Faculty of

Engineering

Handbook

University of Technology, Sydney

1998

Year 1998
UTS Faculty of Engineering Handbook
1998

UTS Faculty of Engineering Handbook 1998

The University attempts to ensure that the information contained in this handbook is correct as at 28 November 1997. The University reserves the right to vary any matter described in the handbook at any time without notice.

University of Technology, Sydney

Equal opportunity

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

Free speech

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

Non-discriminatory language

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

Editorial and production:

Publications Branch,
Registrar's Division

Cover

UTS – The Global Classroom
UTS congratulates our first group of students from the International Studies program who will spend 1998 studying overseas in the country of their choice.

External Relations Unit

Table of contents

General University information

PREFACE

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

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

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

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

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

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

ADDRESSES AND TELEPHONE NUMBERS

University of Technology, Sydney

Postal address

PO Box 123
Broadway
NSW 2007 Australia

Telephone

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

World Wide Web

http://www.uts.edu.au

City campus

Broadway

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

Haymarket

- Building 5
  Cnr Quay St and Ultimo Rd, Ultimo

Blackfriars

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

Smail Street

- 3 Smail St, Ultimo

Wembley House

- 839–847 George St, Sydney

Harris Street

- 645 Harris St, Ultimo

Student housing

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

Australian Technology Park Sydney Ltd
Institute for Sustainable Futures

- Suite 213
  National Innovation Centre
  Cnr Garden, Cornwallis and Boundary Streets
  Eveleigh NSW 1430
  Telephone: (02) 9209 4350
  Fax: (02) 9209 4351

Kuring-gai campus

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

St Leonards campus

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

Yarrawood conference and research centre

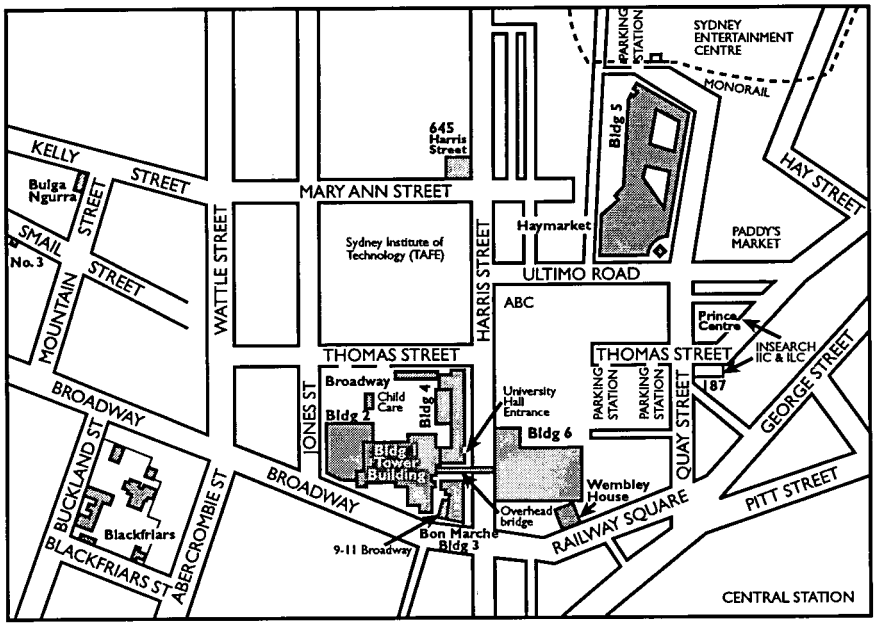
- 689 Springwood Rd
  Yarramundi NSW 2753

Stroud Field Station

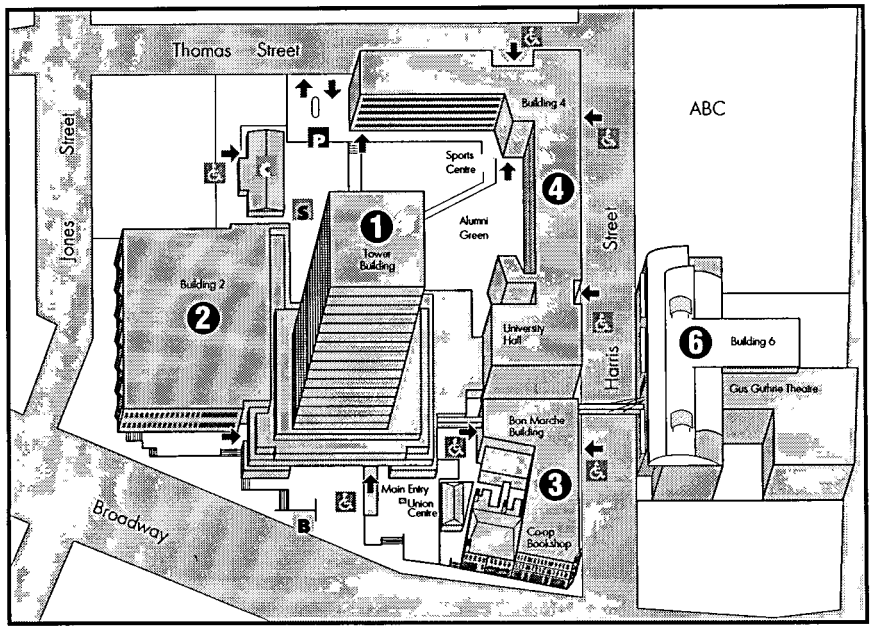
- 2605 The Bucketts Way
  Booral NSW 2425

CAMPUS MAPS

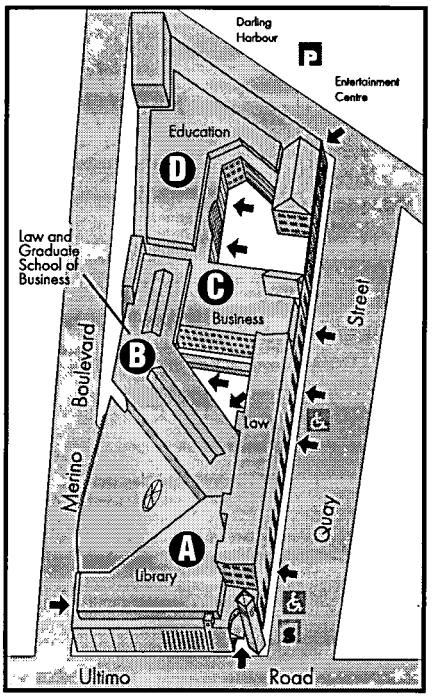
City campus



Broadway



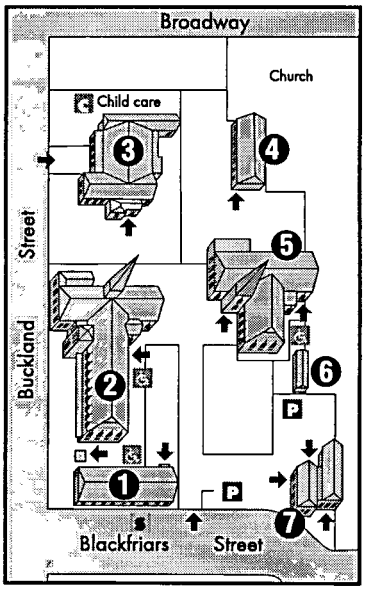
Haymarket



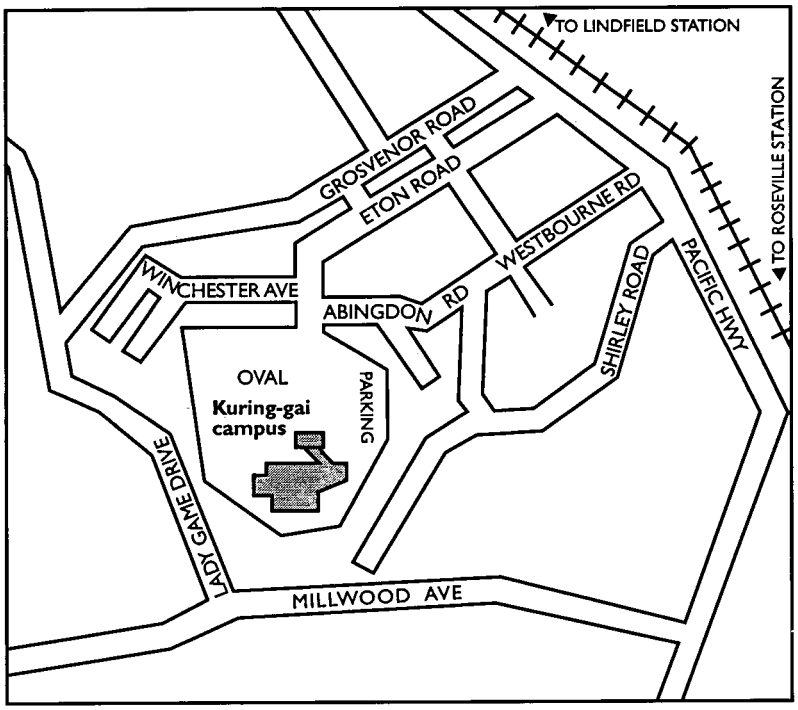
KEY

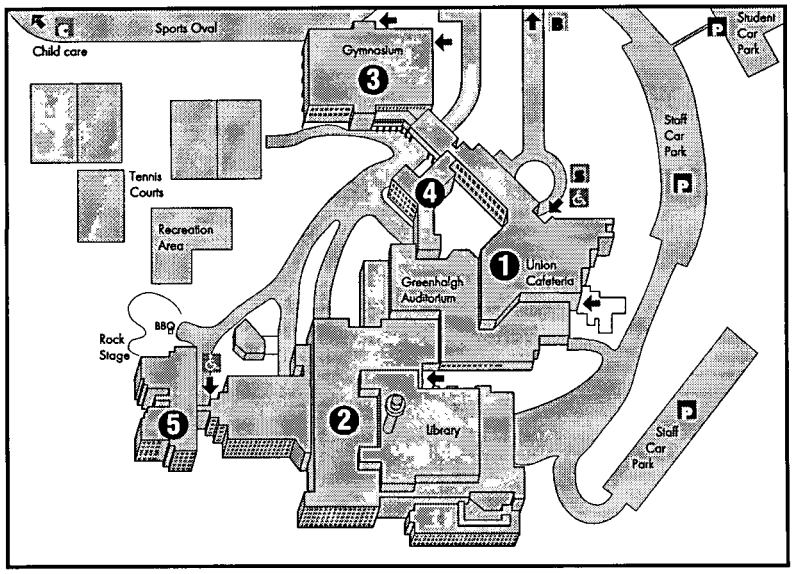
- Entry/Exit
- Disabled access
- Main bus stop
- UTS shuttle bus
- Parking
- Building numbers
- Child care

Blackfriars

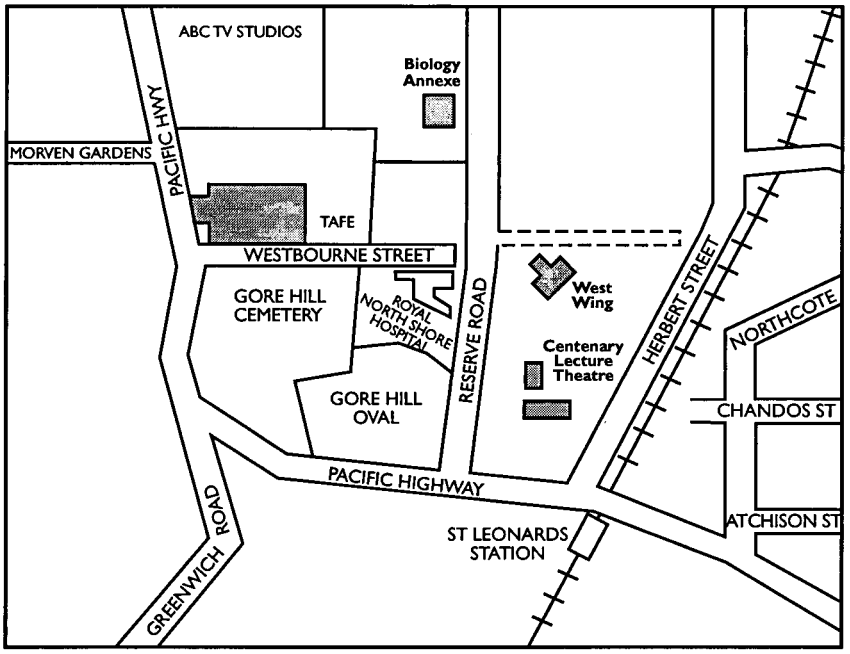


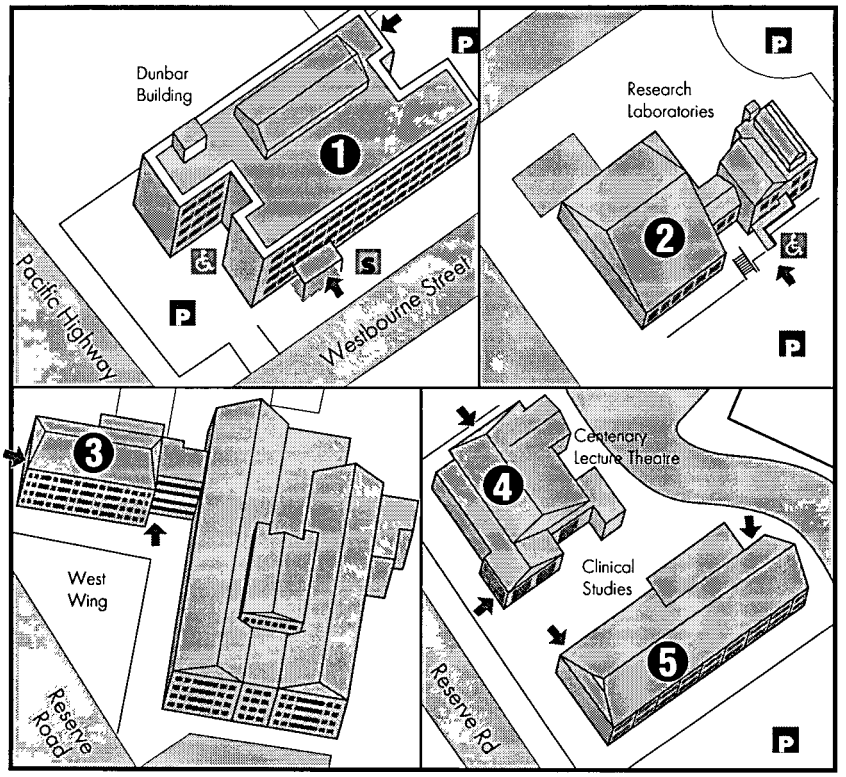
Kuring-gai campus





St Leonards campus





APPLYING FOR UTS COURSES

Undergraduate

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

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

Contact the UTS Information Centres for more information.

Postgraduate

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

Contact the UTS Information Centres for more information.

Non-award and External Award study

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

Contact the UTS Information Centres for more information.

International students

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

UTS INFORMATION CENTRES

Street address	Postal address	Telephone/Fax
City campus		
Foyer, Tower Building 1 Broadway	UTS Information Service PO Box 123 Broadway NSW 2007	Telephone: (02) 9514 1222 Fax: (02) 9514 1200
Kuring-gai campus		
Level 5 or 6, Main Building Eton Road Lindfield	Kuring-gai Student Centre PO Box 222 Lindfield NSW 2070	Telephone: (02) 9514 5555 Fax: (02) 9514 5032
International Programs		
Level 5, Tower Building 1 Broadway	International Programs PO Box 123 Broadway NSW 2007	Telephone: (02) 9514 1531 Fax: (02) 9514 1530

Email inquiries

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

International – *intlprograms@uts.edu.au*

PRINCIPAL DATES FOR 1998

Autumn semester

January

2 Release of HSC results

9 Formal supplementary examinations for 1997 Spring semester students

9 Closing date for changes of preference to UAC from 1997 NSW and ACT HSC applicants

16 Final examination timetable for Summer session

23 Main round of offers to UAC applicants

26 Australia Day – public holiday

26 Public school holidays end

28 Closing date for changes of preference to UAC for final round offers

28-30 Enrolment of new undergraduate students at City campus (and 2–4 February)

February

2 Last day for continuing students to pay their 1998 service fees

2-4 Enrolment of new undergraduate students at City campus (and 28–30 January)

6 Final round of offers (UAC)

2-13 Formal examinations for Summer session

23 Release of results for Summer session

5-26 Enrolment of students at City campus

March

2 Classes begin

4-5 Enrolment (External award, Non-award and Exchange students)

13 Last day to enrol in a course or add subjects

20 Last day to pay HECS

30 Last day to apply to graduate in Spring semester 1998

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

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

31 HECS census date

April

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

9 Public school holidays begin

10 Good Friday

13-17 Vice-Chancellors' Week (non-teaching)

14-17 Graduation (Kuring-gai)

24 Provisional examination timetable available

25 Anzac Day – public holiday

27 Public school holidays end

May

1 Applications available for undergraduate courses where applicable

1 Applications open for available postgraduate courses for Spring semester 1998

4-15 Graduation (City)

15 Examination masters due

29 Closing date for undergraduate and postgraduate applications for Spring semester

29 Final examination timetable

June

8 Queen's Birthday – public holiday

12 Last teaching day of Autumn semester

13-30 Formal examination period (and 1–3 July)

July

1-3 Formal examination period (and 13–30 June)

3 Autumn semester ends

3 Public school holidays begin

6-10 Vice-Chancellors' Week (non-teaching)

13-17 Formal alternative examination period for Autumn semester students

20 Public school holidays end

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

27 Formal supplementary examinations for Autumn semester students

Spring semester

August

3 Classes begin

3 Applications available for undergraduate and postgraduate courses for Autumn semester 1999

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

14 Last day to enrol in a course or add subjects

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

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

31 Last day to apply to graduate in Autumn semester 1999

31 HECS census date

September

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

25 Provisional examination timetable available

25 Public school holidays begin

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

28-30 Graduation (City)

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

30 Closing date for inpUTS Special Admission Scheme applications

October

1-2 Graduation (City)

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

5 Labour Day – public holiday

12 Public school holidays end

16 Examination masters due

30 Final examination timetable available

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

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

30 Closing date for most postgraduate courses for Autumn semester 1999 (some courses may have earlier closing dates in September)

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

November

13 Last teaching day of Spring semester

14-30 Formal examination period (and 1–4 December)

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

December

1-4 Formal examination period (and 14–30 November)

4 Spring semester ends

14-18 Formal alternative examination period for Spring semester students

18 Public school holidays begin

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

---

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

Note: Information is correct as at 6 November 1997. The University reserves the right to vary any information described in Principal Dates for 1998 without notice.

Faculty information

This handbook is the formal statement of awards, courses and programs of study offered through the Faculty of Engineering at UTS. It is designed primarily to provide information for students, prospective students and those interested in the Faculty's educational policies and programs. It contains a brief outline of the Faculty's research programs and professional activities, but is not meant to describe these in any comprehensive way.

Other publications are available concerning these matters, together with less formal publications about particular courses and activities and about what the Faculty can offer to particular clients or partners. Inquiries may be directed to any of the principal contacts listed in this handbook.

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 1997, the Faculty has some 2,740 undergraduate students and 470 postgraduate students. Of the latter, some 70 are candidates for higher degrees by research, and 400 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 practice 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 practice, 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 practice 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 experience in industry, or other authentic professional setting. 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. From 1998, it will take 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 inter-relations between theory and practice, technology and human factors. They are equipped to undertake professional responsibility much sooner – 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 thirty 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, and it is now the only Australian faculty of engineering in which all BE students take the Co-op program. Co-op is well-known and highly regarded in other countries also, particularly North America. UTS is a member of the World Council for Cooperative Education.

For 1998, the BE program has been completely re-designed. The new program 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 now leads to the combined award of Bachelor of Engineering, Diploma of Engineering Practice. 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 may shortly introduce formal work-based learning courses or course elements.

