, CEE, CSE, ESE, EE, ME, SE, TE, BEBA, BEBBus, BScBE

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

CE, CEE, CSE, ESE, EE, ME, SE, TE, BEBA, BScBE

CORE

Undergraduate

Subject Coordinator: Elizabeth Taylor

The objective of this subject is to provide students with an understanding of the development of impact as a concept, and to gain an appreciation of how it has been specifically constructed within the engineering culture.

Students will consider the concept of impact within the frameworks of technology assessment techniques; acquire an appreciation of and sensitivity to different interpretations of the impact of technologies; examine how different understandings of the concept of impact affect the relationships between technological professions and society; compare and critique methodologies and strategies for dealing with the impacts of engineering activity; develop skills in determining the appropriate use of various techniques used by decision makers to manage/determine the impact of engineering activity; develop skills in involving community in decision making regarding the impact of engineering activity; gain an appreciation of the diversity of engineering practice and its interdependence with other professions; experience and reflect on the interdisciplinary nature of engineering activity.

48301

Mechanical Services

6cp

BT

Undergraduate

Subject Coordinator: Mr D M Eager

This subject provides skills in estimation of building cooling and heating loads; the design of simple airconditioning systems; and the design of piped systems for the circulation of water and refrigerants as heat transfer media. Students will also gain an understanding of the principles of energy and mass transfer

underlying mechanical services systems and fundamentals of noise control, water supply and drainage and fire suppression systems.

Assessment: laboratory 5 per cent, seven assignments: four worth 10 per cent each; two worth 15 per cent each; and one worth 25 per cent.

48304

Building Construction Technology

6cp

BT

Undergraduate

Subject Coordinator: Mr D M Eager

This subject provides a knowledge of the environment in which professional engineers operate in the building industry; and introduces an understanding of the design and construction of building elements and of fundamentals of heat transfer and effects of external conditions on indoor comfort. It explores the requirements of the Building Code of Australia (BCA); discusses influences on the indoor environment such as services coordination and vibration; and introduces fundamentals of vertical transportation within buildings. It is expected that students will acquire an understanding of requirements of the BCA and statutory regulations and a knowledge of principles for the design and construction of building structural elements; space requirements for the integration of services into the building fabric; and heat transfer through the building skin including solar effects on buildings.

Assessment: four major projects of 20 per cent, 30 per cent, 25 per cent, and 25 per cent.

48310

Introduction to Civil Engineering

6cp

CE, CEE, BEBA, BEBBus

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, whilst having due regard for both the developed and fragile

natural environment; to ensure an understanding of the need to develop the necessary individual, and multi-disciplinary 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 (three hours' duration each) of basic surveying and levelling in the field, followed by one three-hour session of design work involving catchment area calculation, storm-water 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 work place. Practising civil engineers and other professionals accompany the students in outlining the necessary skills required to design, 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

CE, BEBA, BEBBus

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; 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 will be discussed in class and it will be 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 will be introduced. Services of professional surveyors will be explained, as will 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 and Introduction to Design Process

6cp; corequisite(s): 33130 Mathematical

Modelling 1; 68037 Physical Modelling

CE, CEE, BEBA, BEBBus

FIELDS OF PRACTICE: CIVIL ENGINEERING PROGRAM

Undergraduate

The main aim of this subject is to acquire a fundamental understanding of equilibrium concepts commonly used in analysis and design of engineered structures; develop their

skills to analyse simple structures such as beams and trusses subjected to various loading and support conditions; and acquire an appreciation of the design process and the issues involved in design, taking into account design constraints and the expectation to meet often conflicting design requirements.

Topics are designed to encompass all the fundamental concepts in statics which are essential to acquire early in the professional course. Students are exposed to design issues through the process of designing a simple structure such as a truss.

Content ensures the minimum knowledge needed to embark on more advanced analysis as well as introductory design subjects in subsequent semesters: basic concepts and laws, units, scalars and vectors, rectangular components, resultants using rectangular components; equilibrium of a particle in 2D, free body diagrams, 2D rigid bodies, external and internal forces, principle of transmissibility, moment of a force – Varignon’s theorem, moment of a couple, equivalent couples, addition of couples, resultant of a force/couple system, equivalent force couple systems, support reactions on 2D bodies; equilibrium of 2D bodies; equilibrium of two and three force bodies; types of beams; distributed loads; equilibrium conditions for beams; internal actions – sign convention, calculating internal actions using equilibrium, equations of internal actions using first principles, diagrams of internal actions in straight beams; equilibrium relations between moment, shear and load; internal forces in pin-jointed structures, pin-jointed trusses – definition, method of joints, method of sections, zero force members; analysis of pin-jointed frames; properties of plane areas – centroid, first and second moment of area, polar moment of inertia, radius of gyration, introduction to mechanics of solids; concept of stress, uniaxial stresses, shearing stresses, ultimate and allowable stress, factor of safety; concept of strain, stress-strain diagram, Hook’s law, modulus of elasticity, Poisson’s ratio, generalised Hook’s law; introduction to design process: analysis and design of model truss (roof truss, bridge truss).

48330**Soil Behaviour**

6cp; corequisite(s): 48331 mechanics of Solids CE, CEE, BEBA, BEBBus

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 – ground-water, 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 and Introduction to Design Process or 48620 Fundamentals of Mechanical Engineering CE, CEE, ME, BEBA, BEBBus

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 constitutive 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

CE, CEE, BEBA, BEBBus

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 ground water

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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.

48341

Structural Mechanics and Component Design

6cp; prerequisite(s): 33230 Mathematical Modelling 2; 48331 Mechanics of Solids CE, CEE, BEBA, BEBBus

FIELDS OF PRACTICE: CIVIL ENGINEERING PROGRAM Undergraduate

This subject aims to develop understanding of the behaviour of structural components and simple frames under load. In addition to the principles of equilibrium and linear elasticity, used in prior subjects to analyse simple structural components, students will learn how the principle of virtual work and the concept of compatibility can be used to analyse the response of deformable components to load and environmental effects. Students will develop their skills to apply energy principles and compatibility conditions to analyse internal actions and deformations of simple redundant frames. The subject also introduces the fundamental concepts of limit state design of structures. These concepts will be applied to the design of tension and compression members of timber and of steel.

Topics include: concept of work, introduction to strain energy, strain energy density in multi-axial stress states; effects of impact loading on axially loaded members and statically determinate beams; application of the principle of work to the calculation of deflections; concept of virtual work; application of the concept of virtual work to the calculation of deflections of statically determinate beams and frames; Maxwell-Betti reciprocal theorem; introduction to structural analysis; redundant structures, degrees of static indeterminacy and degrees of freedom, support conditions; method of consistent deformations; compatibility equations, analysis of 1 and 2 fold redundant beams and frames; effects of changes in temperature, lack of fit and support settlement; stiffness and flexibility matrices of beam and frame elements; failure theories appropriate for modelling engineering materials; determination of loads, load distributions and load combinations; introduction to concept of limit states – serviceability, strength, stability, durability fire rating;

material properties, quality assurance issues, specification and selection of appropriate materials – performance, aesthetics, cost, sustainability and environmental consideration; availability of manufactured materials and products; design of steel tension and compression members to AS4100; design of timber tension and compression members to AS1720.1.

48350

Environmental and Sanitation Engineering

6cp; prerequisite(s): 60101 Chemistry and Materials Science CE, BEBA, BEBBus

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 to 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 will help 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.

48351**Structural Analysis and Component Design**

6cp; prerequisite(s): 48341 Structural mechanics and Component Design

CE, CEE, BEBA, BEBBus

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. Earlier structural subjects have introduced students to statics, aspects of the structural design process, the structural behaviour of materials, some simple structural analysis methods and the structural design of tension and compression members in steel and timber in accordance with the relevant Australian Standards.

This subject introduces more involved methods of structural analysis, both by hand and by the use of computer software packages. The competence gained in structural analysis will assist students in gaining experience and competence in the structural design of other structural components. Students will learn about the behaviour of timber, steel and reinforced concrete beams and beam-columns and of timber and steel connections. They will gain competence in doing the structural design of timber, steel and reinforced concrete beams and beam-columns and of timber and steel connections in accordance with the relevant Australian Standards.

Structural analysis topics: method of moment distribution – revision of major assumptions used in linear elastic structural analysis, degree of indeterminacy, sign convention; physical interpretation of moment distribution; absolute bending stiffness, relative bending stiffness, distribution factors and carry-over factors; application of the method of moment distribution to continuous beams; application of the method of moment distribution to braced frames; application of the method of moment distribution to frames with single sway freedom; introduction to computer applications – introduction to typical commercial analysis programs; aspects of modelling, including global and local coordinate systems,

definition of nodes and members, member connectivity, nodal freedom and restraint and releases in members; definition of member and material properties; definition of loads and load combinations; analysis of a continuous beam and a frame on computer and the interpretation of the output.

Component design topics: beams in timber, steel and reinforced concrete – section moment capacities, deflection, long-term effects, shear; lateral-torsional buckling and member moment capacities in timber and steel; uncracked and cracked sections, linear elastic and ERSB behaviour in RC beams; beam-columns in timber, steel and reinforced concrete – second-order effects; section and member interaction; interaction diagrams and slenderness effects for RC beam-columns; connections in timber and steel – nailed and bolted joints in timber; bolted and welded joints in steel, loaded in-plane.

48352**Construction Materials**

6cp; prerequisite(s): 60101 Chemistry and Materials Science

CE, BEBA, BEBBus

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; 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.

48360

Geotechnical Engineering

6cp; prerequisite(s): 48330 Soil Behaviour; 48340 Construction

CE, BEBA, BEBBus

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 field work in association with subsurface investigations.

Topics include: shear strength theory – Mohr Coulomb failure law; site investigation – planning, field work, 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.

48361

Behaviour of Structures and Design

6cp; prerequisite(s): 48351 Structural Analysis and Component Design; 48240 Uncertainties and Risks in Engineering

CE, BEBA, BEBBus

FIELDS OF PRACTICE: CIVIL ENGINEERING PROGRAM Undergraduate

This subject encompasses fundamental concepts in two important aspects of structural engineering design: computer analysis and behaviour of skeletal structures, and design of complex structural elements in accordance with the requirements of the relevant Australian design standards.

The aims of the analysis component are to enable students to acquire a basic understanding of the theory of computer methods of analysis of skeletal structures and its application using commercially available software; reinforce computer modelling skills and develop the ability to verify computer results; develop an understanding of the behaviour of typical skeletal structures when subjected to actual loads; develop an understanding of the difference in behaviour of various structural systems. The aim of the design component is to give students an understanding of the basic concepts underlying the design of reinforced concrete slabs and pre-stressed concrete elements and to achieve some competence in the design of these elements in accordance with the relevant Australian design standards.

Topics include: comparison of analyses approaches by means of compatible deformations versus force equilibrium; the concept of stiffness method of analysis of plane frames; derivation of beam element stiffness matrix for different combinations of end conditions (rigid/pinned); assembly of structure stiffness matrix and load vector; solution for structure displacements and recovery of internal forces and reactions; simple three dimensional frames; plane frames subjected to support settlement and temperature loading; application of computer modelling to structural behaviour – plane frames (sway, versus non-sway frames); concepts of geometric non-linear behaviour of structures – non-linear load-deflection behaviour (P-D effects) of simple trusses made of rigid bars and linear elastic springs; concept of bifurcation instability; second order elastic analysis of plane frames; approximate methods of analysis – sources of inaccuracy inherent in various methods of structural analysis; analysis of rectangular

frames subject to vertical loads by assuming points of inflections; and analysis of rectangular frames subject to horizontal loads by the portal and cantilever method.

The subject also covers the design of complex structural elements in accordance with the requirements of the relevant Australian design standards – pre-stressed concrete to AS3600; overview of history of pre-stressed concrete and reasons for its use; elastic analysis of cracked and uncracked sections under severe loads; pre-stress strain; ultimate moment capacity using the Equivalent Rectangular Stress Block to AS3600; deflection; design for shear; reinforced concrete slabs to AS3600 – one way slabs; two way slabs supported on four sides; flat slabs with or without drop panels; punching shear; footings and cantilevered retaining walls.

48362

Hydraulics and Hydrology

6cp; prerequisite(s): 48641 Fluid mechanics CE, CEE, BEBA, BEBBus

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 will be consolidated and problem-solving skills in dealing with water engineering tasks will be 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.

48370

Transport in the Environment

6cp; prerequisite(s): 33230 Mathematical Modelling 2

CE, CEE, BEBA, BEBBus

FIELDS OF PRACTICE: CIVIL ENGINEERING PROGRAM Undergraduate

The objectives of this subject are to enable students to understand the following: 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.

48380

Civil and Environmental Engineering Design

6cp; prerequisite: successful completion of 144cp

CE, BEBA, BEBBus

FIELDS OF PRACTICE: CIVIL ENGINEERING PROGRAM, CIVIL AND ENVIRONMENTAL ENGINEERING PROGRAM Undergraduate

The objective of this subject is to enhance a student's engineering design skills. The student is given the opportunity to define a project topic related to his or her experience and future aspirations. Through a process of self-learning, the student is guided to undertake a total design process as encountered in a 'true to life' project. The subject aims to foster in students the skills and confidence to call on all aspects of their prior studies and experience to devise, analyse, assess and refine alternative workable solutions.

This subject has, as its core, the design and documentation of a major civil and/or environmental engineering project that draws for input on the knowledge and, more importantly, the competencies developed throughout the earlier stages of the courses. A 'project' should be defined and interpreted in its broadest sense. It

should be a complex problem requiring determination of scope, information collection, preliminary development of workable solutions, analysis, and conclusions. An integral part of the project is a very structured interaction with the client (subject coordinator and academic team). The documentation, presentation and selling of project definition, process, conclusions, and recommendations are essential requirements. The development of the design brief and formal reporting through presentations and documentation must all be taken in a professional manner in accordance with the standard expected of a consulting engineer.

48401

Aerospace Operations 1

6cp

BT

Undergraduate

This is the first subject in the Aerospace strand 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 25 per cent; literature review 30 per cent; major reports 30 per cent; class participation 15 per cent.

48402

Aerospace Operations 2

6cp; prerequisite(s): 48401 Aerospace

Operations 1

BT

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 strand. 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 objectives of the course overall, and facilitate understanding required of professionals in the industry.

Assessment: seminar presentation 25 per cent; literature review 30 per cent; major reports 30 per cent; class participation 15 per cent.

48403

Aerospace Operations 3

6cp; prerequisite(s): 48402 Aerospace
Operations 2

BT

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 25 per cent; literature review 30 per cent; major reports 30 per cent; class participation 15 per cent.

48404

Aerospace Maintenance and Management

6cp; prerequisite(s): 48403 Aerospace
Operations 3; corequisite(s): 48070

Engineering Material

BT

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 the students are familiar, and the management of the total operation.

Topics covered will 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 25 per cent; literature review 30 per cent; major reports 30 per cent; class participation 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
BT
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 will 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 25 per cent; literature review 30 per cent; major reports 30 per cent; class participation 15 per cent.

48430

Software Development

6cp; prerequisite(s): 48220 Informatics CSE, EE, SE, TE, BEBA, BEBBus, BScBE
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 development of software systems, including understanding of the concepts of software life cycles, processes and software paradigms; software methodologies; software

analysis, design, implementation, and testing; and algorithm design and problem solving. It also aims to develop in students the skill to apply analysis and design techniques and programming skills to the development of software systems; and equip them with the ability to acquire new software development skills as required by specific development projects.

Topics include: introduction to the software development life cycle and development processes and models (such as the waterfall model and the ISO 12207 model); 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); principles and procedures for software testing, verification, validation and debugging; approaches to algorithm design and problem solving; software coding – detailed coverage of a programming language in order to develop specific skills related to the above elements.

Students would have developed fundamental programming skills in the prerequisite subject 48220 Informatics. In order to further develop their programming skills, and to understand the relationships between different programming paradigms, they will be required to develop an understanding of the Java programming language. The object-oriented paradigm will be implemented using the Unified Modelling Language (UML) methodology.

48440

Software Engineering

6cp; prerequisite(s): 48430 Software Development
CSE, SE, TE, BEBA, BEBBus
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 will 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 will be 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

CSE, EE, SE, TE, BEBA, BEBBus, BScBE

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. The subject will develop a simple register-based computer incorporating I/O and interrupts.

Topics include: digital sequential circuits; state diagram and its application in the design of digital circuits; basic hardware architectures of the digital computer in terms of its building blocks; how hardware integrates with software at the machine level; low level language programming; internal architecture and design of a typical register-based central processing unit and a main memory subsystem, and their interdependence; concepts of computer system buses, as well as different types of input and output devices; interrupts and DMA (direct memory access) input and output; micro-controller theory; hardware interfacing design techniques. Aspects of real-time programming, concurrency and multiple processing, the

design of a basic multi-tasking operating system and the solution of a concurrent application. Optional modules toward the end of the subject cover an in-depth study of a selected micro-controller, advanced topics in embedded real time applications, printed circuit board design among others.

48450

Operating Systems

6cp; prerequisite(s): 48440 Software Engineering; 48441 Introductory Digital Systems

CSE, SE, TE, BEBA, BEBBus

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); 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; 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

CSE, BEBA, BEBBus

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 (1) analysis/design and (2) implementation, of an advanced computing node. The components are integrated, and are each worth 50 per cent of the course mark.

The subject provides an in-depth understanding of the analysis/design and implementation of advanced digital hardware at medium scale computer system building block level. It builds on the basics of Introductory Digital Systems introduced in the earlier 'field of practice' subjects. This subject is common to the Electrical, CSE and Telecommunication degree courses.

Topics include Quantitative Analysis, The Design Process, Functional Design, Implementation Technologies, Computer Architectures, memory and I/O Systems. It emphasises computer-aided design, including the use of the VHDL specification, simulation and integrated VLSI implementation technologies.

48470

Computer Systems Analysis

6cp; prerequisite(s): 48440 Software Engineering

CSE, BEBA, BEBBus

FIELDS OF PRACTICE: COMPUTER SYSTEMS ENGINEERING PROGRAM Undergraduate

The objectives of this subject are: to learn how to perform a thorough analysis of the various options for implementing a complex computer system; to learn how to write a detailed, unambiguous systems requirements specification; to learn how to acquire new analytical skills; to learn how to 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

SE, BEBA, BEBBus

FIELDS OF PRACTICE: COMPUTER SYSTEMS ENGINEERING PROGRAM Undergraduate

The aim 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 will be problem based. At the start of semester, students will be given an English language requirement specification for a manufacturing system. They will 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 will 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

CSE, BEBA, BEBBus

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 will 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

SE, BEBA, BEBBus

FIELDS OF PRACTICE: COMPUTER SYSTEMS ENGINEERING PROGRAM Undergraduate

The aim of this subject is to allow students to take the functional specification developed in Software Systems Design, and use it to design and develop the system. In this way the students will learn to develop a large software system, by actually completing and testing the system. They will 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 will be problem based. At the start of semester the students will be given a functional specification for a complex network based system. They will work in teams to develop a detailed design. The students will 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; prerequisite(s): 48210 Engineering for Sustainability

CSE, EE, ME, SE, TE, BEBA, BEBBus, BScBE

FIELDS OF PRACTICE: COMPUTER SYSTEMS ENGINEERING PROGRAM Undergraduate

The major objective of Introduction to Electrical Engineering 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. By the end of the subject, students should be eager to learn more of the analytical techniques used in electrical

engineering design and have had their choice of electrical engineering as a rewarding and stimulating future career confirmed.

The subject material is organised around 2 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 (2 semester mode); Offered jointly by the Faculty of Science and the Faculty of Engineering. Students may choose this subject or 68314 to suit their timetable.

CSE, EE, SE, TE, BEBA, BEBBus, BScBE

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 will be 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 will be a significant proportion of in-class delivery so as to make students proficient in circuit construction, testing, troubleshooting and 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 CSE, EE, TE, BEBA, BEBBus, BScBE

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 will be developed to the point of virtuosity, as students acquire proficiency in the rigorous analysis of real-world models. By a process of (1) theoretical investigation, (2) experiment design, (3) experimental testing, and (4) reflection, students will develop a clear conceptual and experiential understanding of the difference between real-world phenomena and the models that are used to represent them. While electrical circuits are a prime focus, the application of analysis techniques to other disciplines and types of system models will be concomitant. The subject will also provide a perspective on the historical development of this area and on present and future trends.

In most weeks students will partake in a three-hour small group teaching session with up to an additional three hours laboratory or in-field activities. Assessment will consist of individual and group work tasks with weekly quizzes and a final exam.

The following topics are covered:

Signals and Systems – introduction to spectral analysis, Laplace transforms; ideal and real voltage and current sources and loads;

resistors; capacitors, inductors and coupled coils; Kirchoff's voltage and current laws, Thevenin's and Norton's theorems, mesh and nodal analysis, symmetry, circuit transformation, superposition, solution of ODEs using Laplace; power in AC circuits, electrical distribution networks and devices, multiphase systems; one and two ports systems, transfer and immittance functions, two port parameters and behaviour; poles and zeros, s-plane analysis, Bode plots; first order systems – response to periodic and non-periodic inputs, time domain solution, frequency domain solution; arbitrary systems analysis – linear versus non-linear, response to an arbitrary input using convolution, dominant pole approximation, practical system identification techniques.

48531

Electromechanical Systems

6cp; prerequisite(s): 48510 Introduction to Electrical Engineering; 33230 Mathematical Modelling 2

CSE, EE, ME, BEBA, BEBBus

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

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- 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, non-linear, 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, watt-hour meter
- Electrostatic machines – Van der Graaf, Wimshurst, 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, air conditioning 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): 48220 Informatics; 33230 Mathematical Modelling 2

CSE, EE, TE, BEBA, BEBBus, BScBE

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 will also gain study skills including academic literacy skills, and an appreciation of the different fields of practice of engineering and the interdisciplinary nature of engineering.

Class time will be used for lecture-type resource sessions, tutorials, laboratories and project work. There will be a number of formal laboratory sessions that apply system theory to different engineering disciplines, which also familiarise students with the laboratory equipment. Several simple control systems will then be used as case studies in signals and system behaviour. The laboratory component culminates in a substantial group project that will require a formal written and oral presentation.

48550

Electrical Energy Technology

6cp; prerequisite(s): 48531 Electromechanical Systems; 48530 Circuit Analysis; 68038

*Advanced Mathematics and Physics
EE, BEBA, BEBBus, BSCBE*

*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, p.u. system
- Component non-ideal models and performance – transmission line, 1-phase and 3-phase transformer, dc and ac machines (dc, induction, synchronous as motor and generator)
- System control and design principles – energy storage, cogeneration, renewable generation, remote and grid-connected systems, and pollution control

Familiar

- 3-phase circuit theory – symmetrical components, unbalanced network, fault calculations, motor starting, generator short circuit
- Component models and performance – CT, VT, circuit breaker, cables
- System control and design principles – voltage selection, AC vs DC, system losses and efficiency

Aware (*exposure technologies*)

- Component models and performance – d, q transformation
- System control and design principles – P, Q, tie lines, state estimation, tap setting, economic load despatch, load flow, FACTS, SVC, harmonics
- Principles of protection – overcurrent, unit, distance, earth
- Power system applications – electric train, rolling mill, power station, air conditioning fan, sewerage or water pump, wind generator, sub-station, switchyard, HV and LV reticulation

Laboratory skills

- 1-phase transformer tests and performance
- 3-phase transformer tests and performance
- DC machine performance
- Induction machine parameters and performance
- 3-phase DC generator parameters and performance
- Power system performance

48551**Advanced Electronics**

6cp; prerequisite(s): 48530 Circuit Analysis EE, BEBA, BEBBus, BScBE

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 multi-stage 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

EE, BEBA, BEBBus, BScBE

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 Lagrangian techniques; linearisation and development of linear, time-invariant transfer functions; development of lead-lag compensators or PID controllers using classical control design techniques such as root locus, Bode gain and phase diagrams, Nyquist plots and Nichols chart; development of state-variable equations from differential equations; development of state-variable feedback controllers and state observers.; open-loop pulse transfer functions and discrete-time state models; discretisation using backward difference, bilinear, step-invariance or pole-zero mapping; development of digital PID controllers, deadbeat controllers, and discrete-time state-variable feedback controllers; describing functions and limit cycles for nonlinear control systems; and the development of linear controllers for nonlinear systems using describing function techniques.

48561**Power Electronics**

6cp; prerequisite(s): 48530 Circuit Analysis EE, BEBA, BEBBus

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 micro-controller 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 CSE, EE, BE (CSE, EE), BA

FIELDS OF PRACTICE: ELECTRICAL ENGINEERING PROGRAM Undergraduate

Objectives

By the end of this subject students should be able to:

- analyse, design, build and test: data acquisition and distribution systems (DADS); measurement systems; intelligent instrumentation systems
- characterise, specify and select to satisfy the requirements of a DADS: sensors/transducers and associated circuits; transducer analog interfacing and signal conditioning circuits; data conversion devices and systems
- interface DADS to computers, plant and installations
- write, test and embed control and programming software for DADS interfacing.

Material to be taught and learnt 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; data integrity.

48610

Introduction to Mechanical Engineering

6cp

CSE, EE, ME, BEBA, BEBBus

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, for example, 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 (2 semester mode)* or 68037 *Physical Modelling*; 33130 *Mathematical Modelling 1* or 33132 *Mathematical Modelling 1 (2 semester mode)*

ME, BEBA, BEBBus

FIELDS OF PRACTICE: MECHANICAL ENGINEERING PROGRAM Undergraduate

The objectives of this subject are to build on the engineering science fundamentals that were introduced in 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*
ME, BEBA, BEBBus

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 will 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*
ME, BEBA, BEBBus

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 CE, CEE, ME, BEBA, BEBBus

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; 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; environmental hydraulics.