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 approximately 5 per cent of practising professional engineers, and 14 percent of enrolments in engineering degree courses nationally.

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

The Program is recognised in engineering education and professional spheres for its inauguration of the annual Australasian Women in Engineering Forum, which UTS hosted for the second time in 1996; for its initiatives in curriculum development; and for its contributions to the recent national Review of Engineering Education. It has strongly influenced the philosophy of engineering at UTS, and has been a catalyst for many innovations in the new BE DipEngPrac curriculum to be introduced in 1998.

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 looks forward to the time when women constitute a substantial proportion of its students and staff and of the profession generally.

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 practice 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 Bachelor of Engineering degree are outlined in the relevant section of this handbook. Similar opportunities are available to students in all undergraduate and graduate programs, and inquiries should be directed to the Undergraduate Programs 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 sub-divided into departments or other entities, but functions on an integrated basis. Its operating structure is essentially a matrix.

All operations are conducted through Programs, each with a designated Director who is responsible for leading and managing the Program. Programs are grouped into five areas:

Undergraduate Programs
Graduate Coursework Programs
Research
Development
Administration.

Each of the first four is headed by an Associate Dean, and the fifth by the Faculty Administrator. The Dean has overall responsibility for the Faculty as a whole.

The Graduate School of Engineering (GSE) is retained as a vehicle for conducting all graduate programs. The Associate Dean Graduate Coursework Programs is Head of the GSE, and the Associate Dean Research is Alternate Head.

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
Civil and Mechanical Engineering Laboratories
Administration and Information.

The Groups are expected to re-form and evolve with time, and may change during 1998.

Any Program can draw on the resources of any Group. All Groups and Programs contribute to future planning, for which the Faculty Executive (Dean, Associate Deans and Faculty Administrator) has overall responsibility.

The Faculty's governing body is the Faculty Board in Engineering, of which details are given later. There is a Dean's Advisory Committee, a Faculty Budget Committee, a Committee on Curriculum, Learning and Teaching, a Graduate 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 (late 1997) are:

- Dean, Faculty Administrator, Undergraduate Programs Office, Industrial Liaison, Graduate School of Engineering, and Women in Engineering Program:
  Level 7, Building 2.
- Associate Dean Undergraduate Programs:
  Level 24, Building 1.
- Associate Dean Graduate Coursework Programs:
  Level 7, Building 2.
- Associate Dean Research:
  Level 5, Building 2.
- Associate Dean 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, 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 23, 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: Level 4, Building 2.

PRINCIPAL CONTACTS

	Building/Room	Telephone Ext
Dean of Engineering		
Professor Peter Parr	2/7092	2599
Faculty Administrator		
Ms Deborah Carraro	2/7093	2594
Associate Dean, Undergraduate Programs		
Professor Warren Yates	1/2427	2436
Manager, Undergraduate Programs Office		
Ms Susana Tanuwijaya	2/7100	2671
Sub-Dean		
Dr John Nicol	1/2428	2438
Associate Dean Graduate Coursework Programs		
Associate Professor Jim Parkin	2/7078	2638
Graduate Studies Officer		
Ms Beate Buckenmaier	2/7083	2606
Associate Dean Research		
Professor John Reizes	2/511C	2742
Directors, Research Concentrations		
Biomedical Technology		
Associate Professor Hung Nguyen	1/2517	2451
Energy Technologies		
Professor Vic Ramsden	1/2417	2420
Intelligent Transport Systems		
Professor Chris Drane	1/2221	2390
Nomadic Multimedia Data Systems		
Associate Professor Aruna Seneviratne	1/2429	2441
Technologies for the Built Infrastructure		
Professor Steve Bakoss	2/528	2629
Wastewater and Waste Management		
Professor S Vigneswaran	2/523	2641
Associate Dean Development		
Professor Rod Belcher	2/511C	2423
Director, External Relations		
(to be advised)		
Director, Industrial Liaison		
Mr Paul Stapleton	2/7097	2592
Director, International Engineering Program		
Mr Paul Maloney	2/7087	2591
Director, Women in Engineering Program		
Ms Bronwyn Holland	2/7071	2601

Names of Program Directors for undergraduate and postgraduate programs are published separately, and are available from the offices of the respective Associate Deans, the Undergraduate Programs Office or the Graduate School of Engineering.

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*.

Please 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 following centres and organisations:

APACE

APACE (Appropriate Technology for Community and Environment, Inc.) is an independent, community-based organisation to develop ecologically-sustainable technologies for developing countries, particularly in the Asia–Pacific region, and to interact closely with the local communities in devising and operating appropriate energy-supply systems and other forms of infrastructure support. Housed at UTS, it is a recognised non-government organisation under national and international aid programs. Principal contact: Associate Professor Paul Bryce (Chair of Directors).

Australian Graduate School of Engineering Innovation Ltd

The Australian Graduate School of Engineering Innovation Ltd (AGSEI) was formed by UTS, the University of Sydney and a number of industry partners, and is funded as a Commonwealth Government Advanced Engineering Centre. The School's purpose is to help Australian enterprises combine the best of engineering and management into an effective culture of innovation. It builds specifically on the capability of engineers, and focuses on the contribution of engineering to business performance. It is located at the Australian Technology Park, at Eveleigh, close to UTS. Principal contact: Professor Peter Parr.

Australian Technology Park, Sydney Limited

The Australian Technology Park, Sydney Limited is designed to become South-East Asia's premier technology centre. It is situated at the centre of a triangle formed by the three participating universities – the Universities of Sydney and New South Wales, and UTS. It will concentrate on ten generic areas of strength: information technology, telecommunications, biomedical, biotechnology, agriculture and food processing, environmental technology and management, transport systems, instrumentation, materials, and power and energy. It is designed to support and incubate new technology intensive businesses as well as research and development by established enterprises. It is located at Eveleigh, near Redfern, close to UTS. Principal contact: Professor Rod Belcher.

Centre for Biomedical Technology

The Centre for Biomedical Technology is a multi-faculty and interdisciplinary research centre of UTS, with a network of research and education teams from the Faculties of Engineering, Science, Mathematical and Computing Sciences, Nursing and Business. It aims to enhance the scientific and technological base for the biomedical technology industry, government, and health care providers, through research, development, consultancy and continuing education programs. Principal contact: Associate Professor Hung Nguyen (Director).

Centre for Local Government Engineering and Research

The Centre for Local Government Engineering and Research at UTS provides education, training, research facilities and support in the development of ideas for the growth and future direction of local government. It is a major provider of continuing education, has been commissioned by the Commonwealth, State and local governments to provide training programs for major reforms, and has made international contributions to local government development in collaboration with several countries. Principal contact: Ms Roslyn Crichton (Acting Director).

Cooperative Research Centre for Cardiac Technology

The CRC for Cardiac Technology includes UTS and three other university participants, CSIRO, three companies, and three hospitals. It has links with leading international cardiac research groups in the USA, the UK, and Japan. The Faculty is involved in a number of programs through the Centre for Biomedical Technology. Principal contact: Associate Professor Hung Nguyen.

Cooperative Research Centre for Distributed Systems Technology

The CRC for Distributed Systems Technology has five university and eight industry participants. Its focus is on the production of demonstrable prototype technology encompassing distributed systems architectures, databases, tools and management. UTS's contribution is primarily on the management and performance of systems supporting the exchange of large amounts of information between dispersed users, including person-to-person communication. Principal contact: Associate Professor Aruna Seneviratne.

Cooperative Research Centre for Renewable Energy

The CRC for Renewable Energy has seven university and 13 other participants. It undertakes strategic research in energy generation and storage, power conditioning, energy efficiency, and systems integration, aimed at fossil fuel replacement and greenhouse gas abatement. UTS Engineering is primarily involved in the energy efficiency program. Principal contact: Professor Vic Ramsden.

Cooperative Research Centre for Satellite Systems

The CRC for Satellite Systems will be a microsatellite that will be used to conduct communication, space physics, remote sensing and engineering experiments. It will give Australian scientists and engineers valuable data about the space environment, as well as experience in space engineering and practical application of space technology. UTS Engineering is involved together with CSIRO, the University of South Australia, Queensland University of Technology, University of Newcastle, Auspace Limited, VIPAC Scientists and Engineers Pty Ltd, La Trobe University, Curtin University of Technology, the Defence Science and Technology Organisation, the ARIES Consortium, MITEC Pty Ltd, D-Space Ltd and Optus. Principal contact: Associate Professor Sam Reisenfeld.

Institute for Coastal Resource Management

The Institute for Coastal Resource Management is an inter-faculty network within UTS, integrating expertise and resources in environmental sciences, engineering, law, and business, for sustainable development, planning and natural resource management in the coastal zone. It conducts research, consultancy and interdisciplinary professional courses, and has international links in the Pacific region and in North America and Europe. Principal contact: Professor Vigi Vigneswaran.

National Centre for Groundwater Management

The National Centre for Groundwater Management at UTS conducts research and consultancy in groundwater and environmental problems of strategic national importance, and postgraduate and continuing education programs. It is recognised by the Commonwealth as a national centre, liaises extensively with industry, and participates in international research and development programs. Its Director is currently President of the International Association of Hydrogeologists. Principal contact: Professor Michael Knight (Director).

Sydney Microwave Design Resources Centre

The Sydney Microwave Design Resources Centre is a joint initiative of UTS, the University of Sydney, and Hewlett Packard Australia. It assists researchers and Australian companies to develop or extend advanced microwave capabilities through access to modelling, design and measurement facilities, and undertakes research in areas such as microwave communications, electromagnetic interference, antennas, microwave processing and materials characterisation. Principal contact: Professor Rod Belcher.

Institutes of UTS

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

- 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*.

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 are 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 of 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. Recognition of the Bachelor of Technology is at an advanced stage and will be completed during 1998.

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.

ENGINEERING CLUBS AND SOCIETIES

Engineering clubs and societies at UTS include:

- The Faculty of Engineering Speakers Club
- Civil and Structural Engineering Society (CASES)
- Society for Electrical and Computer Systems Engineering (SECSE)
- Mechanical and Production Engineering Society (MECHPAS)
- UTS Amateur Radio Society.

PRIZES AND SCHOLARSHIPS

Prizes and scholarships are awarded each year to students in the Faculty for meritorious work. These are made available through the generosity of private individuals and public organisations. The prizes and scholarships offered are listed below. Full details are published in the UTS Calendar.

General

- Francis E Feledy Memorial Prize
- The Institution of Engineers, Australia MEM Prize
- James N Kirby Foundation Bequest
- United Associations of Women Prize

Civil Engineering programs

- Association of Consulting Structural Engineers Prizes
- Trevor Buchner Design Prize
- The George J Haggarty Civil Engineering Prize
- The George J Haggarty Civil Engineering Scholarship
- Hardie's 'Pipeline Systems' Award
- Jack Kaganer Prize
- Leica Instruments Pty Ltd Prize
- Institute of Municipal Engineering Australia (IMEA), NSW Division Medal
- Pioneer Concrete (Stage 5) Prize
- Ove Arup Bursary

Electrical Engineering programs

- Richard Whitfeld Prize for Industrial Experience
- Electricity Supply Engineers' Association Inc. Prize
- The Institution of Electrical Engineers Prize
- The Institute of Instrumentation and Control, Australia Prize
- The Energy Australia Prize in Power Engineering
- Optus Medal

Mechanical Engineering programs

- The Institution of Electrical Engineers, E C Parkinson Prize
- The L H Baker Medal
- Eldred G Bishop Prize
- Compumod Prize in Solid Mechanics
- The Institute of Instrumentation and Control, Australia Prize
- MTIA John Heine Memorial Prizes
- Society of Manufacturing Engineers (Bachelor of Technology) Prize
- Society of Manufacturing Engineers (Stage 8) Prize

ACADEMIC STAFF GROUPS – AREAS OF PROFESSIONAL INTEREST

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

Civil Engineering

	Building/Room	Telephone Ext
Professor Steve Bakoss Structural Mechanics	2/528	2629
Associate Professor Tom Anderson Construction and Management	2/521	2639
Associate Professor Manfred Hausmann Soil Engineering	2/527	2545
Associate Professor Geoffrey O'Loughlin Water Engineering	2/508	2644
Associate Professor Bijan Samali Structural Dynamics, Structural Mechanics	2/7070	2632
Dr Simon Beecham Water Engineering	2/507	2623
Mr Alan Brady Surveying	2/511B	2627
Dr Hung Chung Construction Materials	2/519	2637
Mr Keith Crews Timber Engineering	2/503	2619
Mr Ken Halstead Local Government Engineering	2/522	2640
Dr Reza ul-Karim Structural Mechanics	2/505	2621
Mr Patrick Kenny Roads and Transport	2/502	2618
Dr Kin Leung Lai Structural Mechanics, Design and Construction	2/510	2626
Dr Sia Parsanejad Design of Steel Structures and Structural Analysis	2/504	2620
Dr Ravi Sri Ravindrarajah Concrete Technology	2/509	2625
Dr Gerald Ring Soil Engineering	2/506	2622
Dr Ali Saleh Structural Mechanics	2/517	2635
Mr Chris Wilkinson Structural Mechanics, Fabric Structures	2/518	2631
Research Fellow		
Dr Jianchun Li	2/536	2651

	Building/Room	Telephone Ext
Computer Systems Engineering		
Professor Chris Drane Positioning Systems, Intelligent Vehicle Highway Systems, Software Engineering	1/2221A	2390
Associate Professor Chris Peterson Research Policy, Computer-integrated Manufacturing, Image Analysis, Process Control, Robotics	1/2220A	2392
Mr Noel Carmody Microcomputer System Design, Operating Systems, Computer Architecture, Digital Control Systems	1/2221B	2391
Dr K K Fung Parallel Processing, Software Engineering, Computer Simulation, Microcomputer Engineering, Digital Systems	1/2225	2394
Mr John Leaney Software/Systems Engineering, Real-time Computing, Intelligent Instrumentation, Robotics	1/2221A	2389
Dr David Lowe Image Processing and Analysis, Object-oriented Software Development, Software System Specification	1/2226	2526
Dr Ron Meegoda Computer Systems Engineering, Robotics, Software Engineering, Software Quality, Multimedia, Systems Engineering	1/2227	2396
Mr Steve Murray Embedded Systems, Real-time Systems, Operating Systems, Computer Systems Engineering	1/2222	1553
Dr Craig Scott Intelligent Transport Systems, Motor Vehicle and Robotic Navigation	1/2220D	2397
Dr Keiko Yasukawa Mathematics Education, Nonlinear Systems and Control, Numeracy and Engineering	1/2210C	2437
Electrical Engineering		
Professor Vic Ramsden Electrical Machines, Electrical Variable-Speed Drives, Electromagnetics	1/2417C	2420
Associate Professor Roman Stere Instrumentation and Control, Data Acquisition Systems, Electronic Measurements, Engineering Education	1/2315	2401
Associate Professor Hung Nguyen Biomedical Engineering, Neural Networks and Fuzzy Systems, Power Electronics and Machine Control	1/2515	2451
Ms Vicki McKain Instrumentation and Control, Biomedical Engineering	1/2433	2443

	Building/Room	Telephone Ext
Mr Peter McLean Power and Machines, Power System Protection, Numerical Methods, Parallel Processing, Electromagnetic Communications	1/1921	2339
Dr Andrew Mears Biomedical Technology, Control Systems	1/2520B	2427
Dr John Nicol Control Theory, Optimal Control, Multivariable Control	1/2428	2438
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 David Webster Estimation and Detection Theory, Sensors and Transducers, Radar, Sonar	1/2520B	2453
Dr Jianguo Zhu Electromagnetics, Electrical Machines and Drive Systems, Power Electronics	1/1823	231
Senior Research Fellow		
Dr Peter Watterson Electromagnetics, Engineering Mathematics, Numerical Methods	1/1823	2319
Engineering Management and Practice		
Professor Rod Belcher Antenna and Microwave Systems, Systems Engineering	2/511	2423
Professor Peter Parr Engineering Education and Management	2/7092	2599
Associate Professor Paul Bryce Microhydroelectricity, Appropriate Technology, Fibre Optic Communications, Electromagnetic Theory	1/2420A	2425
Mr Peter Lewis Engineering Education, Engineering Management, Project Management	1/2431	2431
Mr Paul Maloney (Director, International Engineering Program)	2/7100	2591
Mr Robert Mellor Local Government Management (Centre for Local Government Education and Research)	1/1714	2595
Dr Deepak Sharma Energy Planning and Policy, Energy Economics, Energy Modelling, Institutional Restructuring and Decision Processes, Project Planning and Performance	2/7088	2422
Mr Paul Stapleton Director, Industrial Liaison	2/7097	2592

	Building/Room	Telephone Ext
Ms Elizabeth Taylor Sociology and Engineering, Engineering Education, Appropriate Engineering and Society, Technology, Law and Society	1/2432	2442
Dr Ron Ward Engineering Management, Technical Communication, Maintenance Hazard and Risk	2/621	2679
Environmental Engineering		
Professor S (Vigi) Vigneswaran Environmental Engineering	2/523	2641
Professor Michael Knight (Director, National Centre for Groundwater Management)	1/1715	2692
Associate Professor Jim Parkin Engineering Management	2/7087	2638
Ms Roslyn Crichton Local Government Management (Acting Director, Centre for Local Government Education and Research)	1/1714	2597
Dr Prasanthi Hagare Environmental Engineering	2/520	1952
Dr Pamela Hazelton Environmental Engineering	2/512	2661
Ms Bronwyn Holland Environmental Engineering (Director, Women in Engineering Program)	2/7071	2601
Mr James Irish Environmental Engineering	2/501	2617
Dr Robert McLaughlan (National Centre for Groundwater Management)	1/1715	2614
Mr Noel Merrick Groundwater Modelling (National Centre for Groundwater Management)	1/1715	2612
Dr William Milne-Home (National Centre for Groundwater Management)	1/1715	2654
Dr Hao Ngo Environmental Engineering	2/547	2653
Ms Kayleen Walsh Site Rehabilitation (National Centre for Groundwater Management)	1/1715	1984
Mechanical Engineering and Manufacturing		
Professor John Reizes Computational Fluid Dynamics, Thermodynamics, Heat Transfer, Engineering Ethics	2/511C	2742
Professor Frank Swinkels Design for Manufacturing, Materials, Computer-aided Design and Computer-aided Manufacturing	2/416	2588

	Building/Room	Telephone Ext
Associate Professor Stephen Johnston Design, Ergonomics, Social Context and Philosophy of Technology	2/610	2663
Associate Professor Helen McGregor Human Communication, Engineering and Social Issues, Cooperative Education, Engineering Documentation, Professional Development	2/611	2678
Associate Professor Robert Spencer Production Planning and Control, Product Process Design and Development, Computer-aided Manufacture, Metrology/CMM, Robotics	2/606	2660
Mr Terry Brown Experimental and Computer-aided Stress Analysis and Design, Adhesives	2/604	2658
Mr John Dartnall Mechanical Engineering Design	2/622	2541
Mr David Eager Acoustics, Project Management, Occupational Health and Safety, Building Services Engineering	2/612B	2687
Dr Guang Hong Turbulence Transition, Internal Combustion Engines, Thermodynamics, Engineering Statistics	2/619	2677
Dr Phuoc Huynh Computational Mechanics, Fluid Mechanics, Heat Transfer	2/616	2675
Ms Catherine Killen Computer-aided Design, Computer-aided Manufacture	2/624	2697
Dr Austin Mack Computing, Aerodynamics, Finite Element Methods, Computational Fluid Dynamics	2/626	2684
Dr Jaffar Madadnia Computational Fluid Dynamics, Thermodynamics, Heat Transfer	2/607	2740
Mr Garry Marks Appropriate Technology, Industry Development Policy, Mechanics, Engineering Education	2/625	2683
Dr Fred Sticher Advanced Kinematics and Dynamics, Instrumentation	2/623	2681
Mr Kel Stillman Control Engineering, Chemical Engineering, Real-time Computing, Simulation, Optimisation	2/612C	2682
Dr Nong Zhang Vibration Analysis, Machine and Rotor Dynamics	2/608	2662

Telecommunications Engineering

	Building/Room	Telephone Ext
Professor Warren Yates Signal Processing, Communication System Theory, Packet Radio and Spread Spectrum Communications, Synchronisation Issues in Communications	1/2427	2436
Associate Professor Sam Reisenfeld Communications Systems, Satellite Communication, Information Theory, Modulation, Channel Coding, Synchronisation, Mobile Communications, Wireless Networks, Neural Networks	1/2512B	2448
Associate Professor Aruna Seneviratne Protocol Design, Software Engineering, Computer Networks, Data Communications, Operating Systems	1/2431	2441
Dr Tim Aubrey Antennas and Propagation, Microwave Engineering	1/2417B	2360
Dr Jihad Daba Teletraffic Engineering, Telecommunication Systems Analysis and Design, Image Processing, Radar Remote Sensing	1/2420C	2530
Dr Michael Eckert Human Visual Perception, Medical Image Processing, Biomedical Signal Processing, Signal Compression	1/2420D	2428
Dr Jules Harnett Engineering Mathematics	1/2419	2413
Mr Anthony Kadi Real-time Signal Processing, Ultrasound Signal Processing, Signal Theory, Hardware Design and Construction	1/2420E	2459
Dr Ananda Sanagavarapu High Frequency Electromagnetics, Wave Propagation, Microwave Engineering, Mobile Communication	1/2512A	2447

LIST OF COURSES AND CODES

Course codes are listed below. Please note that course codes for commencing students in 1998 may differ from those for some continuing students.

Undergraduate

Bachelor of Engineering, Diploma in Engineering Practice	E001
Bachelor of Engineering, Bachelor of Arts in International Studies, Diploma in Engineering Practice	E002
Bachelor of Engineering, Graduate Certificate in Engineering Practice	E004
Major Codes (for E001, E002, E004)	
Civil Engineering	*01*
Civil and Environmental Engineering	*02*
Computer Systems Engineering	*03*
Electrical Engineering	*04*
Environmental Engineering (from 1999)	*05*
Mechanical Engineering	*06*
Telecommunications Engineering	*07*
Bachelor of Technology	E012
Major Codes (for E012)	
Manufacturing Engineering	*01*
Heating, Ventilating, Airconditioning and Refrigeration	*02*
Aerospace Operations	*03*
Bachelor of Science in Applied Physics, Bachelor of Engineering in Electrical Engineering, Diploma in Engineering Practice	NP04

Note: Readers seeking details of the BE programs offered prior to 1998 are referred to the 1997 handbook, available free of charge from the Faculty's Undergraduate Programs Office, level 7, Building 2, City campus.

Postgraduate

Research awards

New Students

Doctor of Philosophy	EP99
Master of Engineering (by Thesis)	EP98

Continuing Students

Doctor of Philosophy	
Civil Engineering	EC55
Electrical Engineering	EE53
Mechanical Engineering	EM55
Groundwater Management	EO55
Master of Engineering (by Thesis)	
Civil Engineering	EC51
Electrical Engineering	EE51
Mechanical Engineering	EM51
Groundwater Management	EO56

Coursework awards

Master of Engineering (by Coursework)	EP81
Master of Engineering (by Coursework) (Energy Planning and Policy)	EP82
Master of Engineering (by Coursework) (Software Engineering Program)	EP83
Master of Engineering Management	EP85
Master of Engineering Practice	EP86
Master of Engineering in Groundwater Management	EO57
Master of Technology	EP71
Master of Technology (Energy Planning and Policy)	EP72
Master of Technology (Software Engineering Program)	EP73
Graduate Diploma in Engineering	EP61
Graduate Diploma in Engineering (Energy Planning and Policy)	EP62
Graduate Diploma in Engineering (Software Engineering Program)	EP63
Graduate Diploma in Local Government Engineering	EP64
Graduate Diploma in Engineering in Groundwater Management	EO61
Graduate Certificate in Engineering	EP51
Graduate Certificate in Engineering (Energy Planning and Policy)	EP52
Graduate Certificate in Engineering (Software Engineering Program)	EP53
Graduate Certificate in Engineering Management	EP57
Graduate Certificate in Environmental Engineering and Management	EP54

Note: Continuing students who commenced before 1 January 1995 and who are uncertain of their course codes should contact the GSE Graduate Studies Officer.

Undergraduate courses

Bachelor of Engineering, Diploma in Engineering Practice

Course code: E001

Introduction

The program leading to the combined awards of Bachelor of Engineering and Diploma in Engineering Practice (BE DipEngPrac) is a comprehensive preparation for careers in the professional practice of engineering. The program comprises eight semesters of full-time study on campus, or equivalent, and two six-month periods of experience in engineering practice. This experience must be gained in engineering industry, or other authentic workplace setting.

The awards of Bachelor of Engineering and Diploma of Engineering Practice are not available separately. All candidates must complete both elements of the program, which are closely interwoven and interdependent.

Students who have more extensive and advanced experience of engineering practice 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. The remainder of this section describes the normal program leading to BE DipEngPrac.

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 thirty 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. UTS is now the only faculty of engineering in Australia where all BE students take the Co-op program. Co-op is well-known and highly regarded in other countries also, particularly North America.

The program offered from 1998 onwards is completely new. Engineering education in many countries is undergoing revolutionary change, and the new 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 new 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 lifelong learners and to become effective citizens in many different capacities. The concept has been strongly endorsed in wide-ranging industry consultations. Interaction between work experience and academic curriculum has been greatly strengthened, giving the program a depth that no full-time academic course can match. The design has been comprehensively documented, and interested readers may obtain copies of the papers from the Associate Dean Undergraduate Programs or the Faculty Administrator.

At present, students can major in the combined award in one of six areas. These are: Civil Engineering, Civil and Environmental Engineering, Computer Systems Engineering, Electrical Engineering, Mechanical Engineering, and Telecommunications Engineering. The choice of major can be made at entry, or postponed until the end of the first year without extending completion time. Further majors will be introduced in subsequent years in response to technological developments and employment demand, and provision will be made for transfer from existing majors. It is also possible for students to negotiate a program which focuses in 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.

Two associated courses are also available. One combines the BE DipEngPrac with a Bachelor of Arts in International Studies. The other combines it with a Bachelor of Science in Applied Physics. These are described in a later section, together with the Graduate Certificate in Engineering Practice.

Commencement of new program

The new BE DipEngPrac is being introduced in 1998 at first-year level only. Students who were enrolled in 1997 will continue in the BE courses existing at that time, as will students entering in 1998 with advanced standing. In 1999, introduction of the new BE DipEngPrac will be completed in all Stages. Students continuing in the old courses may then transfer into the new program if they so wish, or may elect to complete the BE under the old regulations. Continuing students will receive detailed advice.

This handbook contains details of the new BE DipEngPrac only. Readers seeking details of the old BE courses are referred to the *1997 Faculty of Engineering Handbook*, available free of charge from the Faculty's Undergraduate Programs Office.

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. Exact dates are given elsewhere.

Students undertaking full-time academic enrolment will normally complete the program in eight academic semesters, each containing four subjects, plus two periods of engineering experience in the workplace totalling at least 48 weeks. On this basis the program takes five years, or ten semesters, to complete. The two periods of work experience must be interleaved with the academic semesters: work experience would typically be taken in the third or fourth semester and again in the seventh or eighth. This mode of attendance is often known as the sandwich pattern.

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 as specified in the Faculty's Guidelines for Engineering Practice, 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 preferably 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 through a Summer program, 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 also may 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 (see below) 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 during each work experience period. 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 industrial semester, subject to work availability and satisfactory performance in the job. Salary is usually paid only during the industrial semesters.

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. Sandwich and part-time attendance are only two examples of the flexibility available, and students may adjust their attendance and progression arrangements to suit employment opportunities and personal circumstances.

Students attending on the sandwich pattern are encouraged to undertake additional work experience, over and above the minimum of 48 weeks, provided it is of good standard and contributes to their professional development.

Industrial Liaison Office

The Industrial Liaison Office assists students in obtaining suitable industry or workplace experience to meet the requirements of the program. Its staff maintain contact with industry, register students' intentions of seeking work experience, advise students on the preparation of resumés and presentation at interview, keep students' resumés on file, and advise on the availability of work opportunities in Australia and overseas. Students seeking work experience should register with the Industrial Liaison Office 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 eleven 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 Information Service 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 Undergraduate Programs.

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 meets the requirements for entry to the BE DipEngPrac.

Entry from NSW Higher School Certificate

Selection is competitive, and is made on the basis of TER alone. The minimum TER 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 TER's 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, Japanese, Spanish or Thai is an advantage. Places in this program are very limited and selection is by interview as well as formal qualification.

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.

Advice to applicants

The Faculty will offer advice to applicants who have failed to reach the necessary standard for selection, on steps they might take to improve their prospects of selection in a future year.

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 Programs 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, 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 the industrial experience requirements. Applicants for advanced standing should read the following sections carefully.

TAFE studies

UTS and Sydney Institute of Technology are developing improved articulation arrangements, which may be expected to extend to other New South Wales Institutes of TAFE as appropriate. Details are not complete at the time of printing, and will be influenced by a study of current Australian and international best-practice in TAFE-university articulation in engineering. As an indication, it may be expected that holders of TAFE qualifications who gain admission to the BE DipEngPrac will qualify for 25 per cent advanced standing (equivalent to two academic semesters) and that those who have attained high levels of performance, or who have taken specially-designed TAFE-university articulation subjects, may gain more than this.

Pending completion of the new arrangements, inquiries may be directed to the Associate Dean Undergraduate Programs. However, it should be noted that these arrangements relate to the new BE DipEngPrac, to which entry at levels higher than first year is not available until 1999. Entry with advanced standing in 1998 will generally be to the old BE programs, and will be governed by the arrangements set out in the *1997 Faculty of Engineering Handbook* (see Commencement of New Program, above).

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. A small fee is charged for RPL assessments.

Advanced standing in work experience

Exemption from part of the work experience requirements of both the old BE and the new BE DipEngPrac is granted only on the basis of actual work experience that can be shown to meet the required standards. In the old BE, exemption may be granted up to a maximum of 72 weeks of the 96 weeks required. In the new BE DipEngPrac, exemption may be granted from one only of the two required periods of Engineering Experience, or a maximum of half the required total of 48 weeks. Candidates for such exemption are advised to consider transfer to the Graduate Certificate in Engineering Practice (see below).

In no circumstances will exemption be granted from the whole of the work-experience 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

Up to 20 UTS Engineering Co-op Scholarships, sponsored by engineering employers, are expected to be awarded in 1998. These will be awarded to students who are successful in the 1997 HSC examinations (or equivalent) and who are entering any of the majors available in the BE DipEngPrac in 1998. Selection is based on a combination of achievements at the trial and actual HSC examinations, and personal attributes relevant to a career in professional engineering such as interest and motivation, communication skills, leadership and creativity.

Scholarship features

- Scholarships are only available to applicants who satisfy requirements for admission to any of the majors available in the BE DipEngPrac. A scholarship may be tied to a particular major.
- Each scholarship is valued at between $5,000 and $10,000, and is tenable in the first academic year of the course only.
- An initial payment (10 per cent of total value) is made to the scholar at the time of enrolment, followed by fortnightly payments commencing in the second week of the Autumn semester. Payments conclude at the end of the Spring semester examination period.
- Following the first academic year, a scholar is given the opportunity to undertake one period of work experience with the sponsor of the scholarship. Scholar and sponsor are free to arrange further periods of work experience if they so wish.

Sponsors

Sponsors have included: BP Australia; Canon Australia; Ci Technologies Pty Ltd; CMPS&F; Commonwealth Bank; Comalco; Delta Electricity; Energy Australia; GHD; IBM Australia; Institute of Municipal Engineering Australia; Keycorp Pty Ltd; Kinhill Engineers; Leighton Contractors; McMillan, Britton & Kell; Pacific Power; Optus; Ove Arup and Partners; Rose Consulting; Vodafone; Warman International. The list of 1998 Scholarship sponsors is not yet finalised.

Applications

Application forms are available from high-school careers advisers by August each year for admission to UTS in the year following.

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.

COURSE DESCRIPTION

All programs lead to the combined award of Bachelor of Engineering and Diploma in Engineering Practice (or Graduate Certificate in Engineering Practice – see below). 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, and Telecommunications Engineering. The Faculty expects to introduce a Major in Environmental Engineering in 1999, and further majors in new areas of engineering practice 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 periods of Engineering Experience in the workplace, totalling not less than 48 weeks, plus two Review of Engineering Practice 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 work experience

Fields of Practice: 90, 96 or 102cp, depending on Major

Electives: 24 or 30cp, depending on Major

Capstone Project: 6 or 12 credit points, depending on Major.

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

All subjects are rated at 6 credit points (except for some electives offered by other faculties). 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 six 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 practice to develop inter-disciplinary 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):

Engineering for Sustainability
Mathematical Modelling 1
Physical Modelling
Mathematical Modelling 2
Informatics
Engineering Communication
Uncertainties and Risks in Engineering
Engineering Economics and Finance
Engineering Management
Technology Assessment

Fields of practice and majors

This component relates theoretical and practical learning from core subjects to applications in specific fields of engineering practice. 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 judgement, 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 practice.

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 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 field of practice subjects associated with another major; or to take subjects from another faculty, including part credit for a second degree. A number of sub-majors are available in other disciplines, such as business. 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.

In most majors, graduate-level sub-majors within the specialist discipline of the major are available. Students who complete these sub-majors at a satisfactory standard will qualify for advanced standing in the Master of Engineering program, allowing completion of the ME in one year part-time after graduation with the BE DipEngPrac.

Some courses and/or majors have an elective component less than 30cp. The Civil Engineering and the Civil and Environmental Engineering Majors have only 24cp 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 BE BA DipEngPrac has 14cp of electives, the BSc BE DipEngPrac has 24cp of electives, and the BE GradCertEngPrac requires that 12cp of the electives be drawn from a restricted set of graduate engineering subjects.

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:

Engineering Experience 1: minimum 24 weeks

Review of Engineering Practice 1: 6 credit points

Engineering Experience 2: minimum 24 weeks

Review of Engineering Practice 2: 6 credit points.

Students are encouraged to undertake additional work experience of good 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 students 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 practice.

Portfolio

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

MAJORS

Civil Engineering Major

Major code: 01

Civil engineering covers a broad range of activities and working styles, generally based on a desire to serve society. Civil engineers may work on the design, construction, management 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.

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, judgement 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 sessions, seminar presentations and project work. The approach is structured to develop written, verbal and audio-visual 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.

Possible sub-majors Towards the later stages of the course sub-majors will be available to provide a focus on a specialist area of civil engineering prior to graduation. Three sub-majors are proposed: Structures, Land and Water, and Construction and Management.

BE in Civil Engineering, DipEngPrac – standard program

Sem 1	Engineering for Sustainability (core)	Mathematical Modelling 1 (core)	Physical Modelling (core)	Introduction to Civil Engineering (fields of practice)	Portfolio
Sem 2	Informatics (core)	Mathematical Modelling 2 (core)	Statics & Introduction to Design Process (fields of practice)	Surveying (fields of practice)	
Sem 3	Engineering Communication (core)	Chemistry & Materials Science (fields of practice)	Mechanics of Solids (fields of practice)	Soil Behaviour (fields of practice)	
Sem 4	Engineering practice subjects (may be taken in semester 3 or 4)				
Sem 5	Uncertainties & Risks in Engineering (core)	Fluid Mechanics (fields of practice)	Structural Mechanics & Component Design (fields of practice)	Construction (fields of practice)	
Sem 6	Engineering Economics & Finance (core)	Construction Materials (fields of practice)	Structural Analysis & Component Design (fields of practice)	Environmental & Sanitation Engineering (fields of practice)	
Sem 7	Engineering Management (core)	Hydraulics & Hydrology (fields of practice)	Behaviour of Structures & Design (fields of practice)	Geotechnical Engineering (fields of practice)	
Sem 8	Engineering practice subjects (may be taken in semester 6 to 9)				
Sem 9	Technology Assessment (core)	Transport in the Environment (fields of practice)	Submajor/electives	Submajor/electives	
Sem 10	Capstone project	Civil & Environmental Design (fields of practice)	Submajor/electives	Submajor/electives	

Engineering practice subjects shown in semesters 4 and 8 for illustration only.

Civil and Environmental Engineering Major

Major code: 02

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 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 practice 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.

Possible sub-majors If a separate major in Environmental Engineering is developed, it may be possible to offer one or more sub-majors within the Civil and Environmental Engineering program.

BE in Civil & Environmental Engineering, DipEngPrac – standard program

Sem 1	Engineering for Sustainability (core)	Chemistry & Materials Science (field of practice)	Biology & Ecology (fields of practice)	Introduction to Civil Engineering (fields of practice)	Portfolio
Sem 2	Informatics (core)	Mathematical Modelling 1 (core)	Physical Modelling (core)	Introduction to Environmental Engineering (fields of practice)	
Sem 3	Engineering Communication (core)	Mathematical Modelling 2 (core)	Statics & Introduction to Design Process (fields of practice)	Construction (fields of practice)	
Sem 4	Engineering practice subjects (may be taken in semester 3 or 4)				
Sem 5	Uncertainties & Risks in Engineering (core)	Fluid Mechanics (fields of practice)	Mechanics of Solids (fields of practice)	Water Supply and Wastewater Engineering (fields of practice)	
Sem 6	Engineering Economics & Finance (core)	Soil Behaviour (fields of practice)	Construction Materials (fields of practice)	Environmental Planning and Law (fields of practice)	
Sem 7	Engineering Management (core)	Hydraulics & Hydrology (fields of practice)	Structural Mechanics & Component Design (fields of practice)	Pollution and Waste Management (field of practice)	
Sem 8	Engineering practice subjects (may be taken in semester 6 to 9)				
Sem 9	Technology Assessment (core)	Structural Analysis & Component Design	Submajor/electives	Submajor/electives	
Sem 10	Capstone project	Transport in the Environment (fields of practice)	Submajor/electives	Submajor/electives	

Engineering practice subjects shown in semesters 4 and 8 for illustration only.

Computer Systems Engineering Major

Major code: 03

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 amongst 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-posing, problem-solving and presentation skills.

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

Possible sub-majors There will not be formal sub-majors, but suggested elective patterns will be published. These may include computing science, information systems engineering, electronics, telecommunications, and research. The computing science pattern

BE in Computer Systems Engineering, DipEngPrac – standard program

Sem 1	Engineering for Sustainability (core)	Mathematical Modelling 1 (core)	Physical Modelling (core)	Introduction to Electrical Engineering (fields of practice)	Portfolio
Sem 2	Informatics (core)	Mathematical Modelling 2 (core)	Introduction to Mechanical Engineering (fields of practice)	Electronics (fields of practice)	
Sem 3	Engineering Communication (core)	Software Development (fields of practice)	Electromechanical Systems (fields of practice)	Circuit Analysis (fields of practice)	
Sem 4	Engineering practice subjects (may be taken in semester 3 or 4)				
Sem 5	Uncertainties & Risks in Engineering (core)	Software Engineering (fields of practice)	Real-time Software & Interfacing (fields of practice)	Submajor/electives	
Sem 6	Engineering Economics & Finance (core)	Operating Systems (fields of practice)	Digital Systems (fields of practice)	Submajor/electives	
Sem 7	Engineering Management (core)	Signal & Systems (fields of practice)	Communications Networks (fields of practice)	Submajor/electives	
Sem 8	Engineering practice subjects (may be taken in semester 6 to 9)				
Sem 9	Technology Assessment (core)	Data Acquisition & Distribution (fields of practice)	Computer Systems Analysis (fields of practice)	Submajor/electives	
Sem 10	Capstone project	Capstone Project	Computer Systems Design (fields of practice)	Submajor/electives	

Engineering practice subjects shown in semesters 4 and 8 for illustration only.

would include topics such as database management systems and paradigms of intelligence. The information systems engineering pattern would relate to complex information engineering applications, such as programs that use the World Wide Web. Electronics would be taken by students who wish to work as hardware engineers, and telecommunications by students interested in a career in the telecommunications industry. The research pattern would be based strongly on mathematics and statistics, and on preparation for a career in research.