48642

Strength of Engineering Materials

6cp; prerequisite(s): 60101 Chemistry and Materials Science; 48331 Mechanics of Solids ME, BEBA, BEBBus

FIELDS OF PRACTICE: MECHANICAL ENGINEERING PROGRAM Undergraduate

This subject draws on, and brings together, the knowledge and skills developed in earlier subjects such as Fundamentals of Mechanical Engineering, Chemistry and Materials Science, and 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
 ME, BEBA, BEBBus

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 (2 semester mode) or 68037 Physical Modelling; 48620 Fundamentals of Mechanical Engineering
 ME, BEBA, BEBBus

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
 ME, BEBA, BEBBus

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 non-linearities 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): 48651 Thermodynamics
 ME, BEBA, BEBBus

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

ME, BEBA, BEBBus

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

ME, BEBA, BEBBus

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 flat-pattern, 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 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

ME, BEBA, BEBBus

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 field 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 thermofluids as design.

48720**Introduction to Telecommunications Engineering***6cp**TE, BEBA, BEBBus**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 computers¹ (PCs, and workstations); networks¹, the Internet¹, 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; 33230 Mathematical Modelling 2; 48220 Informatics; corequisite(s): 48430 Software Development TE, BEBA, BEBBus

*FIELDS OF PRACTICE: TELECOMMUNICATIONS ENGINEERING PROGRAM**Undergraduate*

By completing this subject, students should be able to formulate their own answers to the following questions: How can data security on networks be achieved? What is the role of firewalls? What is the role of cryptographic codes? What file protection techniques exist? How can passwords be used effectively? What hardware security techniques exist? What software security techniques exist?

Topics include: file protection; password protection; controlling computer access; controlling file access; encryption algorithms; firewalls; virus threats and security measures; channel control; and channel verification.

48740**Communication Networks***6cp; prerequisite(s): 48430 Software Development**CSE, SE, TE, BEBA, BEBBus**FIELDS OF PRACTICE: TELECOMMUNICATIONS ENGINEERING PROGRAM**Undergraduate*

Students will be able to appreciate the principles, design approaches, standards and new digital networks in the field of telecommunications networks. The first half of this subject will concentrate on a number of basic principles that appear in this field and examine and evaluate alternative approaches to meeting specific requirements. Students will 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 will concentrate on both narrow-band 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 TE, BEBA, BEBBus

*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 will 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

TE, BEBA, BEBBus, BScBE

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

TE, BEBA BEBBus

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 TE, BEBA, BEBBus

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**CEE, ESE, BEBA**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**CEE, BEBA, BEBBus**FIELDS OF PRACTICE: ENVIRONMENTAL ENGINEERING PROGRAM Undergraduate*

This subject provides Civil and Environmental Engineering students with a detailed knowledge of (1) water pollution control objectives; (2) the design of potable water and sewage treatment processes and sewerage and water reticulation systems, and (3) the technologies used in the upgrading of water and wastewater treatment plants and in water reuse.

At the completion of this subject, students will 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
CEE, BEBA, BEBBus*

*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 will help 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 will 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*, 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 will be 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 will assist in developing verbal communication skills and audiovisual 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
CEE, BEBA, BEBBus*

*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 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 network, 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**Availability: 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 30 per cent each; one quiz 40 per cent.

49002**Project Management***6cp; 3hpw/distance mode**Availability: all courses (core for MEM)**Postgraduate**Subject Coordinator: Mr R Bagia*

The emphasis is an interdisciplinary one of relevance to all fields of engineering. The subject considers the management, financial and contractual responsibilities of engineering managers and organisations from the establishment of a project team and the instigation of a contract. The perspective of all parties, including principal contractors and subcontractors is considered.

Assessment: assignments 30 per cent; reading list evaluations 30 per cent; project 40 per cent.

49003**Economic Evaluation***6cp; 3hpw/distance mode**Availability: 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 40 per cent; two quizzes 60 per cent.

49004**Systems Engineering for Managers***6cp; 3hpw; prerequisite(s): 49001 Judgment**and Decision Making; corequisite(s): 49002**Project Management**Availability: 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) 20 per cent; group assignment (relating to case studies) 30 per cent; individual project (including seminar) 50 per cent.

49006**Risk Management in Engineering***6cp; 3hpw; prerequisite: suitable undergraduate subject**Availability: all courses**Postgraduate**Subject Coordinator: Mr 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 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
Availability: 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 will also learn how to use computer tools to construct a project plan of a real project and control a simulated project. Students will understand how models for Project Management have been developed and which models are appropriate in different contexts. The model will include the 'waterfall' model, the incremental development model and the spiral model. Models for risk assessment and financial planning aspects of projects will also be covered. Students will 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 40 per cent; simulating a project 10 per cent; auditing a project 10 per cent; preparation and participation in workshop 20 per cent; subject portfolio 10 per cent; computer-mediated conference participation 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
Availability: all courses

Postgraduate

Subject Coordinator: Associate Professor
T Anderson

The aim of this subject is to explore the influence of Information Technology (IT) on organisations and management and in particular

engineering management. Students will critically examine both past and recent IT innovations. Issues in information technology will extend into groupware, computer-aided logistic support, decisions support systems, tools for systems engineering and communications technology including the Internet. Students will 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 will be on the Internet.

Assessment: development of IT policy and selection criteria for the IT Manager 30 per cent; library research group project 30 per cent; participating and reflection on using computer mediating conferencing tools 20 per cent; debate 20 per cent.

49014

Quality Assurance in Construction

6cp; block attendance; prerequisite(s): 48340 Construction or equivalent
Availability: all courses

Postgraduate

Subject Coordinator: Associate Professor
T Anderson

The subject promotes awareness of, and develops skills in, quality management in the practice of construction engineering. It extends the scope of the traditional curriculum of construction management. Emphasis is placed on quality control and quality assurance, quality assurance of construction project and development and implementation of quality systems.

Assessment: assignments 30 per cent, quizzes 30 per cent, project (incl. seminar) 40 per cent.

49021

Evaluation of Infrastructure Investments

6cp; 3 modules, each 2 days; prerequisite: introductory course in Probability and Statistics or equivalent

Availability: limited (core in Energy Planning and Policy programs for ME, MTech)

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 40 per cent; quizzes 50 per cent; contribution to class discussions 10 per cent.

49022

Energy Resources and Technology

6cp; block attendance

Availability: limited (core in Energy Planning and Policy programs for ME, MTech)

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 40 per cent; quizzes 60 per cent.

49023

Energy and Environmental Economics

6cp; 3 modules, each 2 days; prerequisite: introductory course in Microeconomics or equivalent; corequisite(s): 49021 Evaluation of Infrastructure Investments

Availability: limited (core in Energy Planning Policy programs for ME, MTech)

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 40 per cent; quizzes 50 per cent; participation 10 per cent.

49024

Energy Modelling

6cp; 3 modules, each 2 days; prerequisite(s):

49023 Energy and Environmental Economics;

49021 Evaluation of Infrastructure

Investments; (recommended)

Availability: limited (core in energy Planning and Policy programs for ME, MTech)

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 40 per cent; quizzes 50 per cent; contribution to class discussions 10 per cent.

49025

Methods for Energy Analysis

3cp; 3hpw

Availability: limited

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 60 per cent; examinations 40 per cent.

49026

Electricity Sector Planning and Restructuring

6cp; 3 modules, each 2 days; prerequisite(s):

49021 Evaluation of Infrastructure

Investments; 49023 Energy and Environmental Economics; (recommended)

Availability: limited (see prerequisites)

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 40 per cent; quizzes 50 per cent; contribution to class discussions 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

Availability: limited (see prerequisites)

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 will 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 40 per cent; quizzes 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

Availability: limited (see prerequisite)

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; decision methods for program design.

Assessment: assignments 40 per cent; quizzes 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)

Availability: limited (see prerequisites)

Postgraduate

Subject Coordinator: Associate Professor

D Sharma

This subject introduces students to the following: 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 40 per cent; quizzes 60 per cent.

49032

Sustainable Technological Development

6cp; 3hpw or block attendance

Availability: 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 50 per cent; minor assignment 25 per cent; presentations and contribution to class discussions 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

Availability: all courses

Postgraduate

Subject Coordinator: Mrs 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 the student's 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 will work with professionals from other non-engineering disciplines which will increase their awareness of engineers' interdependence on other professions as well as enhance their experience in managing group dynamics.

Students will 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 1 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 will specify 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: enrolment in a UTS Research program at Master's or Doctoral level

Availability: all coursework

Postgraduate

Subject Coordinators: Professor W R Belcher, 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 preparing 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: suitable undergraduate subjects

Availability: 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 non-linear 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 60 per cent; project 20 per cent; quiz 20 per cent.

49050–76**Graduate Project**

12cp; individual supervision over 1 semester; prerequisite(s): completion of all other subject requirements of the course in which the student is 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 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.

49050	Graduate Project (12cp in 1 sem)
49051	Graduate Project (12cp in 2 sem)
49052	Graduate Project (18cp in 1 sem)
49053	Graduate Project (19cp in 1 sem)
49054	Graduate Project (20cp in 1 sem)
49055	Graduate Project (21cp in 1 sem)
49056	Graduate Project (22cp in 1 sem)
49057	Graduate Project (23cp in 1 sem)
49058	Graduate Project (24cp in 1 sem)
49060	Graduate Project (18cp in 2 sem)
49061	Graduate Project (19cp in 2 sem)
49062	Graduate Project (20cp in 2 sem)
49063	Graduate Project (21cp in 2 sem)
49064	Graduate Project (22cp in 2 sem)
49065	Graduate Project (23cp in 2 sem)
49066	Graduate Project (24cp in 2 sem)

49070	Graduate Project (18cp in 3 sem)
49071	Graduate Project (19cp in 3 sem)
49072	Graduate Project (20cp in 3 sem)
49073	Graduate Project (21cp in 3 sem)
49074	Graduate Project (22cp in 3 sem)
49075	Graduate Project (23cp in 3 sem)
49076	Graduate Project (24cp in 3 sem)

49082, 49083, 49084, 49086**Special Course A****49092, 49093, 49094, 49096****Special Course B**

2cp; normally block attendance; prerequisite: appropriate to the agreed learning contract

Availability: 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

Availability: all courses

Postgraduate

Subject Coordinator: Mr 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 will be 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 40 per cent; examination 60 per cent.

49104

Asset Maintenance Management

6cp; block attendance

Availability: all courses

Postgraduate

Subject Coordinator: Mr 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.

Subjects include legislative and other requirements, basic maintenance strategies, maintenance support strategies, risk assessment and control, maintenance management systems.

Assessment: project 40 per cent; examination 60 per cent.

49105

Water Supply and Wastewater Management

6cp; block attendance

Availability: 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 will understand 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 30 per cent; mid-semester examination 25 per cent, formal final examination 45 per cent.

49106

Road Engineering Practice

6cp; block attendance

Availability: 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 will be paid to the requirements of the residential street network. Students will 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 40 per cent; examination 60 per cent.

49107

Storm Runoff Regulation

6cp; block attendance

Availability: 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 50 per cent; final examination 50 per cent.

49108

Local Government Law

6cp; block attendance

Availability: all courses

Postgraduate

Subject Coordinator: Mr 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 40 per cent; examination 60 per cent.

49111

Coastal Engineering

6cp; 3hpw; prerequisite: Sound knowledge of Mathematics and Fluid mechanics as part of a first or higher degree in Engineering or a cognate discipline

Availability: all courses

Postgraduate

Subject Coordinator: Mr 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 non-linear 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 60 per cent; examinations 40 per cent.

49113

Urban Stormwater Pollution Management

6cp; 3 blocks of 1.5 day sessions with optional tutorials; prerequisite: suitable undergraduate subjects

Availability: all courses

Postgraduate

Subject Coordinator: Dr S Beecham

The subject develops understanding of the nature of pollution processes and levels in urban situations, and of engineering systems for the reduction of pollution, particularly in receiving waters. Students consider pollution management systems in terms of social and environmental requirements, and the rationale for design and implementation of remedial measures. Through a series of assignments, students become familiar with commonly used procedures and aware of problems encountered in practice.

Assessment: continuous assessment involving six assignments.

49114

Statistical Hydrology

6cp; block attendance totalling 30 hours; prerequisite: 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

Availability: all courses

Postgraduate

Subject Coordinator: Mr 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 20 per cent each; end-of-semester examination 40 per cent.

49121**Environmental Assessment and Planning***6cp; 3hpw**Availability: all courses (core for GC(EEM))**Postgraduate**Subject Coordinator: Mr K Halstead*

This subject analyses the principles of sustainable development and the expectations which they place 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 40 per cent; formal examination 60 per cent.

49122**Ecology and Sustainability***6cp; 3hpw**Availability: all courses (core for GC(EEM))**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 30 per cent; examinations 70 per cent.

49123**Waste and Pollution Management***6cp; 3hpw**Availability: all courses (core for GC(EEM))**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 50 per cent; examinations 50 per cent.

49124**Water Quality Management***6cp; 3hpw**Availability: all courses (core for GC(EEM))**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 will enable students to gain a general knowledge of these systems, their vulnerability to pollution and degradation, and remedial measures.