Electrical Engineering Major

Major code: 04

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

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

The major develops technical expertise in electronics and microelectronics, power electronics, energy and power systems, analogue and digital control and automation, data acquisition and distribution, instrumentation and signal processing, artificial intelligence, real-time computing, and industrial networking. It incorporates substantial laboratory work, and most of the advanced subjects have 50 per cent theory and 50 per cent project work. Appropriate theoretical foundations are provided to ensure that designs are based on social responsibility, sustainability, and sound engineering methodologies with guaranteed stability and accuracy. At the same time, strong encouragement is provided to help student projects to production-level completion using appropriate management techniques. Whenever possible, professional hardware systems are produced, and with a high degree of software validation and professional documentation. There is emphasis on development of comprehension, presentation, interpersonal and team skills, and on interdisciplinary interactions.

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

Possible sub-majors There are sub-majors in three areas of specialisiation: computer control and instrumentation, energy technology, and biomedical technology. Essentially, graduates of the major will have the background to work in any of these areas, but the sub-major provides more advanced coverage.

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.

BE in Electrical Engineering, DipEngPrac – standard program

Sem 1	Engineering for Sustainability (core)	Mathematical Modelling 1 (core)	Physical Modelling (core)	Introduction to Electrical Engineering (fields of practice)	Portfolio
Sem 2	Informatics (core)	Mathematical Modelling 2 (core)	Introduction to Mechanical Engineering (fields of practice)	Electronics (fields of practice)	
Sem 3	Engineering Communication (core)	Software Development (fields of practice)	Electromechanical Systems (fields of practice)	Circuit Analysis (fields of practice)	
Sem 4	Engineering practice subjects (may be taken in semester 3 or 4)				
Sem 5	Uncertainties & Risks in Engineering (core)	Advanced Mathematics & Physics (fields of practice)	Real-time Software & Interfacing (fields of practice)	Signal & Systems (fields of practice)	
Sem 6	Engineering Economics & Finance (core)	Power Systems (fields of practice)	Digital Systems (fields of practice)	Signal Processing (fields of practice)	
Sem 7	Engineering Management (core)	Analogue & Digital Control (fields of practice)	Power Electronics (fields of practice)	Submajor/electives	
Sem 8	Engineering practice subjects (may be taken in semester 6 to 9)				
Sem 9	Technology Assessment (core)	Data Acquisition & Distribution (fields of practice)	Submajor/electives	Submajor/electives	
Sem 10	Capstone project	Capstone Project	Submajor/electives	Submajor/electives	

Engineering practice subjects shown in semesters 4 and 8 for illustration only.

Mechanical Engineering Major

Major code: 06

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 field-of-practice subjects, which are structured so as to emphasise the relationship between engineering science and engineering practice. 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 field 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.

Possible sub-majors The major provides a general competence to practise mechanical engineering. Students may use their electives to pursue further specialisation within mechanical engineering by enrolling in sub-majors, in areas likely to include environmental, materials and chemical technology, manufacturing management, mechanics, and energy systems.

BE in Mechanical Engineering, DipEngPrac – standard program

Sem 1	Engineering for Sustainability (core)	Mathematical Modelling 1 (core)	Physical Modelling (core)	Introduction to Mechanical Engineering (fields of practice)	Portfolio
Sem 2	Informatics (core)	Mathematical Modelling 2 (core)	Manufacturing Engineering (fields of practice)	Fundamentals of Mechanical Engineering (fields of practice)	
Sem 3	Engineering Communication (core)	Chemistry & Materials Science (fields of practice)	Mechanics of Solids (fields of practice)	Introduction to Electrical Engineering (fields of practice)	
Sem 4	Engineering practice subjects (may be taken in semester 3 or 4)				
Sem 5	Uncertainties & Risks in Engineering (core)	Fluid Mechanics (fields of practice)	Machine Dynamics (fields of practice)	Strengths of Engineering Materials (fields of practice)	
Sem 6	Engineering Economics & Finance (core)	Thermodynamics (fields of practice)	Electromechanical Systems (fields of practice)	Mechanical & Manufacturing Design (fields of practice)	
Sem 7	Engineering Management (core)	Dynamics & Control (fields of practice)	Restricted Choice subject 1[1] (fields of practice)	Restricted Choice subject 2[1] (fields of practice)	
Sem 8	Engineering practice subjects (may be taken in semester 6 to 9)				
Sem 9	Technology Assessment (core)	Submajor/electives	Submajor/electives	Engineering Design (fields of practice)	
Sem 10	Capstone project	Submajor/electives	Submajor/electives	Submajor/electives	

[1] Restricted choice subjects: any two from the following – Energy Applications, Mechanics Applications, Advanced Manufacturing.

Engineering practice subjects shown in semesters 4 and 8 for illustration only.

Telecommunications Engineering Major

Major code: 07

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 these equipments 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 engineering practice programs, and with the portfolio, to contribute progressively to professional formation over the ten semesters of the course. An appreciation of concepts such as sustainability, ethical principles and technology assessment is developed by drawing out common themes illustrated in multiple case studies over multiple subjects. Competence in modelling, experimental methods, risk analysis, systems thinking, and mathematical analysis is developed alongside the personal effectiveness skills needed for employment. Many subjects engage the perspectives of other disciplines, 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.

Possible sub-majors Students who wish to undertake research careers in telecommunications will be encouraged to undertake one of three sub-majors, each giving 24 credit points of advanced standing in the ME program. Each sub-major begins with an advanced mathematics course followed by graduate level communications subjects. The first sub-major is in integrated services networks and teletraffic engineering; the second covers electromagnetics, wave propagation, microwave and millimetre wave systems, antennas and propagation; and the third covers information theory, source and channel coding, modulation and error control. Two other sub-majors are available, in applied mathematics and in communications system operation. For students wishing to broaden their knowledge base, coherent sequences of subjects from other engineering fields of practice are suitable. In addition, a wide variety of sub-majors in other disciplines is available across the University.

BE in Telecommunications Engineering, DipEngPrac – standard program

Sem 1	Engineering for Sustainability (core)	Mathematical Modelling 1 (core)	Physical Modelling (core)	Introduction to Electrical Engineering (fields of practice)	
Sem 2	Informatics (core)	Mathematical Modelling 2 (core)	Introduction to Telecommunications Engineering (fields of practice)	Electronics (fields of practice)	
Sem 3	Engineering Communication (core)	Software Development (fields of practice)	Authentication & System Security(fields of practice)	Circuit Analysis (fields of practice)	
Sem 4	Engineering practice subjects (may be taken in semester 3 or 4)				Portfolio
Sem 5	Uncertainties & Risks in Engineering (core)	Software Engineering (fields of practice)	Signals & Systems (fields of practice)	Real-time Software & Interfacing (fields of practice)	
Sem 6	Engineering Economics & Finance (core)	Communications Theory (fields of practice)	Signal Procesing (fields of practice)	Submajor/electives	
Sem 7	Engineering Management (core)	Communication Networks (fields of practice)	Mobile Communications (fields of practice)	Submajor/electives	
Sem 8	Engineering practice subjects (may be taken in semester 6 to 9)				
Sem 9	Technology Assessment (core)	Operating Systems (fields of practice)	Network Planning & Management (field of practice)	Submajor/electives	
Sem 10	Capstone project subject	Legal Issues in Telecommunications (fields of practice)	Submajor/electives	Submajor/electives	

Engineering practice subjects shown in semesters 4 and 8 for illustration only.

General degree, without major

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

Core program: 60cp

Engineering Practice program: 12cp, plus 48 weeks of approved work experience

Fields of practice: 96cp

Electives: 24cp

Capstone Project: 12cp

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. In 1998, all such programs must be approved by the Associate Dean Undergraduate Programs. Any subsequent variations to the program must be approved by the same adviser, or the Associate Dean, who has discretion to approve minor variations to the program above (for example, inclusion in the 96cp 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 Associate Dean 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.

ENGINEERING LEARNING AND DESIGN CENTRES

The Faculty has a strong commitment to providing an effective and supportive learning environment for students. The Learning and Design Centres are located in Building 1, Room 2315 (Level 23) 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

The English Language and Study Skills Assistance (ELSSA) Centre provides free English language and study skills courses for UTS students and staff. These include intensive vacation courses, weekly workshops, day and evening courses on essay and report writing, advanced grammar, critical thinking, discussion skills, seminar presentation, effective reading, pronunciation, and writing at postgraduate level. Individual consultations and self-study facilities are available.

The Mathematics Study Centre coordinates mathematics study assistance across the University. It offers many services to students from all faculties, including assistance with common computing packages.

The Physics Learning Centre operates on a drop-in basis and provides assistance to students from all faculties in relation to first-year Physics studies.

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 the following universities:

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

Nagoya Institute of Technology, Japan

Nanyang Technological University, Singapore

Pontifica Universidad Catolica de Chile

The Technical University of Budapest, Hungary

Shanghai University, 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 UTS 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 Programs Office.

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 of Engineering Practice, described below.

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, whether the language studies are undertaken at UTS or elsewhere. The Institute teaches some language programs at UTS, has made arrangements with other universities for some language programs to be taught to UTS students, and can make special arrangements for individual students to attend specific language programs where appropriate. Some twenty different languages are available at present, and others can be arranged.

Contemporary society

The Institute also offers a series 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, Hong Kong, Taiwan, Latin America and Europe are available. There are no prerequisites for any of these Contemporary Society subjects, which are taught in English.

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

ASSOCIATED COMBINED AND DOUBLE DEGREE COURSES

Bachelor of Engineering, Graduate Certificate in Engineering Practice

Course code: E004

Students enrolled in the BE DipEngPrac, who have more extensive and advanced experience of engineering practice than would normally be attained in two six-month periods, 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 work experience, Engineering Experience 1, and the associated review subject, Review of Engineering Practice 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 Engineering Experience 2 and REP 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 practice 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:

Engineering Experience 1 (or 2)

Review of Engineering Practice 1 (or 2)

Professional Experience

Professional Review

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

plus 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 in Engineering Experience, and who has not been required to enrol in Engineering Experience 1 and REP 1, should seek advice from the Associate Dean Undergraduate Programs or from the Director of the Engineering Practice Program.

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

Course code: E002

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 and Bachelor of Arts in International Studies, and the Diploma of Engineering Practice. The BE may include any of the Majors described above.

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 commenced in 1993, and has now been revised in conjunction with the forward-looking curriculum of the new BE DipEngPrac.

The program links the BE DipEngPrac with the study of a language and culture other than English, and the practice of engineering in one or more overseas countries as well as in Australia. Each student in the program spends a full year overseas, normally their fifth year of enrolment. Half the year is spent studying engineering at university, and half gaining experience in industry, both in the language of the host country. During the first four years, students undertake extensive preparation in the language and culture of the country they will visit. Following their return, they undertake comparative work on Australian and overseas engineering practice, and also provide briefings to outgoing students and to international exchange students visiting UTS.

Some students also choose to take their first period of engineering experience overseas, during their second or third year of enrolment. Most take this first period in Australia.

Admission

Students normally enter the program direct from high school, and are selected on the basis of academic performance, basic proficiency in one of the target languages, commitment to a career in engineering, and demonstrated aptitude for leadership. The language proficiency may have been gained at high school, or through private study or family background. Application is made through UAC in the normal way, and there is a selection interview.

The minimum TER has been set at 80, and the TER for the relevant BE major must also be met. Quotas may have to be set for particular combinations of engineering major and language, based on availability of work experience in the countries concerned.

In normal circumstances, no exemptions are available in the program. The aim is to assist each student to develop their capabilities to the fullest possible extent.

Attendance and duration

Attendance is normally on the sandwich pattern, although students may transfer to part-time attendance for limited periods at certain stages. Overall duration is normally six years, although it may be possible to complete in less than this.

The program involves nine semesters of academic work in Australia plus one six-month period of engineering experience, and one year overseas comprising both academic work and engineering experience. Students are encouraged to take a full program of subjects during their overseas academic semester. If this is not possible, there is latitude during the remaining two semesters in Australia to make up any shortfall. A student failing to complete either engineering or arts subjects overseas, to a satisfactory standard, may be required to complete alternative studies at UTS.

Program arrangements

The program requires a total of 240 credit points of academic subjects, including those taken overseas, plus the normal minimum of 48 weeks of engineering experience. 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 normal BE DipEngPrac.

The first four years of the program include a sequence of six preparatory subjects in the language and culture of the country selected by each student. The overseas year includes further intensive exposure to language and

culture, study of academic subjects at a host university, and study of the practice of engineering in the host country, preferably in conjunction with a period of employment in industry. UTS has partner universities and industry contacts in several countries, and is steadily extending the network. Some of the partner universities are listed under International Exchange Programs, above; there are other partnerships specific to the BA in International Studies, including Zhejiang University in China and Tokyo Institute of Technology in Japan.

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.

Overseas travel and living costs are the responsibility of each student. However, there are a number of industry sponsorships and scholarship schemes which have so far, in conjunction with paid work experience, covered most costs.

The program focuses principally but not exclusively on Pacific Rim countries. Languages offered for study to date include Chinese (Mandarin), French, German, Indonesian, Japanese, Korean, Malaysian, Spanish and Thai. Others may be added.

The standard program for the combined degree is shown in the following diagram.

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

Sem 1	Engineering for Sustainability (core)	core subject	core subject	Language and Culture 1[1]	Portfolio
Sem 2	Informatics (core)	core subject	fields of practice subject	Language and Culture 2[1]	
Sem 3	Engineering Communications (core)	fields of practice subject	fields of practice subject	Language and Culture 3[1]	
Sem 4	Risks & Uncertainties in Engineering (core)	fields of practice subject	fields of practice subject	Language and Culture 4[1]	
Sem 5	Engineering practice subjects (may be taken in semester 4 or 5)				
Sem 6	Engineering Economics & Finance (core)	fields of practice subject	fields of practice subject	fields of practice subject	
Sem 7	Engineering Management (core)	fields of practice subject	Modernisation and Social Change[1]	Language and Culture 5[1]	
Sem 8	Technology Assessment (core)	fields of practice subject	fields of practice subject	Language and Culture 6[1]	
Sem 9	Engineering practice subjects (overseas)				
Sem 10		fields of practice subject (overseas)	fields of practice subject (overseas)	Electives subject[1] (overseas)	
Sem 11		fields of practice subject	fields of practice subject	Electives subject/ fields of practice subject	
Sem 12		Capstone project	fields of practice subject/ Capstone project	Contemporary Society[1]	

[1] These are 8 credit-point subjects. All other subjects are rated 6 credit points.

Bachelor of Science (Applied Physics), Bachelor of Engineering in Electrical Engineering, Diploma in Engineering Practice

Course code: NP04

There is a strong inter-relation between the progress of advanced engineering and developments in applied physics, and a demonstrated need for professionals with a strong understanding, and experience, in both areas. This double-degree program 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.

Graduates will be particularly suited to multi-disciplinary, team-oriented projects because of their deep insights into issues from more than one point of view. Applied physics is philosophically oriented towards the needs of industry, with much of the academic content covering advanced technical skills, as found both in research laboratories and in high technology industry. The program is strongly practice based throughout, in keeping with the focus in all UTS Engineering degrees. Students will thus be able to include references to both areas in their portfolio.

Particular fields of study may include medical technology, energy and applied optics, computer interfacing and control, environmental management, communications and space science, instrumentation and control, computer modelling in a wide variety of fields, mathematical physics, electro-magnetics and electromagnetic design, imaging, and management consulting.

The in-depth first principles, modelling and problem solving skills in the science component will add value to the skills of design and system modelling for engineering work. Those choosing scientific and applied-scientific research careers will have the insight needed to direct their activities in the ways that will be most productive for industry and for the community at large, in terms of what is practically and commercially realisable. A major aim is to equip graduates to fill the critical need for today of evaluating and where appropriate moving technology efficiently from the laboratory to the market place. Business consulting will thus also be an option.

Special features

The degree of overlap between the two professions, especially in the underlying mathematics, computing and science, enables considerable economies in the time taken to complete both degrees.

The two programs are integrated from Stage 1, and the requirements for the award of an Applied Physics degree are completed after the standard six academic semesters. During this period students will undertake at least one semester of work-based engineering practice, generally in an applied science environment relevant to electrical engineering, which will contribute towards the requirements for the award of the DipEngPrac. The second engineering practice semester will take place after completion of the Applied Physics degree.

Both degrees contain a considerable component emphasising sustainability, written and oral communication skills, and team skills. This course will have in total one of the strongest computer modelling contents available at UTS with elements from mathematics, physics and electrical engineering.

At the completion of the Applied Physics degree, students may choose to shift their emphasis into the areas of telecommunications or computer systems. The program aims to tailor the last three semesters for these students to their individual interests and aspirations, keeping in mind prerequisite requirements. This will also include the sub-major/elective component of the last three stages. However, it is hoped that a significant number of students will be motivated to pursue research-oriented careers involving high-level electrical engineering, and applied physics. One outcome will then be a source of students for a number of advanced research areas at UTS in Electrical Engineering and Applied Physics, often jointly with industry collaborators.

Possible sub-majors A number of 24cp sub-majors are being considered to give students the option of using their electives to study a specific field in depth. These include biomedical technology and medical physics, power and energy, materials and chemistry, mathematics, computing and finance, and earth sciences and environment.

The standard program for the double degree is shown in the following diagram.

BSc (Applied Physics), BE (Electrical) DipEngPrac – standard program

Sem 1	Engineering for Sustainability (core)	Physics 1	Mathematical Modelling 1	Chemistry 1	
Sem 2	Informatics (core)	Physics 2	Mathematical Modelling 2	Chemistry 2	
Sem 3	Software Development (fields of practice)	Physics 3	Applied Physics 1	Electronics (fields of practice)	
Sem 4	Engineering practice subjects (may be taken in semester 3 or 4)				Portfolio
Sem 5	Engineering Communication (core)	Physics 4	Computational Maths and Physics	Circuit Analysis (fields of practice)	
Sem 6	Uncertainties & Risks in Engineering (core)	Quantum Physics & Applications	Applied Physics 2	Signals & Systems (fields of practice)	
Sem 7	Engineering Economics & Finance (core)	Electromagnetics & Optics	Applied Physics 3	Real-time Software & Interfacing	
Sem 8	Engineering practice subjects (may be taken in Semester 8 or 9)				
Sem 9	Engineering Management (core)	Power Systems[1] (fields of practice)	Digital Systems[1] (fields of practice)	Data Acquisition & Distribution (fields of practice)	
Sem 10	Technology Assessment (core)	Analog & Digital Control[1] (fields of practice)	Power Electronics[1] (fields of practice)	Submajors/electives	
Sem 11	Submajors/electives	Capstone project	Submajors/electives	Submajors/electives	

[1] These subjects may be replaced by others drawn from the Electrical Engineering, Telecommunications Engineering and Computer Systems Engineering Majors.

Engineering practice subjects shown in semesters 4 and 8 for illustration only.

Bachelor of Technology

Course code: E012

The Faculty has offered Bachelor of Technology courses since 1993. Detailed course arrangements have recently been revised, and those described below came into operation in 1997. Students admitted in 1996 or earlier will complete their course under the arrangements existing at that time.

Description

The Bachelor of Technology degree is designed to provide the skills development needed by engineering technologists. It builds on work already completed in selected NSW TAFE Associate Diploma courses.

A Bachelor of Technology degree is recognised as a three-year full-time qualification, post-HSC. In the UTS program, the Associate Diploma counts for half the total. The course offered at UTS represents the second half of the overall requirement, and is offered over three years of part-time study.

The course is not designed to articulate readily to a Bachelor of Engineering degree. Students wishing to graduate with a Bachelor of Engineering are encouraged to apply for enrolment in this degree program directly.

The degree may be awarded with Distinction, Credit or Pass grades depending on overall performance during the course at UTS.

The program offers a choice of three specialist fields, or majors:

- Manufacturing Engineering
- Heating, Ventilation, Airconditioning and Refrigeration
- Aerospace Operations.

At present, Aerospace Operations is offered only in Singapore, in association with the Singapore Institute of Aerospace Engineers. An Australian offering is under consideration.

Professional recognition

UTS expects that holders of the Bachelor of Technology degree will qualify for membership of the Institution of Engineers, Australia in the category of Engineering Technologist.

Industrial experience

Industrial experience in the specialist strand prior to entering the course is not required but preference in selection will be given to students who are working in this sector and who have the support of their employer. There is a requirement that students accumulate 90 weeks of approved industrial experience prior to or during the three years of study.

Admission

The entry requirement is a TAFE Associate Diploma or equivalent, in a field relevant to the program. Students will be selected on the basis of their previous academic performance in an Associate Diploma course, previous industrial experience, and an indication of support from their current employer.

Attendance pattern

Students attend classes on two evenings a week for 14 weeks each semester. The overall course length is three years, or 6 semesters.

Course structure

The course comprises a core program, taken by all students, and a series of specialist strands or majors of which students select one. The program comprises 72 credit points overall. The core comprises 42 credit points, consisting of seven subjects each of 6 credit points. The majors each comprise 30 credit points, made up of both 3 credit points and 6 credit points subjects.

Core program

Engineering Materials
Numerical Methods
Information Technology
Professional Development
Engineering Communication and Documentation
Business for Technologists (Finance, Economics and Marketing)
Engineering Management

Major in Manufacturing Engineering

Manufacturing Process Systems
Law and Contracts
Inspection and Instrumentation
Technological Change and Strategic Planning
Maintenance Management
Design for Manufacture
Quality for Manufacture

Major in Heating, Ventilation, Airconditioning and Refrigeration

Mechanical Services
Computer Aids for Airconditioning Design
Service Control Systems
Law and Contracts
Building Construction Technology
Airconditioning Design

Major in Aerospace Operations

Aerospace Operations 1
Aerospace Operations 2
Aerospace Operations 3
Aerospace Maintenance and Management
Design Awareness for the Aero Industry

The overall course sequence for each major is as follows.

Course structure (Manufacturing Engineering)

Stage 1		
48072	Information Technology	6cp
48201	Manufacturing Process Systems	6cp
Stage 2		
48071	Numerical Methods	6cp
48202	Inspection and Instrumentation	6cp
Stage 3		
48074	Engineering Communication and Documentation	6cp
48204	Maintenance Management	3cp
48206	Quality for Manufacture	3cp
Stage 4		
48070	Engineering Materials	6cp
79370	Law and Contracts	3cp
48203	Technological Change and Strategic Planning	3cp
Stage 5		
48075	Engineering Management	6cp
48205	Design for Manufacture	6cp
Stage 6		
48073	Professional Development	6cp
25353	Business for Technologists	6cp

Course structure (HVAC and R)

Stage 1		
48072	Information Technology	6cp
48304	Building Construction Technology	6cp
Stage 2		
48071	Numerical Methods	6cp
48301	Mechanical Services	6cp
Stage 3		
48074	Engineering Communication and Documentation	6cp
48302	Computer Aids for Airconditioning Design	6cp
Stage 4		
48070	Engineering Materials	6cp
79370	Law and Contracts	3cp
48303	Service Control Systems	3cp
Stage 5		
48075	Engineering Management	6cp
48305	Airconditioning Design	6cp
Stage 6		
48073	Professional Development	6cp
25353	Business for Technologists	6cp

Course structure (Aerospace Operations)

Stage 1		
48072	Information Technology	6cp
48401	Aerospace Operations 1	6cp
Stage 2		
48071	Numerical Methods	6cp
48402	Aerospace Operations 2	6cp
Stage 3		
48074	Engineering Communication and Documentation	6cp
48403	Aerospace Operations 3	6cp
Stage 4		
48070	Engineering Materials	6cp
48404	Aerospace Maintenance and Management	6cp
Stage 5		
48075	Engineering Management	6cp
48405	Design Awareness for the Aero Industry	6cp
Stage 6		
48073	Professional Development	6cp
25353	Business for Technologists	6cp

The above course arrangements came into operation in 1997. For students who commenced a Bachelor of Technology degree course in 1996 or earlier, the arrangements existing at that time remain in operation. Detailed information is available from the BTech Program Director or the Undergraduate Programs Office.

Other facilities available

Facilities available to students enrolled for Bachelor of Engineering are equally available to those enrolled for Bachelor of Technology. Students are invited to read the relevant sections of this handbook under Bachelor of Engineering, Diploma in Engineering Practice. In particular, the sections on the Industrial Liaison Office, Eligibility for Austudy, Engineering Learning and Design Centres, Other support centres, and International exchange programs.

Postgraduate courses

GRADUATE SCHOOL OF ENGINEERING

The Graduate School of Engineering (GSE) was established in 1993 to give focus and leadership to the wide range of graduate programs offered by the Faculty of Engineering at UTS. The School has responsibility for developing and managing postgraduate coursework and research programs within the Faculty, including the administration of award studies, and for maintaining UTS Engineering as an international node offering a wide range of professional development opportunities to engineers and other graduates. In fulfilling these responsibilities, the School draws on the Faculty's close links with industry to offer distinctive programs highly regarded by engineering-dependent enterprise.

In 1997, approximately 100 research students and 450 coursework students were enrolled in the GSE.

Details of all GSE 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.

Graduate award courses may be taken by coursework or research. The School supports research conducted throughout the Faculty; specifically, 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 School provides opportunities for continuing professional development through studies undertaken on a non-award basis.

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

Staff and location of facilities

The Graduate School of Engineering provides a first point of contact for inquiries from current and prospective students, together with a range of services relating to graduate program management.

The GSE offices are located on Level 7, of Building 2. This connects with Building 1 at the City Campus, Broadway. The postal address is:

Graduate School of Engineering
University of Technology, Sydney
PO Box 123
Broadway NSW 2007 Australia
Telephone: (+ 61 2) 9514 2022
Fax: (+ 61 2) 9514 2549

The School Office is generally open between 9.00 a.m. and 5.00 p.m. Monday to Friday. Voicemail, fax or email contact may be made at any time. Information on GSE courses and programs is also available on the internet at http://www.eng.uts.edu.au/gse.

GSE staff are as listed below:

Head of School
Associate Professor Jim Parkin
Telephone: (+ 61 2) 9514 2638
Fax: (+ 61 2) 9514 2549
Email: jim.parkin@uts.edu.au

Graduate Studies Officer
Ms Beate Buckenmaier
Telephone: (+ 61 2) 9514 2590
Fax: (+ 61 2) 9514 2549
Email: beate.buckenmaier@uts.edu.au

Graduate Students Adviser
Ms Robyn Saunders
Telephone: (+ 61 2) 9514 2606
Fax: (+ 61 2) 9514 2549
Email: robyn.saunders@uts.edu.au

Secretary
Ms Enid Tu
Telephone: (+ 61 2) 9514 2022
Fax: (+ 61 2) 9514 2549
Email: enid.tu@uts.edu.au

Postgraduate studies in engineering, by research or coursework, are coordinated by GSE Program Directors. In 1998, it is expected that programs will be available in each of the majors listed below. Further advice can be obtained from the appropriate Director.

Program major/ Program Director in 1998	Telephone Number (+ 61 2) 9514	Building/Room
Control Engineering		
A/Prof Hung Nguyen	2451	1–2517
Energy Planning and Policy		
Dr Deepak Sharma	2422	2–7088
Engineering Management		
Manufacturing Engineering & Management		
Professional Practice		
A/Prof Bob Spencer	2660	2–606
Environmental Engineering and Management		
Dr Pam Hazelton	2661	2–512
Groundwater Management		
Prof Michael Knight	2692	1–1715
Information Systems Engineering		
Dr David Lowe	2526	1–2226
Local Government Engineering		
Mr Ken Halstead	2640	2–522
Software Engineering		
Mr John Leaney	2389	1–2221A
Structural Engineering		
A/Prof Bijan Samali	2632	2–7070
Telecommunications Engineering		
Dr Michael Eckert	2428	1–2420D
Water Engineering		
A/Prof Geoff O'Loughlin	2644	2–508

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

RESEARCH AREAS AND ASSOCIATED CENTRES

The Faculty of Engineering at UTS offers a range of undergraduate courses in Civil and Environmental Engineering; Electrical, Computer Systems, and Telecommunications Engineering; and Mechanical and Manufacturing Systems Engineering,

and at postgraduate level provides teaching capability in over 100 coursework subjects and research supervision in many specialist areas of engineering.

The Faculty also offers a number of Continuing Professional Education (CPE) courses, which can be taken with or without formal assessment. Where an assessment requirement has been satisfied, such courses may be eligible for credit towards an award course. Information on these CPE courses is available separately. Subjects offered for award may also be taken on a CPE or single-subject basis.

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.

Current research

Current research interests and opportunities are summarised briefly below:

Civil 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.

Electrical Engineering: image processing, intelligent networks, ATM networks, protocol engineering, digital transmission, teletraffic engineering multiple access schemes, spread spectrum communication, neural networks, information theory as applied to position fixing systems, software engineering, microwave processing of materials, microwave circuit design, antennas, mobile communications, digital signal processing in communications, digital systems design, electrical machines and industrial drives, power electronics, instrumentation and data acquisition systems, microhydroelectric control and instrumentation, power systems analysis, adaptive multi-variable control, speech and image coding, multimedia/ hypermedia, robotics, neuro-fuzzy systems.

Mechanical Engineering: advanced 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, fuels and combustion processes, product and process development, occupational health and safety.

In addition, the **Graduate School of Engineering** supports research topics that are generic to engineering as a discipline; those that are inter-disciplinary in nature but with an essential engineering involvement, such as 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; and those which focus on international and Australian practice and management of engineering, including engineering ethics. Candidates who wish to pursue research in engineering management would normally be accommodated through the Graduate School.

Overall, the Faculty's current research spans a range of well established specialist fields, together with an increasing number of inter- and intra-faculty fields involving collaboration supported by the Graduate School of Engineering.

Research management

Research management within the Faculty is coordinated through two GSE 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 to the Head of the Graduate School of Engineering for enhancing research outcomes in the Faculty. It has responsibility for developing, implementing and maintaining the Faculty's Research Management Plan, including program allocations and infrastructure development funded by the Faculty; the coordination and quality of research in 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 is associated with several major Centres, which also offer research opportunities in engineering and related fields. The centres include:

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

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

AGSEI offers modular course programs, multidisciplinary in nature and strongly interactive with industry. These are of interest to professionals in all sectors and from a range of disciplines, including engineering. Initially, 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, systems 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.

AGSEI subjects may be taken as part of the normal range of subjects offered by the GSE.

Inquiries may be made to:

Mr Frank Davies
National Sales Manager
AGSEI Ltd, Australian Technology Park
Cornwallis St, Eveleigh
(PO Box 1686, Strawberry Hills, NSW 2012)
Telephone: (+ 61 2) 9209 4111
Fax: (+ 61 2) 9319 3088
Email: agsei@ozemail.com.au

National Centre for Groundwater Management (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

Centre for Local Government Education and Research (Established jointly by UTS, TAFE NSW, and the NSW Local Government Industry Training Committee; within UTS, the Centre has links with several Faculties including Engineering and Business). Research areas relating to local government include: local and regional policy (development, planning, assessment), strategic planning and management, values and ethics, community participation.

Inquiries may be made to:

Associate Professor Kevin Sproats
Centre Director
Room 1714, Building 1, City Campus
Telephone: (+ 61 2) 9514 2643
Fax: (+ 61 2) 9514 2274
Email: kevin.sproats@uts.edu.au

Centre for Biomedical Technology (operated jointly with the Faculties of Science, Mathematical and Computing Sciences, and Nursing). Research areas relevant to engineering include: cardiac electrophysiology and technology, medical imaging, bio-mathematical modelling, medical instrumentation, diet management and optimal control of diabetes mellitus, optimal cancer therapies, and nursing-technology interfaces.

Inquiries may be made to:

Associate Professor Hung Nguyen
Centre Director
Room 2517, Building 1, City Campus
Telephone: (+ 61 2) 9514 2451
Fax: (+ 61 2) 9514 2435
Email: htn@eng.uts.edu.au

Centre for Materials Technology (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 Mick Wilson
Centre Director
Room 218, Building 4, City Campus
Telephone: (+ 61 2) 9514 1761
Fax: (+ 61 2) 9514 1460
Email: mick.wilson@uts.edu.au

Institute for Coastal Resource Management inquiries should be made directly to the Faculty of Science.

Centre for Aquaculture (operated jointly with the Faculty of Science). Research areas relevant to engineering include: modelling of prawn aquaculture ponds, and waste effluent treatment.

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

The Sydney Microwave Design Resources Centre was established in 1988 as a joint initiative of UTS, the University of Sydney, and Hewlett Packard Australia. It assists researchers and Australian companies to develop or extend their use of advanced microwave capabilities, through access to professional services and state-of-the-art modelling, design and measurement facilities. It participates in inter-disciplinary investigations and research (for example, in microwave processing, materials characterisation and customised process applicators), in addition to its programs across the two universities in microwave communications, electro-magnetic interference and antennas.

Inquiries should be directed to:

Professor Rod Belcher
Room 511C, Building 2, City Campus
Telephone: (+ 61 2) 9514 2423
Fax: (+ 61 2) 9514 2633
Email: rod.belcher@uts.edu.au

Applications for admission

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

Graduate 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 a decision advised soon thereafter.

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 Graduate School of Engineering, Level 7, Building 2 at City Campus; from the UTS Information Service, Level 4, Building 1, City Campus or the Inquiry Office, Level 5, Kuring-gai Campus.

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 this application.

Applications must be submitted to:

UTS Information Service
University of Technology, Sydney
Level 4, Building 1, Broadway
Telephone (+ 61 2) 9514 1990

Postal Address:
PO Box 123
Broadway NSW 2007

Late applications

Applications may be accepted for some postgraduate courses after the closing date. Applicants should contact the UTS Information Service 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 1998. 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 two 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 on Level 5, Building 1 at the City Campus in person, or by telephoning (+ 61 2) 9514 1531.

  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.
- the **Combined Universities Language Test (CULT)** conducted by the Institute of Languages at the University of New South Wales. A minimum mark of 65% is required.

An application for admission will not be considered until proficiency in English has been demonstrated.

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 Information Service.

Applicants with overseas qualifications are advised to contact the UTS Information Service 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)
P O Box 25, Belconnen, ACT 2616
Telephone: freecall 1800 02 0086

As the processing of a NOOSR assessment may take some weeks, applicants are advised to contact the UTS Information Service well before the 1998 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 will be advised of the outcome of their applications by mail in late December 1997/January 1998.

Charges and fees

Student Service Charges

All students are required to pay compulsory student charges at enrolment. In 1998, these charges are as follows:

Students' Association	$A 48.00
UTS Union (General Fee)	$A 186.00
UTS Union (Entrance Fee) (non-refundable)	$A 20.00
Student Accommodation Levy	$A 55.00
Student identification card charge (non-refundable)	$A 10.00
Total	**$A 319.00**[1]

[1] Compulsory student charges are subject to revision for 1998, and are payable in each calendar year of enrolment.

Students will be exempt from Union Fees if they hold and can produce either a UTS Union Life Membership Card, or a Certificate of Exemption at the time specified for enrolment. For further information, contact the University Union on (+ 61 2) 9514 1145.

Course fees

In addition to the above charges, 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 Graduate School of Engineering in 1998 will be required to pay course fees, according to a schedule which will be available late in 1997. The schedule will be provided on inquiry to the Graduate School of Engineering, the Kuring-gai Student Centre or from the UTS Information Service, Level 4, Building 1, Broadway. 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 graduate subjects in Engineering are rated at 6 credit points, 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 1997 for both full-time and part-time attendance were calculated on a schedule fee of $150 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.

Exemption from course fees based on financial hardship or disadvantage

A number of places will be available on a fee-exemption basis, for students commencing in 1998. These will provide exemption from course fees on grounds of financial hardship or disadvantage. A student granted exemption from course fees will incur HECS liability, on a deferred-taxation basis.

The number of fee-exemption places available is limited. You must request the form entitled Application for Exemption from Postgraduate Fees, 1998, complete the form, and submit it with your application for admission. The form is available from the UTS Information Service or the University Graduate School at Broadway, the Kuring-gai Student Centre, or the Graduate Studies Officer at the Graduate School of Engineering.

Applications for exemption from postgraduate course fees must be renewed for each successive semester, and must continue to meet the criteria on each occasion. 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 certain full-time postgraduate programs on a fee paying basis.

Fees for courses offered to fee paying overseas students in 1998 will range from $A12,000 to $A20,000 per annum, depending on the course. For further information, contact the UTS International Programs Office on (+ 61 2) 9514 1531.

Scholarships

Students undertaking Graduate Diploma and Graduate Certificate courses full-time are eligible to apply for assistance under AUSTUDY. Further information and application forms are available from the Department of Employment, Education and Training.

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 Coursework Programs

Australian Postgraduate Award (Coursework)

Scholarships for study overseas

Commonwealth Scholarship and Fellowship Plan

Commonwealth Scholarship and Fellowship Plan (New Zealand award)

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, Level 5, Building 1 at the City campus.

The John Crawford Scholarship Scheme

This is open to applicants from participating developing countries. Scholarships will be advertised early each year for the following academic year. Further information may be obtained from the Australian Diplomatic Mission or the Australian Education Centre in countries where scholarships are available. Application forms are not available in Australia.

Further information may be obtained from the Postgraduate Studies and Scholarships Office, University Graduate School, Level 5, Building 1 on (+ 61 2) 9514 1521.

Information for students

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

Semester patterns

The academic year of the University is divided into two main semesters: Autumn (March–June) and Spring (August–November). For 1998, some subjects may also be offered in a Summer session (December 1997 – February 1998).

All courses have their major intake in March, at the beginning of the academic year. Places are available in the second semester beginning in August, and potential mid-year applicants should contact the Graduate Students Adviser 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 late January or early February for the Autumn Semester, and in late July for the Spring Semester. Complete enrolment details are forwarded to successful applicants. Enrolment must be in person.

Students from country areas 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, Level 5, Building 1, Broadway Campus.

Deferment of enrolment

Deferment of enrolment is not allowed for graduate courses.

Attendance and academic credit

Attendance patterns for 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, graduate subjects are also offered on a block release or intensive short course basis or in distance mode.

Subjects offered in a block release mode require attendance at the University for a block of full-time study (usually 2–3 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.

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 Bachelors 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 degrees by coursework are normally of two and a half or three semesters' duration on a full-time basis, or five or 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).

Graduate Diploma courses are of one year's duration on a full-time basis and two years' duration on a part-time basis.

Graduate Certificate courses are of one semester on a full-time basis and one year's duration on a part-time basis.

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, published in the *UTS Calendar*. 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 Graduate School of Engineering.

A student enrolled for a research degree who receives two unsatisfactory progress reports from his/her supervisors, or a PhD student who fails to satisfy the requirements of the Doctoral Assessment after a prescribed period of candidature (currently twelve 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 Graduate School 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 University rules described in the 1998 UTS Calendar. Exemptions from subjects are granted on the basis of the successful recent completion of equivalent graduate level subjects.