Assessment: two essays 20 per cent; class exercises 30 per cent; quiz and final examination 50 per cent.

49125**Environmental Risk Assessment***6cp; 3 blocks, each of 2 days**Availability: all courses**Postgraduate**Subject Coordinator: Mr 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; environmental auditing procedures.

Assessment: three assignments 20 per cent each; examination 40 per cent.

49126

Environmental Management of Land

6cp; 3hpw or block attendance; prerequisite: suitable undergraduate subjects

Availability: 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 50 per cent; one quiz 50 per cent.

49127

On-site Water and Wastewater Treatment

6cp; block attendance

Availability: all courses

Undergraduate

Subject Coordinator: Dr P Hagare

Due to increased urban sprawl the development of on-site water and wastewater treatment systems are 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 shortcoming will also be covered in this subject.

Assessment: two assignments 30 per cent, major project 20 per cent, and exam 50 per cent.

49131

Bridge Design

6cp; 3hpw; prerequisite: strong background in the design of civil engineering structures

Availability: 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 4 stages 90 per cent, final presentation 10 per cent.

49132

Stability of Structures

6cp; 3hpw; prerequisite: suitable undergraduate subjects

Availability: 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 non-linear 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 60 per cent; informal final examination 40 per cent.

49133**Steel and Composite Design**

6cp; prerequisite: suitable undergraduate subjects

Availability: 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 course will develop familiarity with both Australian and overseas code provisions and their underlying concepts. The teaching strategy will consist of formal and informal lectures, with student participation.

Assessment: composite beam project 25 per cent; plastic design projects 25 per cent; two quizzes, 20 and 30 per cent each respectively.

49134**Structural Dynamics and Earthquake Engineering**

6cp; 3hpw or block attendance; prerequisite: suitable undergraduate subjects

Availability: 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 50 per cent; quizzes 50 per cent.

49135**Wind Engineering**

6cp; 3hpw or block attendance; prerequisite: suitable undergraduate subjects

Availability: 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 50 per cent; two quizzes 25 per cent each.

49136**Timber in Engineering Design**

6cp; 3hpw; prerequisite: suitable undergraduate subjects, competency in computer modelling

Availability: all courses

Postgraduate

Subject Coordinator: Associate Professor K Crews

This subject will present recent advances that have enhanced the role of timber as a versatile renewable resource with a wide range of applications in engineered structures. It will familiarise 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 will 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 will be addressed.

Assessment: assignments 40 per cent; major design project 60 per cent (including presentation).

49137**Railway Engineering**

6cp; 3hpw

Availability: all courses

Postgraduate

Subject Coordinator: Mr 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

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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 50 per cent; bridge design project 20 per cent; quiz 30 per cent.

49141

Advanced Geomechanics

6cp; 3hpw

Availability: all courses

Postgraduate

Subject Coordinator: Dr G Ring

This course 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 non-linear analysis of structural interaction, and stress around underground openings.

Assessment: assignments 50 per cent; projects 50 per cent.

49150

Prestressed Concrete Design

6cp; 3hpw; prerequisite(s): 48361 Behaviour of Structures and Design; (for undergraduate students taking this as a structural elective), (for postgraduate students, a strong understanding of reinforced concrete behaviour and design and an understanding of the fundamentals of prestressed concrete behaviour)

Availability: all courses

Postgraduate

Subject Coordinator: Mr 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 25 per cent; quizzes 35 per cent; final exam 40 per cent.

49151

Concrete Technology and Practice

6cp; prerequisite: suitable undergraduate subjects

Availability: 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 15 per cent; mid-semester quiz 20 per cent; major report 25 per cent; final examination 50 per cent.

49152

Damage and Repair of Concrete Structures

6cp; prerequisite: suitable undergraduate subjects

Availability: 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 20 per cent; quizzes 30 per cent; seminar 10 per cent; major report 30 per cent.

49201**Integrated Services Networks**

6cp; 3hpw; prerequisite: suitable undergraduate subjects

Availability: all courses (core for ME(TE))

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 25 per cent; laboratory project 25 per cent; final examination 50 per cent.

49202**Communication Protocols**

6cp; 3hpw; prerequisite: suitable undergraduate subjects

Availability: all courses (core for ME(TE))

Postgraduate

Subject Coordinator: Dr R Braun

In this subject students will 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 40 per cent; examination 60 per cent.

49203**Telecommunications Signal Processing**

6cp; 3hpw; prerequisite: suitable undergraduate subjects

Availability: all courses (core for ME(TE))

Postgraduate

Subject Coordinator: Dr R Braun

This course will focus on one aspect of telecommunications signal processing: source coding of images and audio. Incorporated in this main topic will be: 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 will be brought together with an in-depth examination of JPEG coding of images.

Finally, we will discuss the implementation of various other compression methods, including MPEG-2, MPEG-4, MPEG-audio, and various techniques of speech coding.

Assessment: assessment is project based.

49204**Advanced Teletraffic Engineering**

6cp; 3hpw; prerequisite: suitable undergraduate subjects; corequisite(s): 49201 Integrated Services Networks

Availability: all courses (core for ME(TE))

Postgraduate

Subject Coordinator: Dr R Braun

The subject exposes students to 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 60 per cent; final examination 40 per cent.

49205**Transmission Systems**

6cp; 3hpw; prerequisite(s): 49203

Telecommunications Signal Processing or equivalent

Availability: all courses (core for ME(TE))

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

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satellite links demonstrate how the effects of performance degradation are incorporated into the link budget. Subject involves lectures supported by assignments and project work using laboratory facilities.

Assessment: design assignment 20 per cent; written examination 80 per cent.

49207

Advanced Concepts in Microwave and Mobile Communications

6cp; 3hpw; prerequisite: some knowledge of Fields and Waves, communication channels
Availability: Telecommunications only; Delivery mode: 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. In this subject, we discuss and explore 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. We will also explore techniques involved in the design of novel antennas for wireless communications.

Assessment: to be announced by subject coordinator at first meeting.

49209

Advanced Web Technology

6cp; 3hpw; prerequisite: experience in usage of both PC and Unix computer systems, familiarity with Email and tools such as Telnet and FTP, HTML, Web page design and Java programming
Availability: 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 20 per cent, Development/Research project 60 per cent, Quiz 20 per cent.

49210

Website Design and Management

6cp; 3hpw; prerequisite(s): 49209 Advanced Web Technology
Availability: 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 will 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, 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 20 per cent, Development/Research project 60 per cent, Quiz 20 per cent.

49211

Software Engineering Principles

6cp; 3hpw; prerequisite: some programming study and experience, ideally in industry
Availability: all courses (core for SEP Graduate Certificate)
Postgraduate
Subject Coordinator: Mr 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 50 per cent, major project (industry involvement where possible) 50 per cent.

49212**Object-oriented Languages**

6cp; 3hpw; prerequisite: some programming study (in C) and experience

Availability: all courses (core for SEP Graduate Certificate)

Postgraduate

Subject Coordinator: Mr 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: 50 per cent major development project; 50 per cent learning contract.

49213**Human-Machine Interfaces and Software Implementation**

6cp; 3hpw; prerequisite: some programming study and experience, ideally in industry

Availability: all courses (core for SEP Graduate Certificate)

Postgraduate

Subject Coordinator: Mr 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: 30 per cent HMI software design project; 70 per cent software development learning contract.

49214**UNIX and C**

6cp; 3hpw; prerequisite(s): 48430 Software Development; (or equivalent programming experience)

Availability: all courses (core for SEP Graduate Certificate)

Postgraduate

Subject Coordinator: Dr C Scott

A subject to develop 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

Availability: all courses

Postgraduate

Subject Coordinator: Dr 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 socio-economic 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

Availability: all courses

Postgraduate

Subject Coordinator: Dr 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/block attendance; prerequisite(s):

49211 *Software Engineering Principles*

Availability: all courses (core for SEP Master's degree)

Postgraduate

Subject Coordinator: Mr 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 50 per cent; major project (industry involvement where possible) 50 per cent.

49218

Asynchronous Transfer Mode (ATM) Technology

6cp; prerequisite(s): 49201 *Integrated Services Networks*; 49202 *Communication Protocols*

Availability: Telecom only; delivery mode: special topic

Postgraduate

Subject Coordinator: Mr 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: Telecom only; delivery mode: special topic

Postgraduate

Subject Coordinator: Mr 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: Telecom only; delivery mode: special topic

Postgraduate

Subject Coordinator: Mr 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: Telecom only; delivery mode: special topic

Postgraduate

Subject Coordinator: Dr 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, entropy, 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: Telecom only; delivery mode: 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: Telecom only; delivery mode: 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: Telecom only; delivery mode: special topic

Postgraduate

Subject Coordinator: Associate Professor S Reisenfeld

We introduce 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/block attendance or part-time;

prerequisite(s): 49211 Software Engineering Principles

Availability: all courses (core for SEP Master's degree)

Postgraduate

Subject Coordinator: Mr 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 (80 per cent) and an examination (20 per cent).

49226

Modem/Codec Design

6cp; prerequisite(s): 49205 Transmission Systems

Availability: Telecom only; delivery mode: 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

Availability: all courses (core for SEP Master's degree)

Postgraduate

Subject Coordinator: Mr J Leaney

This subject establishes, first, the need for software engineering, the current state of the field, and the role that the software engineering program can play in this context.

Second, it is a subject to develop competency in the capture of system requirements and their representation. The requirements' capture focuses on the use of realtime structured analysis and English for representation and documentation. 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 10 per cent; software design project 30 per cent; software specification learning contract 30 per cent; software verification learning contract 30 per cent.

49234

Real-time Object-oriented Software Development

6cp; block attendance; prerequisite: substantial programming study and experience

Availability: all courses (core for SEP Master's degree)

Postgraduate

Subject Coordinator: Mr 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++ will also be covered, especially aspects related to realtime systems.

Assessment: student presentations 20 per cent; software design projects 20 per cent; four minor projects to be used during the second academic project 4 x 15 per cent.

49236

Software Development Project

6cp; block attendance

Availability: Software Engineering Program only

Postgraduate

Subject Coordinator: Mr 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**Availability: all courses (core for SEP Master's degree)**Postgraduate**Subject Coordinator: Mr 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 30 per cent; report 30 per cent; projects 40 per cent.

49238**Telecommunications Network Management***6cp; prerequisite(s): 48740 Communication Networks; 48340 Construction**Availability: Telecom only**Postgraduate**Subject Coordinator: Mr 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.

49261**Biomedical Instrumentation***6cp; 3hpw; prerequisite: suitable undergraduate subjects**Availability: all courses**Postgraduate**Subject Coordinator: Associate 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 25 per cent; project work and seminar 50 per cent (includes 20 per cent for seminar); final examination 25 per cent.

49271**Computer Architecture***6cp; 3hpw; prerequisite: suitable undergraduate subjects**Availability: all courses**Postgraduate**Subject Coordinator: Mr N J Carmody*

The subject explores at an advanced level issues that impact upon the hardware design of modern computers. This experience will enable the student with a quantitative definition of an application requirement to evaluate a proprietary system, to develop a hardware system using standard sub-assemblies, and to design system components, such as specialised processor elements, which meet the application requirement.

Assessment: final examination 50 per cent; laboratory assignment 30 per cent; other assignments 20 per cent.

49272**Adaptive and Multivariable Control***6cp; 3hpw; prerequisite: suitable undergraduate subjects**Availability: all courses**Postgraduate**Subject Coordinator: Dr J G Nicol*

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 50 per cent; three out of four assignments 50 per cent.

49274

Advanced Robotics

6cp; 3hpw or block attendance; prerequisite: suitable undergraduate subjects

Availability: all courses

Postgraduate

Subject Coordinator: Dr R Meegoda

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 course, 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 30 per cent; laboratories and quizzes 10 per cent; final examination 60 per cent.

49275

Neural Networks and Fuzzy Logic

6cp; 3hpw; prerequisite: suitable undergraduate subjects

Availability: all courses

Postgraduate

Subject Coordinator: Associate 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 totalling 25 per cent; project 50 per cent and final examination 25 per cent.

49276

Sliding Mode Control

6cp; 3hpw or block attendance; prerequisite: suitable undergraduate subjects

Availability: all courses

Postgraduate

Subject Coordinator: Associate 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 25 per cent; examination 25 per cent; project 50 per cent.

49306

Quality and Operations Management Systems

6cp; 3hpw or block mode

Availability: all courses

Postgraduate

Subject Coordinator: Associate Professor

T Anderson

More and more organisations recognise that quality is a core strategy for survival in the market. An effective Quality System with its appropriate procedures will ensure that customer requirements are met continuously.

This subject helps 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 30 per cent; projects 30 per cent; written examination 40 per cent.

49307**Internal Combustion Engines and Environmental Issues**

6cp; 3hpw or block attendance

Availability: 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 35 per cent; projects 35 per cent; examination 30 per cent.