Applications for advanced standing can be made at any time on the standard UTS Subject Exemption Form and submitted to the GSE Graduate Students Adviser, together with supporting documentation including relevant subject syllabi (and examination papers if available).

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

The degree of Doctor of Philosophy (PhD) may be awarded to candidates who have completed an individual program of supervised research and submitted a thesis embodying the results of the work. The thesis must constitute a distinct contribution to knowledge, whether by original investigation or by review, criticism or design. A formal course of study or other work may also be prescribed.

The Faculty of Engineering has for many years offered research programs leading to the degree of Master of Engineering (by Thesis). In common with the rest of the University, it has offered Doctoral supervision only within the last few years. In this short space of time a vigorous research culture has developed, assured in part by a large number of Doctoral candidates, most of whom are enrolled full-time. This research culture has been strengthened with the establishment of the Graduate School of Engineering. All candidates from the initial 1989–90 Doctoral cohort who have since submitted theses have been successful.

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 those 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 are 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. 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 full-time candidates, or the first four semesters and 18 months for part-time candidates.

The Doctoral assessment is conducted in accordance with University Rule 3.5.7.

The objectives of the assessment are to ensure the following: that the candidate has gained the prerequisite knowledge and skills to allow successful and timely completion of the proposed research program; 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 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 First Class Honours[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 graduate programs in Engineering should have a minimum of two years' experience in employment related to the course or program they wish to undertake.

[1] In these respects, the Faculty of Engineering requirements are more stringent than those specified in the University Rules.

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 phone 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 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 Graduate Studies Officer. Academic advice on research is also available from the members of:

Faculty Research Degrees Committee
Professor J A Reizes
Associate Dean Research
Room 2/511B, Level 5, Building 2
Telephone: (+ 612) 9514 2742
Fax: (+ 612) 9514 2633
Email: john.reizes@uts.edu.au

Civil, Structural and Environmental Engineering
Associate Professor B Samali
Room 2/7070, Level 7, Building 2
Telephone: (+ 612) 9514 2023
Fax: (+ 612) 9514 2633
Email: bijan.samali@uts.edu.au

Electrical Engineering, Telecommunications and Computer Systems Engineering
Mr C A Scott
Room 1/2220C, Level 22, Building 1
Telephone: (+ 612) 9514 2397
Fax: (+ 612) 9514 2435
Email: cascott@eng.uts.edu.au

Mechanical and Manufacturing Engineering
Dr G Hong
Room 2/619, Level 6, Building 2
Telephone: (+ 61 2) 9514 2677
Fax: (+ 61 2) 9514 2655
Email: guang.hong@uts.edu.au

National Centre for Groundwater Management
Prof M Knight
Director
Room 1/1715, Level 17, Building 1
Telephone: (+61 2) 9514 1984
Fax: (+61 2) 9514 1985
Email:
groundwater.management@uts.edu.au

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 Graduate School of Engineering.

Fees

Under current policies, Australian-resident candidates commencing a UTS doctoral course through the Faculty of Engineering in 1998 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.

Master of Engineering (by thesis)

Course code: EP98

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 very much 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, subject to approval by the Vice-Chancellor. The assessment will be at the end of the first two semesters for full-time candidates, or the first three semesters for 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 the following: that the candidate has gained the prerequisite knowledge and skills to allow successful and timely completion of the proposed research program; 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 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 Academic Board that they possess the educational preparation and capacity to pursue graduate 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 full 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 Graduate Studies Officer. Academic advice on research is also available from the members of:

Faculty Research Degrees Committee
Professor J A Reizes
Associate Dean Research
Room 2/511B, Level 5, Building 2
Telephone: (+ 612) 9514 2742
Fax: (+ 612) 9514 2633
Email: john.reizes@uts.edu.au

Civil, Structural and Environmental Engineering
Associate Professor B Samali
Room 2/7070, Level 7, Building 2
Telephone: (+ 612) 9514 2023
Fax: (+ 612) 9514 2633
Email: bijan.samali@uts.edu.au

Electrical Engineering, Telecommunications and Computer Systems Engineering
Mr C A Scott
Room 1/2220C, Level 22, Building 1
Telephone: (+ 612) 9514 2397
Fax: (+ 612) 9514 2435
Email: cascott@eng.uts.edu.au

Mechanical and Manufacturing Engineering
Dr G Hong
Room 2/619, Level 6, Building 2
Telephone: (+ 61 2) 9514 2677
Fax: (+ 61 2) 9514 2655
Email: guang.hong@uts.edu.au

National Centre for Groundwater Management
Prof M Knight
Director
Room 1/1715, Level 17, Building 1
Telephone: (+61 2) 9514 1984
Fax: (+61 2) 9514 1985
Email:
groundwater.management@uts.edu.au

Fees

Under current policies Australian-resident part-time candidates commencing a UTS Master's by Research course through the Faculty of Engineering will be liable to pay HECS. Commencing Australian-resident full-time candidates may be exempt from HECS for studies completed in minimum time.

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

Inquiries

Initial inquiries should be made with the Graduate Students Adviser. Academic inquiries, such as the selection of an appropriate research topic, should be directed to the relevant members of the Faculty Research Degrees Committee.

COURSEWORK AWARDS – GENERAL

An extensive range of coursework programs is available through the GSE, on a Faculty-wide basis, 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.

Specialist awards by coursework are also available and are described in a separate section of this handbook.

Master of Engineering (by coursework)

Course code: EP81

Aims of the course

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 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 hold one of the following:

1. a degree in engineering from the University of Technology, Sydney; or
2. a degree or equivalent from another higher education institution deemed to be equivalent to the Bachelor of Engineering degree at UTS; or
3. 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 18cp 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% average).

Attendance

Attendance may be on a full-time or part-time basis. Candidates in concurrent employment as professional engineers will wish to attend on a part-time basis, which the Faculty will accommodate through a combination of evening, block release, weekend and other modes. Full-time attendance will be welcomed for candidates who have been released by their employers for the purpose of approved or sponsored study.

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, on advice from its Graduate School, 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% of total credit points must be completed through subjects offered and/or a capstone project supervised by the Faculty of Engineering of UTS. The capstone 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 weighting for the capstone 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, on the advice of the Head of the Graduate School of 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 Graduate School of Engineering. Advice on available program majors in any year may be obtained initially on inquiry to the Faculty of Engineering, through the Graduate Students Adviser.

Subjects offered by the Faculty of Engineering and available to ME candidates, and illustrative 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 Graduate Students Adviser 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 Head of the Graduate School of Engineering 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 Head of the Graduate School of Engineering – 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 capstone 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 capstone project

Responsibility for supervision of the capstone project for the degree will rest with the Head of the Graduate School of Engineering, or with a person designated by the Head of the Graduate School as Director, Graduate Projects.

The capstone 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 Graduate Project Guide Notes available from the Faculty of Engineering through the Graduate Students Adviser.

Fees

Fees apply to this course. A schedule of approved fees is available on inquiry to the GSE Graduate Students Adviser, on (+ 61 2) 9514 2606.

Inquiries

Inquiries should be made to:
Graduate Students Adviser
Ms Robyn Saunders
Room 7083, Level 7, Building 2
Telephone (+61 2) 9514 2606
Fax (+61 2) 9514 2549
Email: robyn.saunders@uts.edu.au

Master of Technology

Course code: EP71

Aims of the course

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 hold one of the following:

1. the degree of Bachelor of Engineering of the University of Technology, Sydney or the New South Wales Institute of Technology; or
2. a Bachelor or Honours degree from UTS or NSWIT, requiring 4 years full-time study for completion, in a cognate discipline (such as Applied Science, Computing, Building); or

3. a Bachelor or Honours degree or equivalent from another higher education institution, deemed to be equivalent to (a) or (b),

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 4 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. Candidates in concurrent employment will wish to attend on a part-time basis which the Faculty will accommodate through a combination of evening, block release, weekend and distance modes. Full-time attendance will be welcomed for candidates who have been released by their employers for the purpose of approved or sponsored study.

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.

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 capstone project supervised by the Faculty of Engineering at UTS. The capstone 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 weighting for the capstone project will lie within the range 18–24 credit point.

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, on the advice of the Head of the Graduate School of 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 through the Graduate School of Engineering.

Subjects offered by the Faculty of Engineering and available to MTech candidates, and illustrative 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 Graduate Students Adviser 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 Head of the Graduate School of Engineering 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 Head of the Graduate School of Engineering – 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 capstone 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 capstone project

Responsibility for supervision of the capstone project for the degree will rest with the Head of the Graduate School of Engineering, or with a person designated by the Head of the Graduate School as Director, Graduate Projects.

The capstone 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 Graduate Project Guide Notes available from the Faculty of Engineering through the Graduate Students Adviser.

Fees

Fees apply to this course. A schedule of approved fees is available from the Graduate Students Adviser, on (+61 2) 9514 2606.

Inquiries

Inquiries should be made to:
Graduate Students Adviser
Ms Robyn Saunders
Room 7083, Level 7, Building 2
Telephone (+61 2) 9514 2606
Fax (+61 2) 9514 2549
Email: robyn.saunders@uts.edu.au

Master of Engineering Practice

Course code: EP86

Aims of the course

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 graduate 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 interfaces with 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.

Attendance and duration

Attendance may be on a full-time or part-time basis. Most candidates will be in concurrent employment as professional engineers and will wish to attend on a part-time basis. Where possible, subjects may be made available in block-release or other mode designed to meet the needs of practising professionals. Full-time attendance will be welcomed for candidates who have been released by their employers for the purpose of approved or sponsored study.

The nominal duration of the course is 3 years part-time or 1.5 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. Currently, these require a minimum of three years of professional practice. 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. Of this total, the major project shall comprise between 12 and 32 credit points, and typically 24 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 1998); 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 Graduate Students Adviser 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 Head of the Graduate School of Engineering 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 Head of the Graduate School of Engineering – 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's 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 Head of the Graduate School of Engineering, or with a person designated by the Head of the Graduate School as Director of Studies for the MEP.

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.

Fees

Fees apply to this course. A schedule of approved fees is available from the Graduate Students Adviser, on (+61 2) 9514 2606.

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

Inquiries

Inquiries should be made to:
Graduate Students Adviser
Ms Robyn Saunders
Room 7083, Level 7, Building 2
Telephone (+61 2) 9514 2606
Fax (+61 2) 9514 2549
Email: robyn.saunders@uts.edu.au

Graduate Diploma in Engineering

Course code: EP61

Graduate Certificate in Engineering

Course code: EP51

Aims of the courses

The objective of each of these courses, offered on a Faculty-wide basis, is to provide practising professional engineers with an opportunity to extend their engineering knowledge beyond the subject areas covered in their first degree, 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 one-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 the University of Technology, Sydney; 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

This will depend on the subjects chosen and on the number of subjects taken in each semester. For full-time attendance, most programs will be available predominantly in the day-time. For part-time attendance it will usually be possible to design suitable programs from subjects available predominantly in the evenings. Some subjects may be offered in block release or weekend 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 appointed by the Head of the Graduate School. 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 its Graduate School, 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 recent 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 in completed subjects of at least 60 per cent over 18 credit points.

Fees

Fees apply to this course. A schedule of approved fees is available from the Graduate Students Adviser, on (+ 612) 9514 2606.

Inquiries

Inquiries should be made to:
Graduate Students Adviser
Ms Robyn Saunders
Room 2/7082, Level 7, Building 2
Telephone (+612) 9514 2606
Fax (+612) 9514 2549
Email: robyn.saunders@uts.edu.au

GRADUATE PROGRAM MAJORS

The Graduate School Engineering (GSE) offers an extensive range of programs by research and/or coursework through its award and non-award courses. A selection of these designated as 1998 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 GSE program majors are differentiated by their focus, structure, presentation, attendance flexibility, assessment practices and multiple entry/completion options.

Students completing a minimum of two thirds of the credit points required for 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, 49022, 49023, 49024 and 49029 plus an approved Graduate Project in energy planning and policy.

For the Telecommunications Major to be shown on the transcript, students will be required to complete subjects 49201, 49202, 49203, 49204 and 49205 plus an approved Graduate Project in telecommunications.

For the Software Engineering Major to be shown on the transcript, students will be required to complete subjects 49233, 49234, 49235, 49236, 49237, 49217 and 49225 plus an approved Graduate Project in software engineering.

For a Computer Systems Major to be shown on the transcript, students will be required to complete subjects and a project, of at least 40 credit points total, from the Software Engineering and Information Systems programs.

GSE program majors reflect current research strengths and interests in the Faculty of Engineering, and change with time. It is expected that all of the program majors listed below will be offered in 1998. 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-GSE) 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. Various undergraduate subjects (or their equivalent) pertaining to each of the 1998 program majors have been designated as foundation subjects, and are listed below. Further information can be found by referring to the Subject descriptions section of this handbook, and noting the prerequisites for GSE subjects.

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

Control Engineering

Program structure

Suitable foundation (undergraduate) subjects

45141	Continuous and Discrete Systems	6cp
45163	Real-time Software and Interfacing	6cp
46531	Control Engineering 1	6cp
46540	Programmable Controllers	4cp
45562	Data Acquisition and Distribution Systems	6cp
45581	Analogue and Digital Control	6cp

Recommended (graduate) subjects

49261	Biomedical Instrumentation	6cp
49271	Computer Architecture	6cp
49272	Adaptive and Multivariable Control	6cp
49273	Random Signal Theory	6cp
49274	Advanced Robotics	6cp
49275	Neural Networks and Fuzzy Logic	6cp
49276	Sliding Mode Control	6cp
49377	Process Control Studies	6cp

Academic inquiries

A/Prof H Nguyen
Co-Director
Control Engineering Graduate Program
Room 2517, Level 25, Building 1
Telephone:(+ 61 2) 9514 2667
Fax: (+ 61 2) 9514 2435
Email: htn@eng.uts.edu.au

Energy Planning & Policy

Program Structure

Core subjects (Master's program major) include

49021	Evaluation of Infrastructure	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	6cp
49027	Energy Demand Analysis and Forecasting	6cp
49028	Policy and Planning of Energy Conservation	6cp
49032	Sustainable Technological Development	6cp

Academic inquiries

Dr D Sharma
Director
Energy Planning and Policy Graduate Program
Room 7088, Level 7, Building 2
Telephone: (+ 61 2) 9514 2422
Fax: (+ 61 2) 9514 2549
Email: deepak.sharma@eng.uts.edu.au

Engineering Management

Program structure

Suitable foundation (undergraduate) subjects

No undergraduate subjects are specifically recommended as foundation subjects.

Recommended (graduate) subjects

49001	Judgment and Decision Making	6cp
49002	Project Management	6cp
49003	Economic Evaluation	6cp
49004	Systems Engineering for Managers	6cp
49005	Technological Change	6cp
49006	Risk Management in Engineering	6cp
49012	Project Management Support Systems	6cp
49013	Managing IT in Engineering	6cp
49044	Engineering Communication and Documentation	6cp
49306	Quality Systems – Implementation and Accreditation	6cp
49309	Quality Planning and Analysis	6cp
49381	Applications of Optimisation in Engineering	6cp

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

Academic inquiries

A/Prof Bob Spencer
Director
Engineering Management Graduate Program
Room 2–606, Level 6, Building 2
Telephone: (+ 61 2) 9514 2660
Fax: (+ 61 2) 9514 2655
Email: bob.spencer@uts.edu.au

Environmental Engineering and Management

Program structure

Suitable foundation (undergraduate) subjects

47142	Environmental Engineering	3cp
47449	Introduction to Environmental Economics and Law	3cp
47450	The Built Environment	3cp
47452	Pollution Control and Management	3cp

Recommended (graduate) subjects

49121	Environmental Assessment and Planning	6cp
49122	Environmental Engineering and Management Practices	6cp
49123	Industrial Waste Minimisation	6cp
49124	Water Quality Management	6cp
49125	Environmental Risk Assessment	6cp
49126	Land Resource and Environmental Management	6cp
49452	Environmental Management	6cp

Academic inquiries

Dr Pam Hazelton
Director
Environmental Engineering and Management Graduate Program
Room 512, Level 5, Building 2
Telephone: (+ 61 2) 9514 2661
Fax: (+ 61 2) 9514 2633
Email: pam.hazelton@uts.edu.au

Groundwater Management

Suitable foundation (undergraduate) subjects

No undergraduate subjects are specifically recommended as foundation subjects. However, particular graduate subjects may specify undergraduate prerequisites.

Recommended (graduate) subjects

49550	Computing for Groundwater Specialists (non credit)	
49551	Surface Hydrology and Groundwater	6cp
49554	Groundwater Computing	6cp
49555	Groundwater Modelling	6cp

Suitable additional subjects

Other suitable graduate subjects are offered by the Faulty of Engineering and the Faculty of Science.

Academic inquiries

Prof M Knight
Director, National Centre for Groundwater Management
Telephone: (+ 61 2) 9514 2692
Fax: (+ 61 2) 9514 1985
Email:
groundwater.management@uts.edu.au

Information Systems Engineering

Program structure

Suitable foundation (undergraduate) subjects

55080	Information Issues in Telecommunications	6cp

Recommended (graduate) subjects

49031	Information Structures, Perception and User–Interface Design	6cp
49241	Hypermedia Technologies	6cp
49242	Mono Media Technologies	6cp
49243	Development of Hypermedia Information Systems	6cp

Candidates are encouraged to take information science and visual communication subjects offered by other faculties, as part of the Master's program.

Academic inquiries

Dr D B Lowe
Director
Information Systems Engineering Graduate Program
Room 2226, Level 22, Building 1
Telephone: (+ 61 2) 9514 2526
Fax: (+ 61 2) 9514 2435
Email: david.lowe@.uts.edu.au

Local Government Engineering

Program structure

Suitable foundation (undergraduate) subjects

No undergraduate subjects are specifically recommended as foundations subjects. However, particular graduate subjects may specify undergraduate prerequisites.

Recommended graduate subjects

49102	Traffic and Transportation	6cp
49103	Management and Industrial Relations	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

Note: Selected subjects from the Environmental Engineering and Management concentrations can frequently be combined with studies in this program major.

Academic inquiries

Mr K Halstead
Director
Local Government Engineering Graduate Program
Room 522, Level 5, Building 2
Telephone: (+ 61 2) 9514 2640
Fax: (+ 61 2) 9514 2633
Email: ken.halstead@uts.edu.au

Manufacturing Engineering and Management

Program structure

Suitable foundation (undergraduate) subjects

46321	Computer Aided Drafting	4cp
46710	Materials Processing	4cp

Recommended (graduate) subjects

49308	Rapid Response Manufacturing	6cp
49309	Quality Planning and Analysis	6cp
49316	Bulk Materials Handling	6cp
49317	Design and Manufacture with Adhesives	6cp
49318	Manufacturing Systems Management	6cp
49381	Applications of Optimisation in Engineering	6cp
49319	Product Modelling and Analysis	6cp
49320	Industrial Tool Design and Manufacture	6cp
49002	Project Management	6cp

49003	Economic Evaluation	6cp
49012	Project Management Support Systems	6cp
49013	Managing IT in Engineering	6cp
49306	Quality Systems – Implementation and Accreditation	6cp

Academic inquiries

A/Prof R M Spencer
Director
Manufacturing Engineering and Management Graduate Program
Room 606, Level 6, Building 2
Telephone: (+ 61 2) 9514 2660
Fax: (+ 61 2) 9514 2655
Email: bob.spencer@uts.edu.au

Professional Practice

Program structure

Suitable foundation (undergraduate) subjects

No undergraduate subjects are specifically recommended as foundation subjects. However, particular graduate subjects may specify undergraduate prerequisites.

Recommended graduate subjects

49009	Engineering in Australian Society	6cp
49010	Engineering Ethics	6cp
49011	International Engineering	6cp
49044	Engineering Communication and Documentation	6cp

Academic inquiries

A/Prof R M Spencer
Director
Professional Practice Graduate Program
Room 2–606, Level 6, Building 2
Telephone: (+ 61 2) 9514 2660
Fax: (+ 61 2) 9514 2655
Email: bob.spencer@uts.edu.au

Software Engineering

Program structure

Suitable foundation, and prerequisite, (undergraduate) subjects

45123	Software Development 1	6cp
45133	Software Development 2	3cp
45163	Realtime Software and Interfacing	3cp

Graduate subjects (Graduate Certificate)

49211	Software Engineering Principles	6cp
49212	Object-oriented Languages	6cp
49213	Human Machine Interfaces and Software Implementation	6cp
49214	Unix and C	6cp

Graduate subjects (Software Engineering Program Master's degree/Graduate Diploma)

49233	Software Requirements Specification	9cp
49234	Real-time Object-oriented Software Development	9cp
49235	Real-time Operating Systems	3cp
49237	Software Quality and Configuration	3cp
49217	Software Verification and Validation	6cp
49225	Software Project Management	6cp
49236	Software Development Project	6cp

Notes: Credit for subjects completed in the Graduate Certificate will not be available in either the Graduate Diploma or the Master's degree, as there is no overlap of material between subjects.

To meet the needs of an emerging discipline, this program depends heavily on its industry partner, Thomson-CSF.

Subject availability depends on demand.

Subjects offered in either the Graduate Certificate, or the Master's may be taken as part of a general course, subject to prerequisites.

Academic inquiries

Mr J Leaney
Co-Director
Software Engineering Graduate Program
Room 2221A, Level 22, Building 1
Telephone: (+ 61 2) 9514 2389
Fax: (+ 61 2) 9514 2435
Email: jrleaney@eng.uts.edu.au

Structural Engineering

Program structure

Suitable foundation (undergraduate) subjects

47133	Numerical Methods	3cp
47144	Timber Design	3cp
47151	Structural Analysis 2	4cp
47154	Concrete Technology	3cp
47156	Soil Engineering	3cp
47171	Steel Structures and Concept Design	4cp
47176	Ground Modification	3cp
47277	Loading on Building Structures	3cp

Recommended (graduate) subjects

49131	Medium Span Bridges	6cp
49132	Stability of Structures	6cp
49133	Steel and Composite Design	6cp
49134	Structural Dynamics	6cp
49135	Wind Engineering	6cp
49136	Application of Timber in Engineered Structures	6cp
49141	Advanced Geomechanics	6cp
49142	Advanced Ground Modification	6cp
49151	Advanced Concrete Technology	6cp

49152	Damage and Repair of Concrete Structures	6cp
49047	Finite Element Applications in Structural Mechanics	6cp
49103	Management and Industrial Relations	6cp
49104	Asset Maintenance Management	6cp

Academic inquiries

A/Prof B Samali
Co-Director
Structural Engineering Graduate Program
Room 7079, Level 7, Building 2
Telephone: (+ 61 2) 9514 2623
Fax: (+ 61 2) 9514 2633
Email: bijan.samali@uts.edu.au

Telecommunications Engineering

Program structure

Suitable foundation (undergraduate) subjects

27001	Commercial Issues in Telecommunications	6cp
55080	Information Issues in Telecommunications	6cp
45661	Communication Networks	3cp
45663	Digital Transmission	3cp
45664	Communications Engineering	3cp
45668	Teletraffic Engineering	3cp

Recommended graduate subjects

49273	Random Signal Theory	6cp
49201	Integrated Services Networks	6cp
49202	Communication Protocols	6cp
49203	Telecommunications Signal Processing	6cp
49204	Advanced Teletraffic Engineering	6cp
49205	Transmission Systems	6cp
49206	Advanced Studies in Electromagnetic Compatibility	6cp
49207	Wave Propagation for Microwave and Mobile Communications	6cp
49208	Telecommunications Management	6cp

Academic inquiries

Mr M P Eckert
Director
Telecommunications Engineering Graduate Program
Room 2420D, Level 24, Building 1
Telephone: (+ 61 2) 9514 2428
Fax: (+ 61 2) 9514 2435
Email: meckert@eng.uts.edu.au

Water Engineering

Program structure

Suitable foundation (undergraduate) subjects

47135	Fluid Mechanics	4cp
47145	Hydraulics	3cp
47155	Hydrology	3cp
47175	Water Resources Engineering	3cp

Recommended (graduate) subjects

49107	Storm Runoff Regulation	6cp
49111	Coastal Engineering	6cp
49112	Urban Stormwater Flood Management	6cp
49113	Urban Stormwater Pollution Management	6cp
49114	Statistical Hydrology	6cp
49124	Water Quality Management	6cp
49551	Surface Hydrology and Groundwater	6cp
49554	Groundwater Computing	6cp
49555	Groundwater Modelling	6cp

Academic inquiries

A/Prof G O'Loughlin
Director
Water Engineering Graduate Program
Room 508, Level 5, Building 2
Telephone: (+ 61 2) 9514 2644
Fax: (+ 61 2) 9514 2633
Email: geoff.o'loughlin@uts.edu.au

SPECIALIST COURSEWORK AWARDS

Specialist courses by coursework are offered by the Faculty in several fields. Each of these courses includes 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. Candidature in specialist courses is only offered when the demand is sufficient to assure viable class sizes in all subjects.

Master of Engineering Management

Course code: EP85

The Master of Engineering Management (MEM) 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 and the Australian Graduate School of Engineering Innovation 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.

Duration

The course requires 60 credit points of study. The program is structured for evening attendance, block release or distance mode. Extra intensive classes may be held in the university breaks. Most students taking two subjects per semester require between two and two-and-a-half years to complete the degree.

Overseas students

The MEM course is also available to fee-paying overseas students on a full-time basis, taking approximately one-and-a-half years 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, Sydney; 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 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

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 18–24 credit points of electives may be completed from the following.

49052–49076	Graduate Project	18-24cp
	Graduate subjects from the Faculty of Engineering	6cp each

Other approved graduate UTS subjects from the Faculties of Business, Law, and other Universities	6cp each
Approved graduate subjects from AGSEI	6cp each
Approved AGSEI workshops and short courses	2/3/4cp each

Not less than 50 per cent of total credit points must be completed through subjects offered by the Faculty of Engineering.

UTS subjects are generally presented in the evenings and AGSEI subjects in one week blocks. Apart from 49004, all the subjects named above are available in distance mode if requested. AGSEI subjects 49601, 49602, 49603 and 49604 are also in distance mode.

Fees

Fees apply to this course. A schedule of approved fees is available from the Graduate Students Adviser, on (+ 61 2) 9514 2606.

Inquiries

Initial inquiries should be made to:

The Graduate Students Adviser
Ms Robyn Saunders
Room 7082, Level 7, Building 2
Telephone (+61 2) 9514 2606
Fax (+61 2) 9514 2549
Email: robyn.saunders@uts.edu.au

Academic Inquiries should be made to:

A/Prof Bob Spencer
Room 606, Level 6, Building 2
Telephone (+61 2) 9514 2660
Fax (+61 2) 9514 2655
Email: bob.spencer@uts.edu.au

Master of Environmental Engineering Management

Course code: EP89

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 require 60 credit points of study. The program is structured for evening attendance, block release or distance mode. Most students taking two subjects per semester require between two and two and a half years to complete the degree.

Overseas students

The MEEM course is also available to fee-paying overseas students on a full-time basis, taking approximately one and a half years to complete.

Admission requirements

Normally, a degree in engineering or other technological/applied science field plus two years experience. 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.

Course structure

Group A

A minimum of 6 subjects 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 2 subjects 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
49023	Energy and Environmental Economics	6cp

Open electives or graduate project

An additional 2 subjects may be taken from the above list of subjects, approved graduate subjects from UTS or other universities, or 49050 Graduate Project.

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

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 multi-disciplinary perspective to issues of groundwater management.

Duration

The course requires attendance for three periods of 1.5 days each for a series of lectures and laboratory work during Autumn semester and project work during Spring semester. The time taken to complete the project will be approximately 30 weeks, requiring students to continue project work until a satisfactory level of achievement has been attained.

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

Admission requirements

Applicants must possess a degree in engineering from UTS or an equivalent qualification. Applicants are required to submit a curriculum vitae, and the names, phone numbers and addresses of two professional referees.

Course structure

Autumn semester

49550	Computing for Groundwater Specialists 1	0cp
49551	Surface Hydrology and Groundwater	6cp
49555	Groundwater Modelling	6cp
66014	Hydrogeology	6cp
66015	Hydrogeochemistry	6cp
	Elective 1	6cp
	Elective 2	6cp

Spring semester

44152	Groundwater Engineering Project	24cp

Electives available

49554	Groundwater Computing	6cp
66016	Geophysics and Remote Sensing of Groundwater Resources	6cp
66017	Geopollution Management	6cp
66018	Groundwater Geophysics	6cp
66025	Contaminated Site Management	6cp
	An approved subject offered elsewhere	6cp

Inquiries

Inquiries should be made to:

Prof M Knight
Room 1715, Level 17, Building 1
Telephone (+ 61 2) 9514 2692
Fax (+ 61 2) 9514 1985
Email:
groundwater.management@uts.edu.au

Graduate Diploma in Engineering in Groundwater Management

Course code: E061

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

Autumn semester

49550	Computing for Groundwater Specialists1	0cp
49551	Surface Hydrology and Groundwater	6cp
49555	Groundwater Modelling	6cp
66014	Hydrogeology	6cp
66015	Hydrogeochemistry	6cp
	Elective 1	6cp
	Elective 2	6cp

Spring semester

44153	Groundwater Engineering Project	12cp

Electives

As for Master of Engineering in Groundwater Management course.

Attendance

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

Inquiries

Inquiries should be made to:

Prof M Knight
Room 1715, Level 17, Building 1
Telephone (+ 61 2) 9514 2692
Fax (+ 61 2) 9514 1985
Email:
groundwater.management@uts.edu.au

Graduate Diploma in Local Government Engineering

Course code: EP64

The objective of this course is to equip the professional engineer involved with local government – in particular local government employees, developers, consultants, employees in government enterprises and state public servants – with the understanding and expertise required for efficient and effective engineering development and/or management of technical services for which local government is responsible.

Graduates from this course will be well equipped to operate within the legal framework of a more open and responsive level of local government, having due regard for economic and environmental constraints.

Duration

This course is offered in a block-release pattern of study to accommodate the special needs of students living in country areas. A total of 48 credit points must be accrued by completing six core subjects and two electives.

Admission requirements

Professional engineers making application to enter the course must hold a Bachelor's Degree in Civil or Structural Engineering or an equivalent qualification acceptable to the Institution of Engineers, Australia, and must have obtained a minimum of two years' work experience in local government or similar.

A comprehensive curriculum vitae is to be submitted, together with a detailed description of work experience, and evidence of eligibility for graduate membership of the Institution of Engineers, Australia. Applicants must also submit two letters with their application – one outlining why they wish to undertake the course, and the other indicating the level of support from their employer.

In special circumstances, engineers and other technical professionals who have been employed in senior positions within local government and who do not possess a degree (or equivalent) may be admitted to the course of study if they submit evidence of professional qualifications and experience which satisfies the Faculty that they possess the educational base and capacity to pursue graduate studies. Consideration will be given to applicants possessing a degree in an area allied to civil engineering, e.g. surveying, where applicants are employed in or as an expert consultant by local government, and have considerable experience at a senior technical or managerial level.

In certain circumstances an applicant may be required to attend for interview. It may be necessary in some cases, to pursue an area of study to prepare for admission to the course.

Course structure

Core

49103	Management and Industrial Relations	6cp
49104	Asset Maintenance Management	6cp
49105	Water Supply and Wastewater Management	6cp
49106	Road Engineering Practice	6cp
49108	Local Government Law	6cp
49121	Environmental Assessment and Planning	6cp

Electives

49102	Traffic & Transportation	6cp
49107	Storm Runoff Regulation	6cp

Additional electives will be on offer from other Graduate School programs for block release attendance; these may include subjects offered in the Environmental Engineering and Management program area.

Consideration will be given to accumulation of credit points for the elective strand by completing approved specialist short courses offered by the Centre for Local Government Education and Research, other universities and professional bodies. These short courses must be undertaken whilst enrolled in the Graduate Diploma in Local Government Engineering course.

Attendance

The normal attendance pattern is based on the student attempting two subjects per semester, and completing the course in four semesters. Attendance at UTS is required for a three-day block of full-time study (covering two subjects) on three occasions each semester.

Fees

Fees apply to this course. A schedule of approved fees is available from the Graduate Students Adviser, on (+ 61 2) 9514 2606.

Inquiries

Initial inquiries should be made to:

The Graduate Students Adviser
Ms Robyn Saunders
Room 7082, Level 7, Building 2
Telephone (+ 61 2) 9514 2606
Fax (+ 61 2) 9514 2549
Email: robyn.saunders@uts.edu.au

Academic inquiries should be made to:

Mr Ken Halstead
Room 522, Level 5, Building 2
Telephone (+ 61 2) 9514 2640
Fax (+ 61 2) 9514 2633
Email: ken.halstead@uts.edu.au

Graduate Certificate in Environmental Engineering and Management

Course code: EP54

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-release pattern of study. The normal attendance pattern is based on two subjects per semester requiring a minimum of two semesters to complete the course.

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. Each application in these categories will be used as a selection criterion if acceptable applications outnumber available places.

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

49121	Environmental Assessment and Planning	6cp
49122	Environmental Engineering and Management Practices	6cp

Semester 2

49123	Industrial Waste Minimisation	6cp
49124	Water Quality Management	6cp

Attendance

The block-release pattern of study currently consists of three sessions per semester. Each session involves three days of full-time attendance covering two subjects per semester.

Fees

Fees apply to this course. A schedule of approved fees is available from the Graduate Students Adviser, on (+ 61 2) 9514 2606.

Inquiries

Initial inquiries should be made to:

The Graduate Students Adviser
Ms Robyn Saunders
Room 7082, Level 7, Building 2
Telephone (+ 612) 9514 2606
Fax (+ 612) 9514 2549
Email: robyn.saunders@uts.edu.au

Academic inquiries should be directed to:

Dr Pam Hazelton
Room 512, Level 5, Building 2
Telephone (+ 61 2) 9514 2661
Fax (+61 2) 9514 2633
Email: pam.hazelton@uts.edu.au

Graduate Certificate in Engineering Management

Course code: EP57

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 the University of Technology, Sydney; 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 courses and a detailed curriculum vitae.

Course structure

This course requires 24 credit points of study. A minimum of 18 credit points from the core of the MEM and the remainder from the core or electives.

Fees

Fees apply to this course. A schedule of approved fees is available from the Graduate Students Adviser, on (+ 61 2) 9514 2606.

Inquiries

Initial inquiries should be made to:

The Graduate Students Adviser
Ms Robyn Saunders
Room 7082, Level 7, Building 2
Tel (+ 612) 9514 2606
Fax (+ 612) 9514 2549
Email: robyn.saunders@uts.edu.au

Academic inquiries should be directed to:

A/Prof Bob Spencer
Room 606, Level 6, Building 2
Telephone (+ 61 2) 9514 2660
Fax (+ 61 2) 9514 2655
Email: bob.spencer@uts.edu.au

CONTINUING PROFESSIONAL EDUCATION

Most subjects offered through the Graduate School 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 GSE 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 Graduate Students Adviser at any time.

Subject descriptions

UNDERGRADUATE SUBJECTS

Subject descriptions are listed in numerical order. Information includes subject number, subject name, number of credit points (e.g. 6cp), type of subject (e.g. capstone project, engineering practice, core, fields of practice, elective), prerequisites and corequisites, if any, and a summary of learning objectives and content.

Key to abbreviations used in subject descriptions

The following abbreviations have been used to indicate where a subject forms a prescribed or recommended part of a major or course.

CE	Civil Engineering Major
CEE	Civil and Environmental Engineering Major
CSE	Computer Systems Engineering Major
EE	Electrical Engineering Major
ME	Mechanical Engineering Major
TE	Telecommunications Engineering Major
BEBA	Bachelor of Engineering, Bachelor of Arts in International Studies, Diploma in Engineering Practice
BScBE	Bachelor of Science, Bachelor of Engineering, Diploma in Engineering Practice
BT	Bachelor of Technology

25353

Business for Technologists

BT

6cp; prerequisite: 48071 Numerical Methods; subject coordinator: Ms W Bui (Faculty of Business)

This subject introduces the basic economic principles to provide the student with an understanding of the business operating environment. Financial ratio analysis, financial mathematics and valuation process are then presented as essential tools for financial decision-making in the area of capital investment analysis, cost of capital, financing mix, capital structure and financial planning and forecasting.

This subject also covers the basic principles of marketing. It develops an understanding of the processes of market research and customer selection, product development, pricing strategies, promotional strategies and the distribution of goods and services to all sectors of the economy.

Assessment: assignments 15 per cent; case study 25 per cent; mid-semester exam 30 per cent; final exam 30 per cent.

33130

Mathematical Modelling I

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

6cp; prerequisites: there are no formal prerequisites, but knowledge at the level of NSW HSC of 3-unit Mathematics is assumed; corequisite: 68037 Physical Modelling

CORE

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 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)

CE, CEE, CSE, EE, ME,TE, BEBA, BScBE
6cp; prerequisites:There are no formal prerequisites, but a knowledge of 3-unit Mathematics is assumed; corequisite: 68036 Physical Modelling (2 semester mode)
CORE

Refer to 33130 Mathematical Modelling 1 for subject description.

33230

Mathematical Modelling 2

CE, CEE, CSE, EE, ME,TE, BEBA
6cp, prerequisites: 33130 Mathematical Modelling 1 or 33132 Mathematical Modelling 1
CORE

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; be able to 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.

48006

Capstone Project (6cp)

CE, CEE, ME,TE, BE(CE, CEE, ME,TE) BA
6cp; prerequisites: 48140 Review of Engineering Practice 2 or 48160 Professional Review, 48360 Engineering Management, at least 84cp of fields of practice subjects; corequisite: 48370 Technology Assessment

Objectives of the capstone project are: to bring together and integrate knowledge and skills gained in the course as a whole, including engineering principles, planning and design, ethics, management, and communication, and apply these to an initially unstructured problem formulated by each student in consultation with an adviser; to reinforce and develop competencies that have not been sufficiently emphasised in the student's choice of subjects or engineering practice to date; to define a substantial engineering study or design task, place it in context, and carry it to completion within a specified time and to a professional standard; to complete a comprehensive written and bound report that places the project in context, defines its objectives, and describes the work done and the resulting conclusions or recommendations; to provide a bridge to the student's professional future, and opportunity to demonstrate professional competencies and capabilities; to provide scope to demonstrate initiative and creativity, and take pride in achievement.

Each student is required to undertake a substantial engineering project, normally during their final year of study, and to prepare a formal report describing the work performed and the resulting conclusions and recommendations. The work is planned and carried out under the supervision of a member of academic staff. Both the work and the report must meet professional engineering standards. The project may be in any area of engineering. Students may choose a topic relating to their experience in engineering practice, or an area of interest which they wish to study in detail. Typical projects might take any of the following forms: literature review – a study of

the available literature and a state-of-the-art appraisal of an area of engineering; design – the complete design of a substantial engineering artefact or system; experimental investigation – a comprehensive laboratory investigation or testing program; research and development – original research of a fundamental or applied nature, or development of a new application of a particular technology; computer-based analysis – development or use of computer software to study the behaviour of an engineering solution; project management – planning and management of a substantial engineering project, normally in a workplace, business or community context; combining technical and management skills; impact analysis, planning, system design – study and analysis of an engineering solution in its economic, social and environmental context, integrating the engineering dimension with cross-disciplinary interfaces, and optimising overall system design, normally interactive with other professions.

48012

Capstone Project (12cp)

CSE, EE, BE (CSE, EE) BA, BSCBE
12cp; prerequisites: 48140 Review of Engineering Practice 2 or 48160 Professional Review, 48360 Engineering Management, at least 84cp of fields of practice subjects; corequisites: 48370 Technology Assessment

Refer to the subject description for 48006 Capstone Project.