49309**Quality Planning and Analysis**

6cp; 3hpw/distance mode; prerequisite:

suitable undergraduate subjects

Availability: all courses

Postgraduate

Subject Coordinator: Associate Professor

T Anderson

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: concept mastery tests 20 per cent; assignments 40 per cent; project including seminar 40 per cent.

49311**Advanced Heat Transfer**

6cp; 3hpw

Availability: 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 convection 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: suitable undergraduate subjects, plus some programming experience

Availability: 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 50 per cent; assignments 35 per cent; laboratories 15 per cent.

49318**Manufacturing Systems Management**

6cp; 3hpw/distance; prerequisite(s): 48621

Manufacturing Engineering or equivalent

Availability: all courses

Postgraduate

Subject Coordinator: Associate Professor

T Anderson

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 non-linear, 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 35 per cent; formative assignments 35 per cent; examination 30 per cent.

49321

Energy Conversion

6cp; 3hpw

Availability: 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 will consider 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 will be directed towards improving understanding of the fundamentals of the energy conversion.

Assessment: assignments 15 per cent; laboratories and case studies 60 per cent; examination 25 per cent.

49322

Airconditioning

6cp; 3hpw; prerequisite(s): 48651

Thermodynamics

Availability: 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, to maintain 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 20 per cent; project 30 per cent; examination 50 per cent.

49323

Vibration Analysis: Theory and Applications

6cp; 3hpw or block attendance; prerequisite(s):

48662 Mechanical Applications

Availability: all courses

Postgraduate

Subject Coordinator: Dr 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 70 per cent; final examination 30 per cent.

49324

Instrumentation and Condition Monitoring

6cp; 3hpw or block attendance; prerequisite(s): 48660 Dynamics and Control

Availability: 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 70 per cent; final examination 30 per cent.

49325

Computer-aided Mechanical Design

6cp; 3hpw or block attendance; prerequisite(s): 48650 Mechanical and Manufacturing Design

Availability: all courses

Postgraduate

Subject Coordinator: Mr T Brown

This subject extends the development of students' design skills. Students will 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 will be used for designing mechanical systems and controls, and to introduce virtual prototyping. A finite element analysis program will be used for analysing stresses in mechanical components. Although commercially available software will be used, students will not simply be 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 70 per cent; quiz 30 per cent.

49326

Heat Transfer and Equipment Design

6cp; 3hpw

Availability: 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 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 10 per cent; laboratory reports 10 per cent; design projects 50 per cent; examination 30 per cent.

49327

Advanced Kinematics and Dynamics

6cp; 3hpw

Availability: 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 gyrocompasses and inertial navigation, calculation of forces in 'swash plate' mechanisms and the theory of spin stability and non-synchronous whirl.

Assessment: five assignments, 100 per cent.

49550

Computing for Groundwater Specialists

Ocp; block attendance totalling 24 hours

Availability: ME(GWM), GDE(GWM) only

Postgraduate

Subject Coordinator: Mr 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.

Assessment: continuous assessment involving assignments and problems.

49551

Surface Hydrology and Groundwater

6cp; block attendance totalling 36 hours

Availability: all courses (core for ME(GWM) and GDE(GWM))

Postgraduate

Subject Coordinator: Professor M J Knight, National Centre for Groundwater Management

This subject provides the interface process link between Surface Hydrology and Groundwater. Topics include hydrological cycle, water and energy balances and circulation, precipitation, interception, infiltration, storm runoff, hydrograph analysis, evaporation and transpiration, surface and groundwater interactions, land-use effects, artificial recharge.

Assessment: continuous assessment involving assignments and problems and short examinations.

49554

Groundwater Computing

6cp; block attendance

Availability: all courses (elective for ME(GWM) and GDE(GWM))

Postgraduate

Subject Coordinator: Mr N Merrick, National Centre for Groundwater Management

This subject provides a strong computing basis for groundwater management especially in the area of statistics and graphics as applied to groundwater problems involving computing. Introduction to DOS and Windows operating systems, databases, spreadsheets, word processing, elements of geostatistics and graphical packages with applications related to groundwater processes, groundwater computing project.

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;

corequisite(s): 49550 Computing for Groundwater Specialists

Availability: all courses (core for ME(GWM) and GDE(GWM))

Postgraduate

Subject Coordinator: Mr N Merrick, National Centre for Groundwater Management

The subject 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, bore-field management, optimisation problems.

Assessment: continuous assessment involving assignments, problems and short examinations.

49629**New Business Creation**

6cp; prerequisite(s): 48250 Engineering Economics and Finance

Availability: 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.

There will be a single three (3) hour block each week which will consist of lectures, presentations, case study discussions and workshops, videos and computer print based material.

In addition to three hours, students will be 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: 10 per cent; Assignment Number 1: 10 per cent; Assignment Number 2: 20 per cent; two-hour examination 60 per cent.

49701**Gas Sector Planning**

6cp; block attendance; prerequisite(s): 49021

Evaluation of Infrastructure Investments;

49023 Energy and Environmental Economics

Availability: limited (see prerequisites)

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 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: 40 per cent assignments; 50 per cent quizzes; 10 per cent contribution to class discussion.

49702**Gas Distribution Technology and Management**

6cp; block attendance

Availability: 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 their 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: 40 per cent assignments; 50 per cent quizzes; 10 per cent contribution to class discussion.

49703**Selected Topics (Energy Pricing)**

3cp; block attendance; prerequisite(s): 49023

Energy and Environmental Economics

Availability: limited (see prerequisite)

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.

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Assessment: 40 per cent assignments; 50 per cent quizzes; 10 per cent contribution to class discussion.

49706

Regulatory Economics

6cp; block attendance; prerequisite(s): 49021 Evaluation of Infrastructure Investments; 49023 Energy and Environmental Economics; 49026 Electricity Sector Planning and Restructuring
Availability: limited (see prerequisites)
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 sector 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: 40 per cent assignments; 50 per cent quizzes; 10 per cent contribution to class discussion.

4xxxx

Construction Management 1A

8cp
Undergraduate

This subject covers residential construction for single occupancy. Topics covered include: terminology and detail design of typical residential buildings; footings, floor, wall and roof framing, cladding, windows and doors, finishes and joinery; building regulations; interpreting architectural drawings and sketching construction details; model making; concurrent practical studies and field work.

4xxxx

Construction Management 2A

8cp; prerequisite(s): 4xxxx Construction Management 1A
Undergraduate

This subject looks at residential construction for multiple occupancy and is centred on terminology and detail design of typical attached housing, including: duplex, villa, townhouse, cluster housing and walk up flats.

Topics will include: footings, floor, wall and roof framing, cladding, windows and doors, finishes and joinery; interpreting architectural drawings and sketching construction details; building regulations; model making; industrial construction; terminology and detail design of typical industrial buildings; as well as concurrent practical studies and field work.

4xxxx

Construction Management 2S

8cp; prerequisite(s): 4xxxx Construction Management 1A
Undergraduate

This subject looks at residential construction for multiple occupancy and is centred on terminology and detail design of typical attached housing, including: duplex, villa, townhouse, cluster housing and walk up flats. Topics will include: footings, floor, wall and roof framing, cladding, windows and doors, finishes and joinery; interpreting architectural drawings and sketching construction details; building regulations; model making; industrial construction; terminology and detail design of typical industrial buildings; as well as concurrent practical studies and field work.

4xxxx

Construction Management 3A

8cp; prerequisite(s): 4xxxx Construction Management 2A
Undergraduate

The focus of this subject will be multi-storey commercial construction. Detailed attention will be given to: footings, sub-surface drainage systems, basement construction, load-bearing wall systems, concrete framed buildings and steel framed buildings for multi-storey construction; transportation and placement of concrete; prestressed and post-tensioned concrete; prefabricated construction; scaffolding; building regulations together with concurrent practical studies and field work.

4xxxx

Construction Management 3S

8cp; prerequisite(s): 4xxxx Construction Management 2S
Undergraduate

The focus of this subject will be multi-storey commercial construction. Detailed attention will be given to: footings, sub-surface drainage systems, basement construction, load-bearing wall systems, concrete framed buildings and steel framed buildings for multi-storey

construction; transportation and placement of concrete; prestressed and post-tensioned concrete; prefabricated construction; scaffolding; building regulations together with concurrent practical studies and field work.

4xxxx

Construction Management 4A

*8cp; prerequisite(s): 4xxxx Construction Management 3A
Undergraduate*

This subject continues the analysis of multi-storey commercial construction. Topics include: shoring, formwork, stair and ramp construction; curtain walling, built-up roofing systems, doors and frames, partitions, suspended ceilings and finishes; construction techniques and equipment used for temporary works, site preparation and demolition; earthmoving and soil compaction equipment, compressed air services, piling systems and associated plant, dewatering, blasting equipment and landscaping; refurbishment and restoration of buildings; building and fire safety regulations and requirements; occupational health and safety; as well as concurrent practical studies and field work.

4xxxx

Construction Management 4S

*8cp; prerequisite(s): 4xxxx Construction Management 3S
Undergraduate*

This subject continues the analysis of multi-storey commercial construction. Topics include: shoring, formwork, stair and ramp construction; curtain walling, built-up roofing systems, doors and frames, partitions, suspended ceilings and finishes; construction techniques and equipment used for temporary works, site preparation and demolition; earthmoving and soil compaction equipment, compressed air services, piling systems and associated plant, dewatering, blasting equipment and landscaping; refurbishment and restoration of buildings; building and fire safety regulations and requirements; occupational health and safety; as well as concurrent practical studies and field work.

SUBJECTS OFFERED BY OTHER FACULTIES

21715

Strategic Management

*6cp; prerequisite(s): 22747 Accounting for Managerial Decisions; 25706 Economics for Management; 24734 Managerial Marketing; 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.

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

Managerial Marketing

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.

25706**Economics for Management***6cp**Postgraduate*

Provides an intensive introduction to the two major components of economic theory – micro-economics (which deals with the behaviour of individuals, firms and industries) and macro-economics (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 optimal 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

Subject Coordinator: Dr G Keller

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 usability.

31429**Procedural Programming**

6cp; prerequisite(s): 31415 Principles of Software Development A

Subject Coordinator: Dr B Howarth

This subject deals with top-down structured program design techniques and their application to the development of commercial programming applications. Emphasis will be

on the quality and usability of the resultant systems. Debugging and testing skills are developed. The language used is C.

31434**Database Design**

6cp; prerequisite(s): 31424 Systems Modelling
Subject Coordinator: Dr G Feuerlicht

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*

Subject Coordinator: Professor J Debenham

This subject introduces students to some of the theory underlying computing science. It includes such topics as formal methods and computational complexity.

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

Subject Coordinator: Mr B Wong

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.

32107**Formal Reasoning for Software Development**

6cp; prerequisite(s): 48440 Software Engineering; 48122 Engineering Practice Review 1

This subject promotes a methodology where correctness is established before efficiency is considered. Specification languages allow the precise description of systems, while abstracting away from implementation concerns. Formal refinement allows programs to be developed from specifications, while preserving correctness. Semantics of languages provide a basis for reasoning about their correct implementation. Reasoning about concurrency is difficult; formal models of concurrency will be introduced.

32108**Applications of Artificial Intelligence**

6cp
Subject Coordinator: Professor J Debenham

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; 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 knowledge of NSW HSC of 3-unit 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 will be used throughout the subject as an aid to computation, graph plotting and visualisation.

33132**Mathematical Modelling 1 (2 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 HSC 2-unit 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 will be used for symbolic, graphical and numerical computations.

33230

Mathematical Modelling 2

6cp; prerequisite(s): 33130 Mathematical Modelling 1 or 33132 Mathematical Modelling 1 (2 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 will be 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 will include studies of simultaneous linear equations and their occurrence in scientific problems; methods for solving these equations using matrices and determinants; eigenvalues and eigenvectors; vectors in two and three dimensions; products of vectors; spatial geometry and coordinate systems; functions of several variables; partial derivatives; optimisation; 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.

60102**Environmental Physical Chemistry**

ESE

6cp; prerequisite: 60101 Chemistry and Materials Science

FIELDS OF PRACTICE: ENVIRONMENTAL ENGINEERING PROGRAM

This subject is designed to provide students with a sound knowledge of the underlying physical chemistry principles of chemical thermodynamics and reaction kinetics, in the study of environmental systems engineering. A sound knowledge of these twin pillars of physical chemistry is extremely important for numerous professional environmental engineering activities that include process design for waste treatment, as well as fate and transport modelling.

The bedrock of environmental engineering is a sound knowledge of chemical thermodynamics and reaction kinetics. Unfortunately, these topics are not formally addressed in most environmental engineering curricula.

During the early stages of the development of environmental engineering, the emphasis was on air and water quality, hence traditional courses in environmental engineering focussed on the basic chemistry of water analysis, and to some extent atmospheric processes. Over the last few decades a change in both the emphasis and content of environmental engineering has occurred, due to its interdisciplinary nature. Increasingly, it is becoming obvious that a student deficient in physical chemistry principles will find himself/herself treading on unfamiliar territory.

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; 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.

66014

Hydrogeology

6cp

Provides a knowledge of geological occurrence and hydraulics of groundwater flow, exploration techniques, extraction engineering and borefield management.

66015

Hydrogeochemistry

6cp

Covers the chemical basis for understanding how the chemistry of groundwater evolves both naturally and in the case of contamination. Both practical field measurement and computer modelling will be covered.

66016

Geophysics and Remote Sensing of Groundwater Resources

6cp

A theoretical and practical examination of the geophysical and remote sensing techniques applicable to groundwater resources evaluation and other environmental problems.

66017

Geopollution Management

6cp

The relationship between groundwater contamination and water quality, together with appropriate waste management and disposal methods for minimal environmental impact. Contaminated land issues are also addressed.

66018

Groundwater Geophysics

6cp

This subject presents an advanced application of geophysical techniques for groundwater research and resource management, and includes contamination assessment and monitoring. The focus is on seismic, electrical and electromagnetic methods.

66025

Contaminated Site Management

6cp

To develop an understanding of the methodology and technology used in the assessment and remediation of contaminated sites.

The subject content includes: site assessment methodology, physical, chemical and biological properties and behaviour of contaminants, health issues, risk assessment, site assessment technology. Further details are available at the website:

<http://groundwater.ncgm.uts.edu.au/ncgm/>
or contact the Subject Coordinator on telephone (02) 9514 2614.

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 analysis, 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 Schrodinger 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 (2 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 will study 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 at the same time as exploring 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 will develop 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, to variable mass and fluid flow and to the special features of the mechanics of the atom. The students will 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 conventional 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 will highlight 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, p-n junction and the light emitting diode will be explored. You do not have to be Einstein to

understand the quantum mechanical basis of modern devices and their application in modern life. A major assignment will be computational and will utilise 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 will be able to develop skills in cutting edge research techniques. Exact topics covered will vary depending on availability of staff. For example, X-ray diffraction, atomic force microscopy, scanning electron microscopy, solar energy materials, advanced optical characterisation, lighting, energy, medical imaging, and parallel computing could be offered. A few background lectures may take place though the subject will be predominantly project and laboratory based. The subject would be a suitable elective for students in all branches of the physical sciences.

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 will benefit scientists and engineers. The subject seeks to consolidate students' understanding of the theory of electromagnetism in the modern world. The topics include derivation, and application, of Maxwell's equations, energy transfer by waves, guided waves and optical fibre technology, optical instrumentation, diffraction and spatial filtering techniques. The emphasis of this subject is conceptual. Students will also engage in an extensive laboratory program in experimental optics. Computer simulation and data visualisation techniques will underpin the electromagnetics theory. Students will be encouraged to explore topics of interest through project activities.

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.

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 will be asked to consider what is law, who makes law, and how and why the law has developed in the way that it has. They will also examine the institutions that make up our legal system – the legislature, the Crown and the executive, the courts and the 'legal players' (the judge, the jury and the legal practitioner) – and explore the principles and doctrines that underpin our legal system. Further, they will be asked to consider why our legal system is so different from that of some of our regional neighbours, and to evaluate the strengths and weaknesses of the common law legal system. Valuable insight into the way our legal system operates may be gained through using a historical approach, and this means delving back into English, as well as Australian, legal and constitutional history. Such an approach also facilitates refinement of critical analysis skills. At the end of the subject, students should have a fully developed understanding of the Western legal tradition, the place of common law in that system, and the ramifications of living under a Westminster parliamentary system as well as a federal system.

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 when promises are binding, the difficulties arising out of their interpretation, how they may become defeasible, issues relating to their performance, and how they may be discharged. Topics covered include the formation of contracts (agreement, consideration, terms); vitiating factors (capacity, mistake, misrepresentation, illegality, duress, undue influence, unconscionability); discharge by performance and non-performance of contractual obligations (breach and frustration); and contractual remedies.

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.

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.

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.

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.

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 will be a brief discussion of the manner in which non-corporate entities including partnerships are regulated. The study of corporations law will include an overview of the historical developments, the current method of regulation and the proposals for reform.

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.

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.

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).

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 will also be considered.

71216**Law of Evidence**

6cp; prerequisite(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 will be admissible in evidence, and how the rules of proof are applied. The inclusionary rule of relevance, the various exclusionary rules (such as hearsay, opinion, tendency, coincidence, credibility, character,

privilege), and the judicial discretion to exclude will be studied, as well as the incidence of the burden of proof.

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 BBus. It covers Australian and international commercial relationships in contract and consumer protection, as well as developing laws, such as intellectual property. Students are able to learn legal research techniques involving the internet and paper-based library resources. Focus on skills and developing general principles that can be applied to all areas of law, both now and in the future. Particular focus is made of resolving personal and professional ethical dilemmas, as well as the choice of resolving commercial disputes in and outside the court system.

79370

Law and Contracts

3cp; 1 semester; prerequisite(s): 48074

Engineering Communication and Documentation; availability Bachelor of Technology

Undergraduate Cross-Disciplinary

This subject aims to familiarise the student with the Australian legal framework, the sources of commercial engineering law in Australia and the responsibilities of engineers in an industrial environment, and to prepare the student for the procedures and processes of operating and negotiating contractual matters as a client, consultant or contractor. Topics covered include an introduction to Australian law; elements of engineering contracting including the contract life cycle; contract organisation; application of quality assurance; occupational safety and security; environmental protection; product liability; intellectual property; and principles of employment contracts.

79371

Legal Issues in Communications

6cp; 1 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.

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.

95560

Multimedia Industry and Process

6cp

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.

95561

Multimedia Products and Technology

6cp

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. The subject also includes a series of optional master classes to introduce some of the common contemporary authoring tools.

INTERNATIONAL STUDIES SUBJECTS

50140

Comparative Social Change

*8cp; for undergraduate students
Offered by the Faculty of Humanities
and Social Sciences*

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, and East and South-East Asia. The lectures will highlight a number of key issues, including whether the processes of social change are universal or specific; the consequences of modernisation in and for the economy, politics, society, culture and ideology of non-Western societies; and whether the established Eurocentric analytical models are still useful in understanding the modern world. It will be emphasised that differing interpretations of modernisation flow from various relations of power which lead to a multiplicity of views on its meanings and significance.

971111, 972111, 973111, 974111

Chinese Language and Culture subjects

Chinese Unit 1

8cp; 6hpw; prerequisite: nil

Chinese 1 aims at developing 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 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 at further developing students' oral communicative competence in basic social interactions. More written texts will be gradually introduced to enhance the ability of students to use Chinese characters. The basic structures and devices of the language will be 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 at further developing 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 at further developing students' communicative competence in general social interactions. While reinforcing the macro-skills of reading, writing, listening and speaking, this unit will focus 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 at further developing students' communicative competence in general social interactions. While reinforcing basic structures and devices of the language, this unit will further develop 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 at developing 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 at developing 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 at developing 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 at further developing 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 subjects

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 would be 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 will be 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 would be 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 will 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 will be 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 would be 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 would also be 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 will be 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 would be 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 will be 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 would be 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 would also be 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 will be 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 would be expected to have achieved the communicative competence required for limited formal and informal conversations on practical and social topics. Students would also be expected to be able 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 will be 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 subjects

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 would be 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 will be 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 would be 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 will 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 would be 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 would also be 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 will be 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 would be 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 will be 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 would be 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 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 will be 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 would be 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 would also be 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, 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 will be 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. They 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 will be 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 will also learn about academic writing and will develop academic skills such as note taking and essay writing in German. They will be 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.

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 subjects

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 would be 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 will be 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 would be 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 will 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 will be 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 would be 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 would also be 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 will be 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 would be 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 will be 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 would be 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 would also be 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 will be 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 would be 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 would also be 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 will be used to facilitate learning.

971211, 972211, 973211, 974211

Japanese Language and Culture subjects

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 sociocultural 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 will 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 will 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 final subject 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 590 *kanji*.

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 subjects****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 would be 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. Audio-visual equipment and computers will be 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 would be 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 will 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 will be 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 would be 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 would also be 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 will be 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 would be expected to have begun to develop the communication skills required to satisfy limited routine social and work demands.

They would also be 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 will be 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 would be 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 will be 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 would be 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 would also be 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 will be 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 would be 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 would also be 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 would be 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 on UTS campuses.

976101

Chinese East Asia

8cp; 2nd semester, 4hpw

South China – Hong Kong, Taiwan and the Southern Chinese provinces of Fujian and Guangdong – is a region of global importance. It is a dynamo of economic growth for the East Asia region and one that has resulted from the economic integration of Hong Kong, Taiwan and South China, and which is now expanding to include East China. Yet its constituent parts have developed separately in different and often inimical political systems. As a result of all these factors, South China is likely to become a region of increasing importance, strategically and politically, as well as economically. This subject examines the development of Hong Kong, Taiwan and South China and their interaction. It is an introductory subject that requires no prior knowledge of the region or of any Chinese language.

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.

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 will be examined at a political-economic level and also at an individual level. Issues which will be 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.

976401**Contemporary Europe***8cp; 2nd semester, 4hpw*

This subject is an introduction and an overview laying the groundwork for the study of contemporary Europe. It surveys present-day European Union institutions and sociopolitical developments and provides a comparative study of political and social developments in the countries of Western and Eastern Europe.

It aims to provide students with an understanding of the historical background of present-day Europe and enable them to identify major contemporary policy issues in this region of the world.

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 subject 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.

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: Argentina, Chile, China, France, Germany, Indonesia, Italy, Japan, Malaysia, Mexico, Russia, Spain and Thailand. The availability of the Russian major is currently being reviewed. 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 Greece, Hong Kong, Korea, Poland, Taiwan and Vietnam.

188 Subject descriptions

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 would need 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

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.

The following majors are available in the International Studies program: Argentina, Australia and the Asia–Pacific Region, Chile, China, France, Germany, Indonesia, Italy, Japan, Malaysia, Mexico, Russia, Spain and Thailand.

ALPHABETICAL LIST OF SUBJECTS

Adaptive and Multivariable Control	49272	Construction Management 3A	4xxxx
Advanced Concepts in Microwave and Mobile Communications	49207	Construction Management 3S	4xxxx
Advanced Digital Modulation Techniques	49222	Construction Management 4A	4xxxx
Advanced Digital Systems	48451	Construction Management 4S	4xxxx
Advanced Electronics	48551	Damage and Repair of Concrete Structures	49152
Advanced Flow Modelling	49312	Data Acquisition and Distribution	48570
Advanced Geomechanics	49141	Design Awareness for the Aero Industry	48405
Advanced Heat Transfer	49311	Dynamics and Control	48660
Advanced Kinematics and Dynamics	49327	Ecology and Sustainability	49122
Advanced Manufacturing	48663	Economic Evaluation	49003
Advanced Mathematics for Telecommunications	49216	Electrical Energy Technology	48550
Advanced Robotics	49274	Electricity Sector Planning and Restructuring	49026
Advanced Teletraffic Engineering	49204	Electromechanical Systems	48531
Advanced Web Technology	49209	Electronics	48520
Aerospace Maintenance and Management	48404	Emerging Internetworking Protocols	49219
Aerospace Operations 1	48401	Energy and Environmental Economics	49023
Aerospace Operations 2	48402	Energy Applications	48661
Aerospace Operations 3	48403	Energy Conversion	49321
Airconditioning	49322	Energy Demand Analysis and Forecasting	49027
Analogue and Digital Control	48560	Energy Modelling	49024
Asset Maintenance Management	49104	Energy Resources and Technology	49022
Asynchronous Transfer Mode (ATM) Technology	49218	Engineering Communication	48230
Authentication and System Security	48730	Engineering Communication and Documentation	48074
Behaviour of Structures and Design	48361	Engineering Design	48670
Biomedical Instrumentation	49261	Engineering Economics and Finance	48250
Bridge Design	49131	Engineering Practice 1	48110
Building Construction Technology	48304	Engineering Practice 2	48130
Capstone Project (12cp)	48012	Engineering for Sustainability	48210
Capstone Project (6cp)	48006	Engineering Management	48075
Capstone Project – Part A	48016	Engineering Management	48260
Capstone Project – Part B	48026	Engineering Material	48070
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Coastal Engineering	49111	Engineering Practice Review 1	48122
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Communications Networks	48740	Engineering Research Methodology	49041
Communication Protocols	49202	Environmental and Sanitation Engineering	48350
Communication Theory	48771	Environmental Assessment and Planning	49121
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Computer Systems Design	48480	Environmental Risk Assessment	49125
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Concrete Technology and Practice	49151	Finite Element Analysis	49047
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Construction Materials	48352	Fundamentals of Mechanical Engineering	48620
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Construction Management 2S	4xxxx	Geotechnical Engineering	48360
		Graduate Project	49050–76

190 Alphabetical list of subjects

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Groundwater Engineering Project (GD) (FT) 12cp	44153	Management Systems	49306
Groundwater Engineering Project (GD) (PT) 6cp	44157	Railway Engineering	49137
Groundwater Engineering Project (M) (FT) 24cp	44152	Real-time Object-oriented Software Development	49234
Groundwater Engineering Project (M) (PT) 12cp	44156	Real-time Signal Processing in Telecommunications	49220
Groundwater Modelling	49555	Regulatory Economics	49706
Heat Transfer and Equipment Design	49326	Review of Engineering Practice 1	48120
Human-Machine Interfaces and Software Implementation	49213	Review of Engineering Practice 2	48140
Hydraulics and Hydrology	48362	Risk Management in Engineering	49006
Informatics	48220	Road Engineering Practice	49106
Information Technology	48072	Satellite Communication Systems	49223
Instrumentation and Condition Monitoring	49324	Selected Topics (Energy Pricing)	49703
Integrated Services Networks	49201	Signal Processing	48770
Internal Combustion Engines and Environmental Issues	49307	Signals and Systems	48540
Introduction to Civil Engineering	48310	Simulation of Digital Communication Systems	49224
Introduction to Electrical Engineering	48510	Sliding Mode Control	49276
Introduction to Environmental Engineering	48820	Software Development	48430
Introduction to Mechanical Engineering	48610	Software Development Project	49236
Introduction to Telecommunications Engineering	48720	Software Engineering	48440
Introductory Digital Systems	48441	Software Engineering Principles	49211
Judgment and Decision Making	49001	Software Project Management	49225
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Machine Dynamics	48640	Software Requirements Specification	49233
Managing Information Technology in Engineering	49013	Software Systems Analysis	48475
Manufacturing Engineering	48621	Software Systems Design	48485
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SUBJECTS OFFERED BY OTHER FACULTIES

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Accounting for Managerial Decisions	22747	German Language and Culture	97x421
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Chemistry and Materials Science	60101	Law of Contract	70211
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Electronics	68314	Personal Property	70318
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BOARDS AND COMMITTEES

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Nominee of the Dean from the Faculty Board
in Business

Dr G Smith (Spring)

Mr R Raban (Autumn)

Nominee of the Dean from the Faculty Board
in Information Technology

Professor G Smith

Nominee of the Dean from the Faculty Board
in Science

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Dr T Aubrey

Mr M Benitez

Mr E A Brady

Dr R Braun

Associate Professor P Bryce

Ms B Buckenmaier

Associate Professor K Crews

Mr D M Eager

Mr C Evans

Dr G Hong

Dr P Huynh

Associate Professor S Johnston

Dr R Karim

Mr J Leaney

Mr P G Lewis

Dr J Li

Associate Professor D B Lowe

Dr A N F Mack

Dr J Madadnia

Mr P Maloney

Associate Professor H McGregor

Ms V McKain

Mr S McKendrick

Dr J G Nicol

Dr R Sri Ravindrarajah

Dr A Sanagavarapu

Associate Professor D Sharma

Mr M de la Villefromoy

Dr R Ward

Dr K Yasukawa

Dr J G Zhu

Dr N Zhang

Elected student member

Mr C Nimmagadda

*Two remaining vacancies are for a student each
from a postgraduate by coursework program,
and a postgraduate by research program.*

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.)

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Chairman
Ove Arup & Partners

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Managing Director
Connell Wagner Pty Ltd

Mr Michael Kirby
Marketing Manager
Kirby Engineering Pty Ltd

Mr Ian Stuart
General Manager
National & International Projects
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Chief Executive Officer
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Mr Bob Pentecost, AM
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NDC Limited

Mr John Wood
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Chair
Powerlink Queensland Board

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Associate Dean
Research and Development

Professor Archie Johnston
Dean

Faculty of Engineering
Associate Professor Steve Johnston
Director

Faculty of Engineering Internship Programs

Associate Professor Helen McGregor
Planning Director

Engineering Practice Program

Associate Professor Jim Parkin
Associate Dean
Graduate Programs

Mr Paul Stapleton
Director
Industrial Liaison

Ms Elizabeth Taylor
Director
BE DipEngPrac Core Program

Professor Warren Yates
Associate Dean
Teaching and Learning

STAFF LIST

Professor and Dean of Engineering

A Johnston, BSc (Hons), PhD (Heriot-Watt), FIEAust, CPEng, MICE

Associate Dean, Teaching and Learning

Professor K W Yates, BSc, BE, PhD (Syd), FIEAust, CPEng, SMIREE, MIEE, SMIEEE

Associate Dean, International and Enterprise Development

Associate Professor J V Parkin, MSc, MEnvStud, PhD (UNSW), FIEAust, CPEng

Associate Dean, Research and Development

Professor W R Belcher, BE, MEngSc (Q'ld), PhD (Lond), DIC, FIEAust, CPEng, MIEE

Faculty Manager

S Meiras, BSc (Syd)

IT Systems Manager

W S McKendrick, BSc (Hons) (N'cle), MACS

Director, Industrial Liaison

P Stapleton, BE, MEngSc (UNSW)

Director, International Engineering Program

P Maloney, BA (Macq), MA (Syd)

Director, Women in Engineering Program

B Holland, BA (Syd), GradDipComm (NSWIT), MScSoc (UNSW)

Adjunct Professors

S L Bakoss, BE (Syd), MEngSc (UNSW), MS (Calif), PhD (UNSW), FIEAust, CPEng, MASCE

A Chappel, BE, DipT&RP (Melb), FIEAust

J Nutt, BE (Q'ld), PhD (Manchester), Hon DSc (Macq), Hon FIEAust, FIStructrE (UK), MICE (UK), KTSE, FRSA

M Sargent, BE (Hons), PhD (Q'ld)

V Ireland, BE (UNSW), BA, MEngSc, PhD (Syd), FAIB, MIEAust

J A Reizes, BE, ME, PhD (UNSW), FIEAust, CPEng

A C Wightley, BE, ME (UTS)

Staff Groups

Administration

Faculty Manager

S Meiras, BSc (Syd)

IT Systems Manager

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Office Manager, National Centre for Groundwater Management

H P Xu

Office Systems Support Manager

R Corran, BE (UTS)

Finance Manager

J Chea

Manager, Undergraduate and Postgraduate Office

S Tanuwijaya

Executive Assistant to the Dean

F Couchman, BA (USQ), BA (Hons) (Griffith)

Administrative Officer

A Van Eeuwen

Industrial Liaison Officers (P/T)

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B Buckenmaier, BA (UTS)

Student Administration Officers

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L B Smith (secondment until May 2001)

L Venglinsky

Administrative Assistants

S Ali

L Dixon (National Centre for Groundwater Management)

Administrative Officer, Associate Dean, Teaching and Learning

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Secretary (P/T)

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Executive Assistant to Associate Dean, Research and Development

G Lye

Executive Assistant to Associate Dean, International and Enterprise Development

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K Moore

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R B Clout

Scientific Officer

C M Chapman

Senior Technical Officers

M Benitez

P M Chatfield

G W Evans

W Firth

J S Gibson

P T Gimes

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R J Turnell

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S Gordon

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D Nikitopoulos

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R Smith

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Professor

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Director, Microelectronics Fabrication Centre

L Weber

Technical Officer

Vacant

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Director, Capstone and BE BBus

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Director, Industrial Liaison

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Lecturers

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Engineer

R Jarman, BE (UTS)

Centre for Local Government

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faculties as well as Engineering. Staff are also
members of staff groups within the Faculty
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Associate Professor and Centre Director

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FRAPI

Manager, Special Projects

R Mellor, MPS (UNSW)

Research Officer

Vacant

**National Centre for Groundwater
Management**

**Joint Centre of the Faculties of Engineering
and Science**

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H P Xu

Principle Scientist

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Administrative Assistant

L Dixon

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Youth Allowance 8

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- Building 3 (Bon Marche Building)
Cnr Harris Street and Broadway, Ultimo
- Building 4
Cnr Thomas and Harris Streets, Ultimo
- Building 6 (Peter Johnson Building)
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- Broadway Terraces
9, 11 and 13 Broadway, Ultimo
- Magic Pudding Childcare Centre,
Thomas Street, Ultimo

Haymarket

- Building 5
Corner Quay Street and Ultimo Road,
Haymarket, Sydney

Blackfriars

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

Smail Street

- 3 Smail Street, Ultimo

Quay Street

- 10 Quay Street, Haymarket, Sydney
- Prince Centre
8 Quay Street, Haymarket, Sydney

Wembley House

- 839–847 George Street, Sydney

Harris Street

- 645 Harris Street, Ultimo

Student housing

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

Australian Technology Park

- Corner Garden, Cornwallis and
Boundary Streets
Eveleigh NSW 1430

Kuring-gai campus

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

St Leonards campus

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

Yarrawood conference and research centre

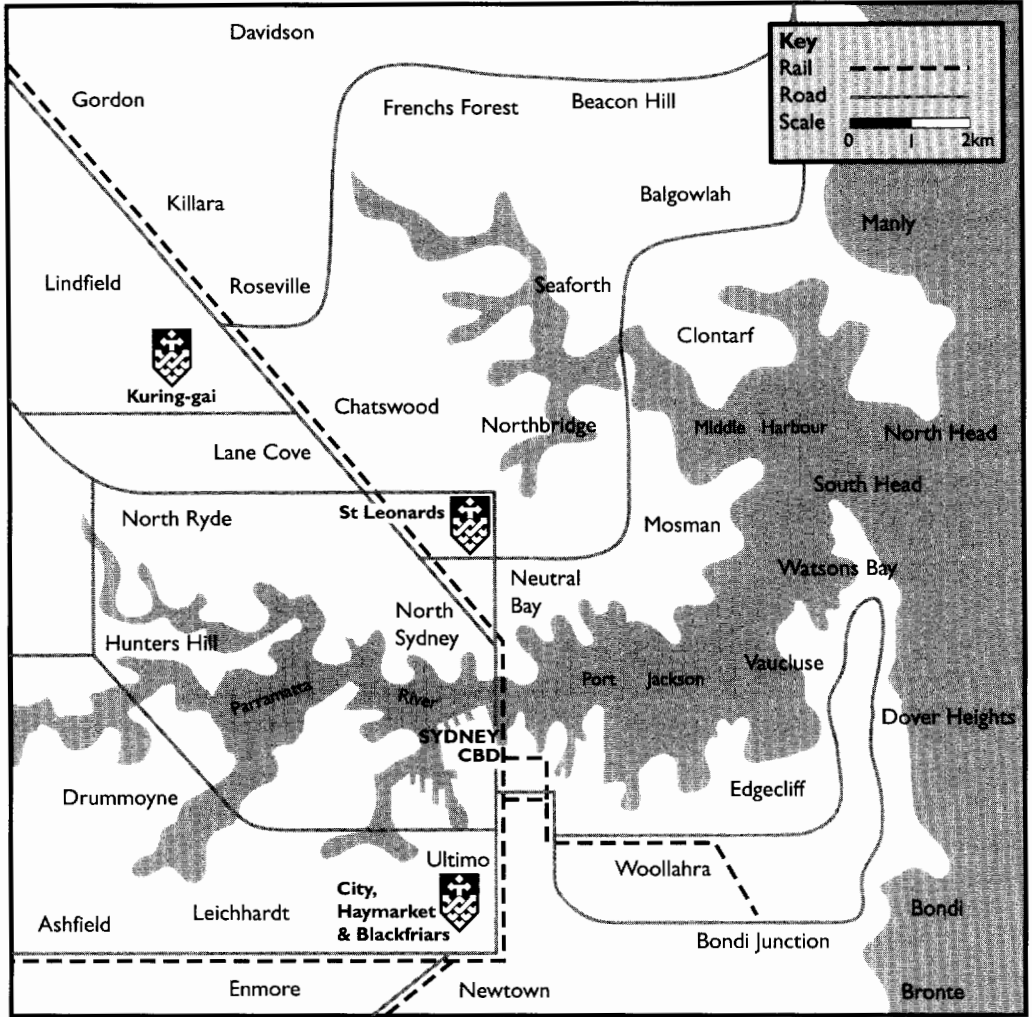
- 689 Springwood Road
Yarramundi NSW 2753

Stroud field station

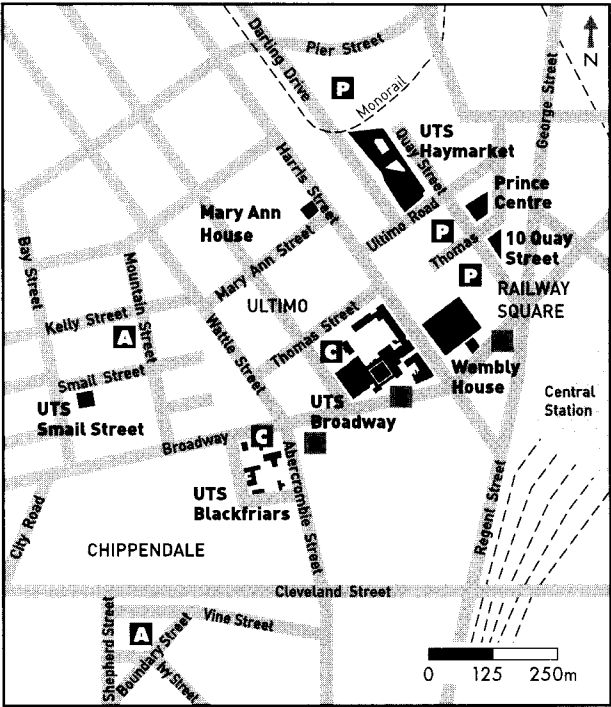
- 2605 The Bucketts Way
Booral NSW 2425

MAPS

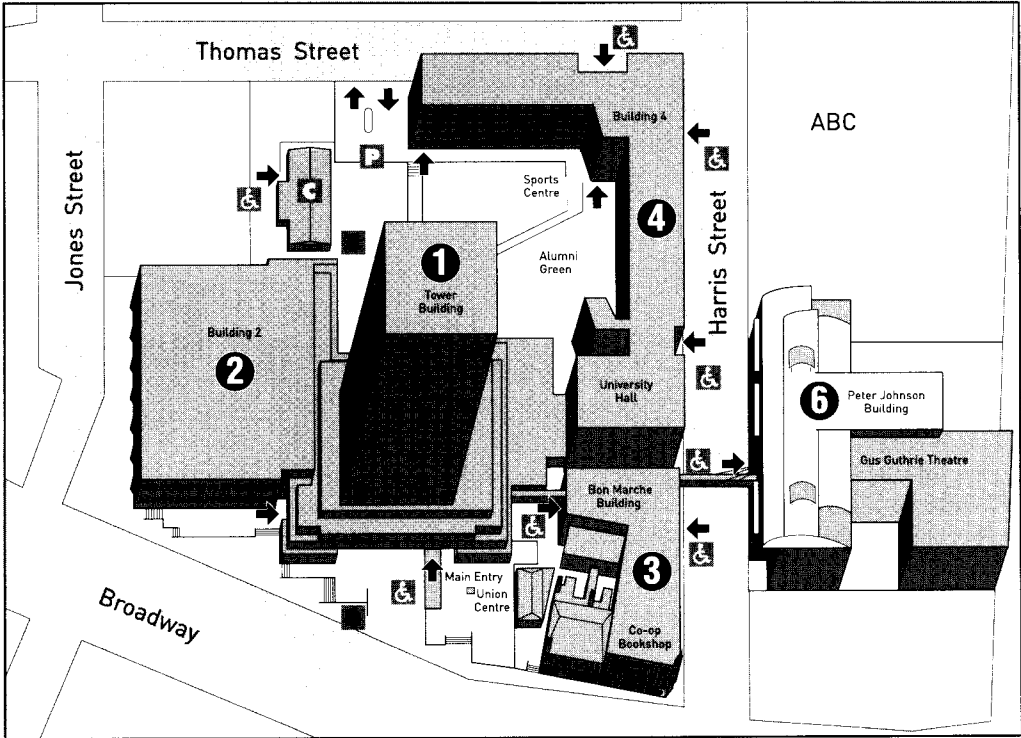
Sydney regional map



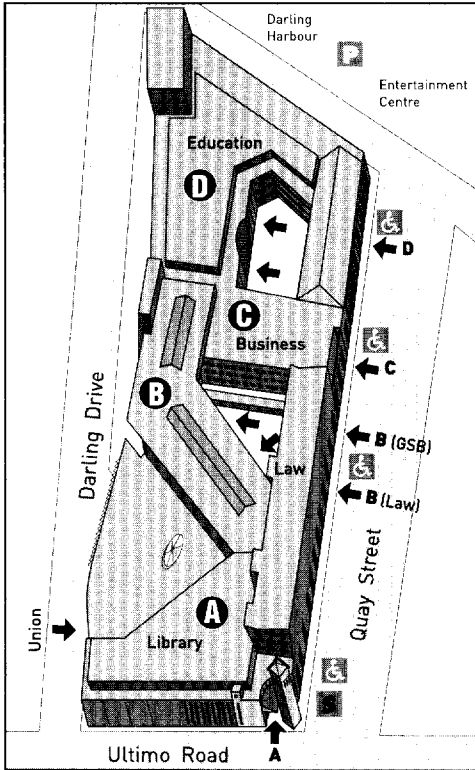
City campus



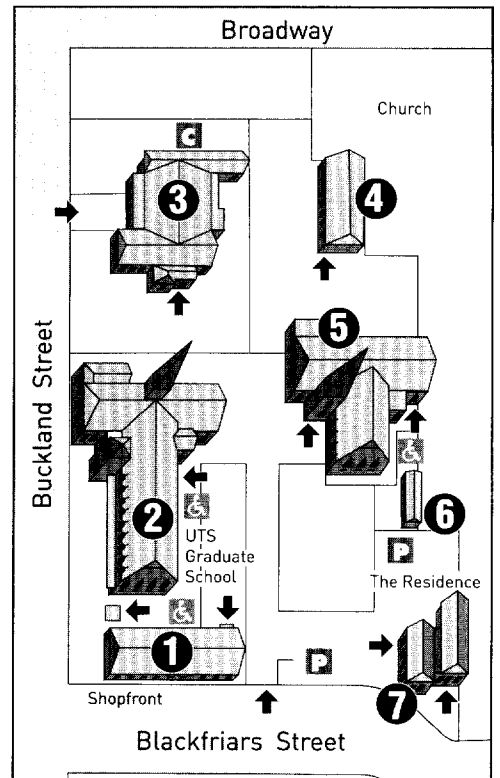
Broadway



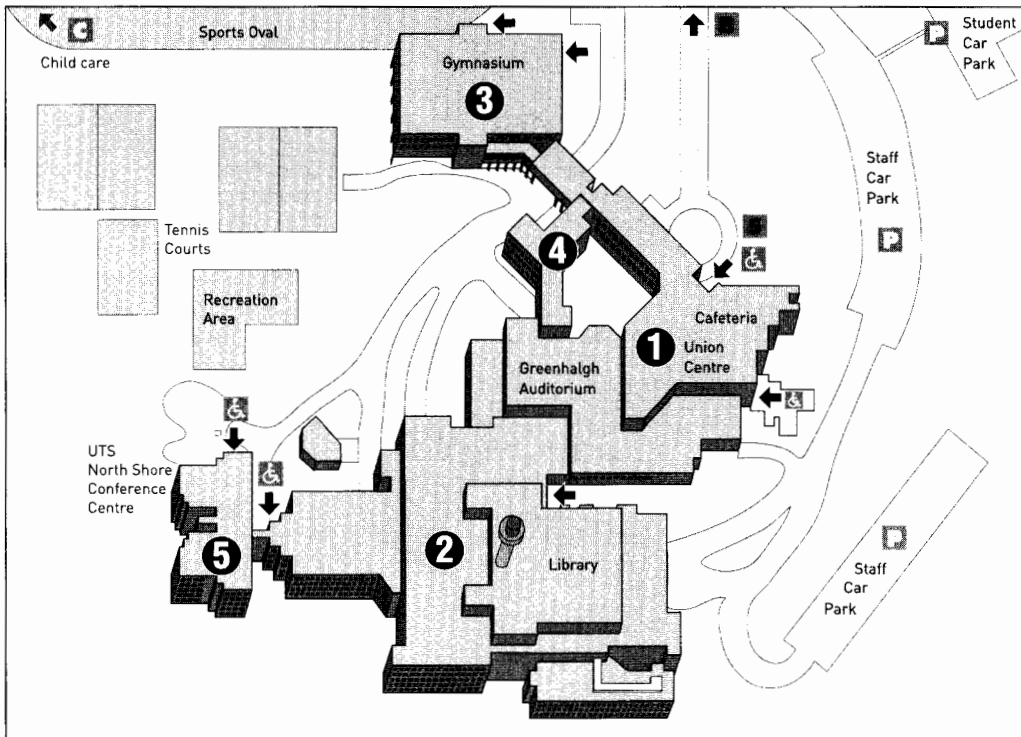
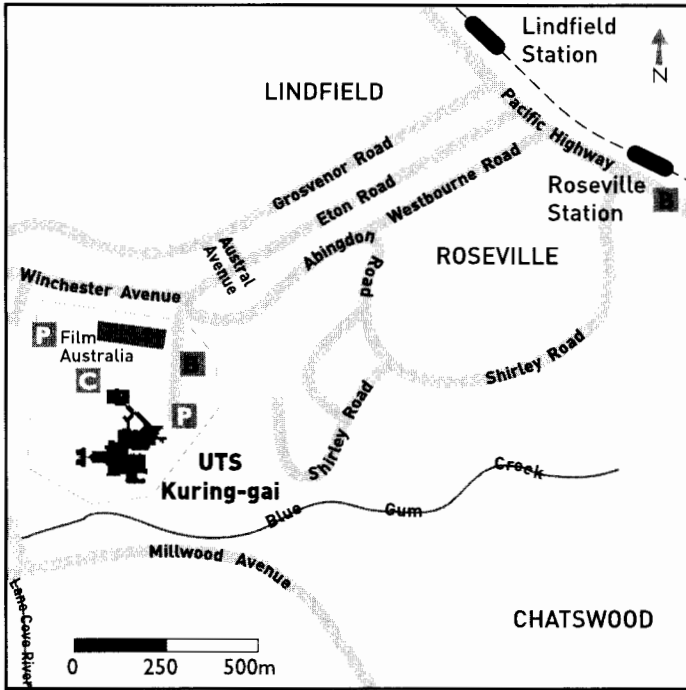
Haymarket



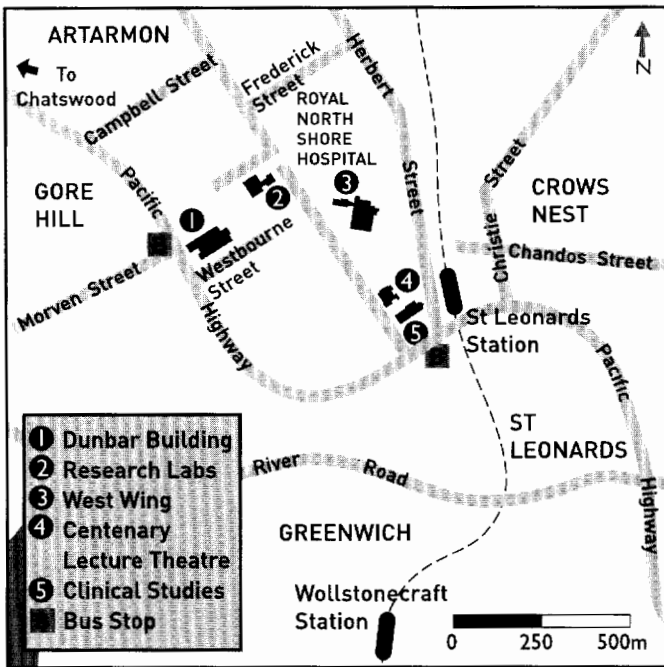
Blackfriars



Kuring-gai campus



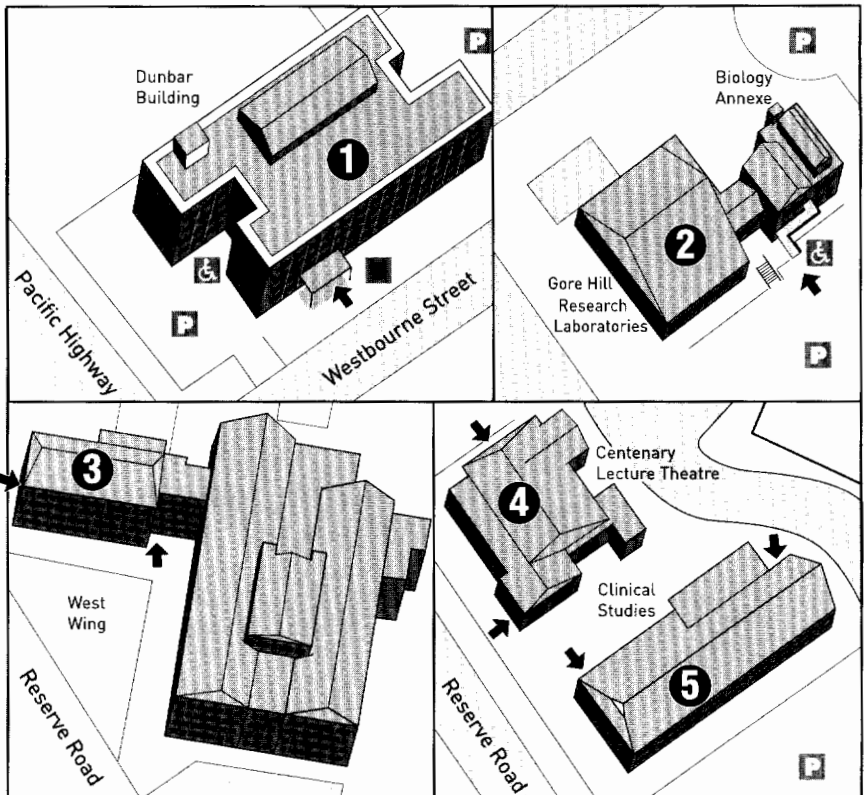
St Leonards campus



- ① Dunbar Building
- ② Research Labs
- ③ West Wing
- ④ Centenary Lecture Theatre
- ⑤ Clinical Studies
- Bus Stop

KEY

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



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