48070

Engineering Materials

BT
6cp; subject coordinator: Mr W J Dartnall

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

BT
6cp; subject coordinator: Mr W J Dartnall

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 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

BT
6cp; subject coordinator: Mr D M Eager

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 computers 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

BT

6cp; prerequisites: 48074 Engineering Communication and Documentation; 48203 Technological Change and Strategic Planning; corequisites: 48075 Engineering Management; 48205 Design for Manufacture
subject coordinator: Mr W J Dartnall

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 a 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; and class participation 10 per cent.

48074

Engineering Communication and Documentation

BT

6cp; prerequisite: 48072 Information Technology
subject coordinator: A/Prof H T McGregor

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 a product 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; and class participation tasks 10 per cent.

48075

Engineering Management

BT

6cp; prerequisite: 48074 Engineering Communication and Documentation; corequisite: 79370 Law and Contracts
subject coordinator: Mr D M Eager

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. The management of uncertainty, risk and change management .

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

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

48110

Engineering Experience 1

CE, CEE, CSE, EE, ME,TE, BEBA, BSc BE
0cp, prerequisites: 48210 Engineering for Sustainability; 48220 Informatics; 48310 Introduction to Civil Engineering or 48510 Introduction to Electrical Engineering or 48610 Introduction to Mechanical Engineering or 48720 Introduction to Telecommunications Engineering or 48820 Introduction to Environmental Engineering
ENGINEERING PRACTICE

Objectives: Engineering Educators have long recognised the value of integrating experience with academic studies. Engineering Experience 1 and 2 are zero credit point subjects that students enrol in to signal to the university that they are spending the semester working in industry or the community for the purpose of gaining experience in the practice of engineering. One semester prior to undertaking the experience students must enrol in the subject Review of Engineering Practice 1. This subject continues until the semester following the experience and provide the preparation before , the support during and the formalisation of the learning that has occured as a result of the experience.

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 Review of Engineering Practice 1.

48120

Review of Engineering Practice 1

CE, CEE, CSE, EE, ME,TE, BEBA, BSc BE
6cp, subject extends over 3 semesters the middle has 48110 Engineering Experience 1 as a corequisite
ENGINEERING PRACTICE

Objectives: On completion of the subject students should be able to:

- plan and prepare for workplace participation
- explore and experience a process of employment for engineering practice
- demonstrate familiarity with workplace culture and behaviour
- describe important aspects of the dynamics of the engineering workforce and recognise appropriate behaviours
- exercise effective communication skills appropriate to an engineering workplace
- recognise and consider ethical dimensions of engineering practice
- relate the theoretical knowledge they have gained in their studies to the work they are undertaking.
- identify and seize opportunities to extend their engineering knowledge
- recognise and seize opportunities to contribute their engineering expertise for social wellbeing and sustainability
- appreciate the social context in which professional engineering is practised
- identify tensions between personal, organisational and wider social issues
- understand the role of work in social culture
- reflect and review their practice for their own academic and personal development

Material to be taught and learned: Since each student's work experience will be unique, all students can benefit from sharing and discussing their experiences. What each individual student has learned will be a function of a number of factors affecting the experience, however, all students should have received a firm grounding in fundamental engineering workplace practice. Students will receive input from a wide range of resources to focus and guide their learning in the following topic areas:

1. The nature and culture of the engineering workplace
2. The employment process
3. Communication and documentation
4. Ethics and social responsibility
5. Experiential learning and knowledge creation
6. The application of engineering method
7. Occupational health and safety
8. Industrial relations
9. Engineering in a social context
10. Personal and professional development

48130

Engineering Experience 2

CE, CEE, CSE, EE, ME, TE, BEBA, BSc BE
0cp, prerequisites: 48110 Engineering Experience 1; 48120 Review of Engineering Practice 1
ENGINEERING PRACTICE

Objectives: Engineering Educators have long recognised the value of integrating experience with academic studies. Engineering Experience 1 and 2 are zero credit point subjects that students enrol in to signal to the university that they are spending the semester working in industry or the community for the purpose of gaining experience in the practice of engineering. One semester prior to undertaking the Engineering Experience 2 students must enrol in the subject Review of Engineering Practice 2. This subject continues until the semester following the experience and provide the preparation before , the support during and the formalisation of the learning that has occured as a result of the experience.

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 Review of Engineering Practice 2.

48140

Review of Engineering Practice 2

CE, CEE, CSE, EE, ME, TE, BEBA, BSc BE
6cp, Subject extends over 3 semesters the middle one requires 48130 Engineering Experience 2 as a corequisites
ENGINEERING PRACTICE

Objectives: This subject is the review subject associated with the second semester length period of experience in the practice of engineering formalised in the subject Engineering Experience 2.

- The objectives are to be the same as those of 48130 Review of Engineering Practice 1, but students are expected to engage in the issues at an advanced level.

Material to be taught and learnt: See 48130 Review of Engineering Practice 1.

48201

Manufacturing Process Systems

BT
6cp; 3hpw; subject coordinator: Dr J Madadnia

Manufacturing process systems is the foundation subject in the manufacturing strand. This subject provides a broad perspective on Australian and global manufacturing and their interaction. It is presented in a format so as to assist transition from a TAFE to a university learning environment.

A brief history and analysis of manufacturing is presented in an economic and political context. Students explore the scope of manufacturing in Australia through interviews, factory visits, presentations and a professional report. The subject aims to develop an understanding of manufacturing systems, principles and their application.

Topics covered will include development and analysis of manufacturing systems, history and characteristics of manufacturing in Australia, manufacturing processes, global manufacturing, and the evolution of manufacturing in Australia.

Assessment: assignments 30 per cent; seminar presentation and major report 20 per cent; factory visits 10 per cent; and examinations 40 per cent.

48202

Inspection and Instrumentation

BT
6cp; corequisite: 48071 Numerical Methods
subject coordinator: Dr F C O Sticher

This subject introduces the principles and concepts of inspection in the manufacturing environment, and provides exposure to a wide range of measuring instruments used in the manufacturing industry.

Topics include the importance of inspection in manufacturing industry; introduction to measurement; distance, velocity and acceleration measurement; mass, force, strain, torque and pressure measurement; contact and infra-red temperature measurement; measuring dynamic variables; calibration, accuracy and error measurement; fluid quantity and flow measurement; optical and pneumatic comparators; slip gauges, line and end standards; measurement of straightness, flatness and alignment; screw thread measurement; measurement of surface texture;

coordinate measuring machines; and other measuring systems.

Assessment: laboratory reports 20 per cent; industrial visit report 10 per cent; seminar presentation and major report 20 per cent; mid-semester examination 20 per cent; and final examination 30 per cent.

48203

Technological Change and Strategic Planning

BT

3cp; prerequisite: 48074 Engineering Communication and Documentation; corequisite: 48070 Engineering Materials

subject coordinator: Mr W J Dartnall

This subject develops awareness that technology is constantly changing and is influenced by economic, political and social issues. It also provides insight into company strategic planning policies and develops an understanding and appreciation of technological change. Students consider ways of coping with changes and turning these changes into opportunities.

Topics include a brief overview of technological change from Sung China to the 20th century; the Industrial Revolution; Kondratieff cycles; invention and innovation; research, design and development; energy and other sources; trading blocks; multinational companies; strategic planning; and sustainable development.

Assessment: seminar presentation 25 per cent; major reports 45 per cent; and class participation 30 per cent.

48204

Maintenance Management

BT

3cp; prerequisite: 48072 Information Technology; corequisite: 48074 Engineering Communication and Documentation

subject coordinator: Dr R B Ward

This subject provides a basic knowledge of the management of maintenance in the manufacturing industry, by an introduction to current procedures, processes, philosophy and equipment, to prepare the student for managing the repairs to, replacement of, and value of, industrial assets and property.

Topics include an introduction to the financial considerations of asset management, such as Net Present Value and Depreciation; the economics of repair versus replacement; and how maintenance relates to an enterprise as a whole. Under a range of appropriate conditions it covers items such as the effect of design on maintainability, the relationship between plant availability for production and maintenance, maintenance strategies and their dependence on situations, maintenance planning, condition monitoring, failure analysis, loss control, and the organisation, operation and costing of a maintenance department.

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

48205

Design for Manufacture

BT

6cp; prerequisites: 48072 Information Technology; 48071 Numerical Methods; corequisite: 48203 Technological Change and Strategic Planning

subject coordinator: Ms C P Killen

This subject provides an overview of the complete product development cycle – from the initial concept to the end customer. Integral to this product development cycle is the design–manufacture interface. This subject focuses on the relationship between design and manufacturing. Current philosophies and techniques that are used to improve the design and manufacture of the product and the process form the core content. The subject builds on knowledge and techniques developed in earlier subjects. A comprehensive framework is developed for making decisions in modern manufacturing environments. CAM will be introduced and used to provide the student with an understanding of the various elements of machine control data programs, the application of CAD/CAM systems in generating part programs and the role of CLDATA and post-processing in the programming task.

Topics include concurrent engineering; quality function deployment; design for manufacture and assembly; design of experiments; material and process selection; decision-making aids; value analysis; process analysis; and computer-aided process planning.

Assessment: projects 60 per cent; examinations 40 per cent.

48206

Quality for Manufacture

BT
3cp; prerequisites: 48071 Numerical Methods; 48202 Inspection and Instrumentation
subject coordinator: Mr W J Dartnall

This subject covers the principles, practices, tools and techniques of Total Quality Management (TQM).

The history of quality control is introduced with mention of such pioneers as Shewart and Deming. Examples are drawn from the work of Shewart and Deming to show the evolution of ideas leading to TQM. Deming's 14 points are discussed along with some of the current philosophies behind TQM. The current practices of TQM are covered. On completion of this course, the student will be able to understand the concept and principles of quality control techniques and implement systems to improve the quality of any process.

Tools and techniques will include Statistical Process Control (SPC), ISO 9000, Australian Standards, benchmarking and experimental design. Certain topics such as Quality Deployment Function (QDF) and Taguchi methods are introduced.

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

48210

Engineering for Sustainability

CE, CEE, CSE, EE, ME, TE, BEBA, BScBE
6cp
Core

On completion of this subject, students will have developed an orientation to university study and academic skills in order to formulate answers to each of the following questions:

1. How can an appreciation of engineering in historical and social contexts inform our understanding of the current culture(s) of and future possibilities for engineering; what examples can be given of the ways in which socio-political factors of the time have had a critical influence on technological development, and vice versa?
2. How have different ideas about 'progress' evolved through history, and across cultures; how are people's views about progress and society's technological development and choices linked?
3. What are some of the key social and technological factors which have led to the emergence of engineering as a 'profession'; what are some of the positive and negative dimensions of professionalisation?
4. What are codes of ethics, and what purposes do they serve for the professions and the community?
5. What are some of the milestones which have led to the centrality of 'sustainability' as a principal concern in engineering; to what extent is 'sustainability' a shared concept in international and local contexts?
6. How are each of the following principles of sustainability understood; how are they compromised by prevailing practices; what are some strategies for furthering their application in different fields?
   - inter-generational equity
   - intra-generational equity
   - precautionary principle
   - conservation of bio-diversity and ecological integrity
   - community participation in decision making.

Students will choose from a number of modules designed around different themes. Through their respective themes, each of the modules will examine –

- the process and contexts by which technologies were developed and harnessed to address the perceived needs of society in different periods throughout history, and across cultures;
- the interdependence between prevailing social values, and in particular, those associated with society's concept of 'progress', and technological development and choices;
- the emergence of engineering as a profession, and its impact on traditional crafts and trades, and its relationship with other professions;
- the professional code of ethics, its role and limitations;
- the international commitment to sustainability as a concern and challenge for engineering;
- the diverse ways in which principles of sustainability might be interpreted and applied in particular problem areas.

Through learning activities designed for the above material, 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.

48220

Informatics

CE, CEE, CSE, EE, ME,TE, BEBA, BScBE
6cp
CORE

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

Topics include: consideration of issues related informatics tools and categories of informatics tools, types of problems which can benefit from these tools, benefits of using tools, limitation of tools, relevance of tools to different types of problems; consideration of issues related to using tools to identify, structure, conceptualise, visualise, articulate, and reason about engineering problems; consideration of issues related to how tools relate to the culture of engineering, engineering ethics, and critical thinking; specific skills in computing programming fundamentals, and a specific programming language; skills in using operating systems, written and oral communication software, spreadsheets, internet tools, mathematical modelling tools, databases, teamwork tools, and project management tools.

48230

Engineering Communication

CE, CEE, CSE, EE, ME,TE, BEBA, BScBE
6cp; prerequisite: 48220 Informatics
CORE

On completion of this subject students should be able to: understand basic principles and theories of human communication; research within the various discipline areas that inform the study of communication; write competently in a number of different genres; perform competently in a variety of oral communication situations; understand basic principles and practices of graphic communication; demonstrate their ability to express engineering concepts through graphical communication; demonstrate their ability to 'converse' mathematically; lead and participate in group processes; appreciate the central role of communication in engineering practice.

Topics include: principles and theories of communication; communication in practice; the processes of communication; communication technology.

48240

Uncertainties and Risks in Engineering

CE, CEE, CSE, EE, ME,TE, BEBA, BScBE
6cp; prerequisites: 48220 Informatics, 33230 Mathematical Modelling 2
CORE

The objectives of this subject are: to develop in students a critical understanding of ideas concerning decision making under risk, uncertainty, ignorance and indeterminacy, and an appreciation that each person and group has knowledge, attitudes and beliefs about risk and uncertainty which, to the individual or group, are 'rational'; to explore the contexts in which experts, including professional engineers, manipulate problems involving risk and uncertainty; to develop a critical appreciation of the uncertainties and subjectivities inherent in modelling; and to equip students with the ability to select and apply appropriate statistical tools, to acquire additional statistical competencies, and to understand their strengths and limitations.

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

safety, reliability, quality, investment risk, measurement, and system performance evaluation; sources of errors; limitations of models as predictive tools; risk transfer, risk modification, and risk avoidance. The role of formal methods of handling risk and uncertainty – standards, codes, and expert or professional knowledge in resolving risk or uncertainty, particularly in engineering and related professions; how models are constructed and used as the basis for codes and standards; examples and connections to the fields of practice/programs; the complexity of engineering decisions and the reductionist approach to classifying problems; ensuring predictability, quality and reliability in the face of the random perturbations and uncertainties inherent in systems. Techniques for modelling and analysing uncertainties and risks – in order to be able to examine some hypotheses about risk and uncertainty, appreciation of the process of and mastery of some of the skills for modelling and analysis will be developed, including: different classifications of mathematical models and modelling methods, e.g. stochastic, deterministic, mixed stochastic-deterministic, parameteric, black box, simulation; linear, nonlinear, lumped parameter, distributed parameter; static, dynamic; regression and correlation analysis; choice of variables and relationships to model; sources of uncertainty propagation in models, e.g. measurement uncertainties, propagation of computational errors, system noise and disturbances, unmodelled variables, non-quantifiable variables and effects; measures of certainty and uncertainty in models, e.g. robustness, confidence intervals, statistical inference based on hypothesis testing; mechanisms for minimising effects of uncertainties in models and systems, e.g. feedback, filters, and redundancy; model verification e.g. tests of goodness of fit; model validation, e.g. statistical forecasting; how decisions are made under uncertainty; different approaches to documenting and communicating the results of statistical modelling and decision making.

48250

Engineering Economics and Finance

CE, CEE, CSE, EE, ME, TE, BEBA, BScBE
6cp
Core

The objectives are for students to be able to use an understanding of engineering culture to develop an understanding of the relationship between economics and finance and engineering; to gain a working knowledge of macro and micro economic theories in the context of engineering practice, ethics and sustainability; to acquire skills in determining the appropriate use and limitations of various economic and financial models and techniques used to define/manage/analyse engineering activities; to develop competence in identifying and working through the economic and financial aspects of an engineering project/case study; to become aware of the impact of various economic and financial models and techniques on the social and technical dimensions of engineering activity; to integrate economic and financial understanding and fields of practice specialist knowledge in project-based/case study work.

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

48260

Engineering Management

CE, CEE, CSE, EE, ME, TE, BEBA, BScBE
6cp; prerequisites: 48120 Review of Engineering Practice 1; 48240 Uncertainties and Risks in Engineering
Core

This subject enables students to develop the following: an appreciation that management is integral to engineering in aspects ranging from the personal to the organisational; an awareness of the roles and functions of management – general, engineering and project management; an understanding of the rationale underpinning various engineering and project management models and tools and the interaction with engineering practice. It introduces and analyses a range of engineering and project management tools, developing an appreciation of their appropriate uses, strengths and weaknesses. Building on awareness developed in earlier subjects, and through work place experiences, it introduces students to the potential impacts of engineers' decisions and management on the community and the client. Students will acquire skills in choosing and using the most appropriate

engineering and project management tools for identifiable engineering activities.

Topics include: concepts of general management and engineering and project management and their relationships; systems/ product life cycle model and the various contributions which engineers make, or can make, during this cycle; and the contributions of other occupations; models used to visualise the processes occurring during the cycle, and for envisaging management and decision making; 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. that have, and the arguments for and against them; engineering and project management and the capabilities required of engineering managers.

48270

Technology Assessment

CE, CEE, CSE, EE, ME,TE, BEBA, BScBE
6cp
Core

Objective is to gain 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 sustainability and ethics; 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

BT
6cp
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, and seven assignments of four, worth 10 per cent, two worth 15 per cent; and one worth 25 per cent.

48302

Computer Aids for Airconditioning Design

BT
6cp
subject coordinator: Mr D M Eager

This subject provides an introduction to the use of micro-version software for the following: estimation of cooling and heating loads in buildings; simulation of HVAC system operation and estimation of energy consumption over time; and analysis of distribution of air and heat in complex building spaces by application of computational fluid dynamics. Students will gain familiarity with the application of software programs in common use in Australia. It is expected that they will be able to apply learned skills to design applications and to evaluation of the impact on thermal flows of alternative methods and materials of construction.

Assessment: four equally weighted modelling exercises 80 per cent, and essay 20 per cent

48303

Service Control Systems

BT
3cp; prerequisite: 48301 Mechanical Services
subject coordinator: Mr D M Eager

This subject provides knowledge of electric control circuits and electric and pneumatic control elements as applied to the design of automatic control systems for air handling and refrigeration systems and creates an understanding of the selection and application

of electronic, programmable logic and direct digital control systems. On completion of the subject it is expected that students will have gained a knowledge of the capabilities and limitations of electric, electronic, pneumatic and computer based control systems for HVAC applications with an understanding of the types of controllers available to perform automatic control functions. They will also be able to design automatic control systems for HVAC applications and to prepare and understand control diagrams.

Assessment: eight projects of 5 per cent, 7 per cent, 3 per cent, 5 per cent, 15 per cent, 5 per cent, 30 per cent, and 30 per cent.

48304

Building Construction Technology

BT
6cp
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.

48305

Airconditioning Design

BT
6cp; prerequisites: 48071 Numerical Methods; 48302 Computer Aids for Airconditioning Design; 48070 Engineering Materials
subject coordinator: Mr D M Eager

This subject provides the ability to design large airconditioning systems for buildings and to make rational system and component selection decisions. It covers airconditioning system selection; design for energy efficiency; quality of indoor air; air distribution; piped services; water treatment; and airconditioning system components such as fans, coils, filters and heat rejection equipment. It includes practice in the design of large airconditioning systems through the set of assignments which lead students through the processes of airconditioning system selection, heat load estimation, and the design of air distribution, refrigerant and heat rejection systems.

Assessment: five equally weighted major assignments 100 per cent.

48310

Introduction to Civil Engineering

CE, CEE, BE (CE, CEE) BA
6cp
FIELDS OF PRACTICE

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, inter-disciplinary 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 (3 hours duration each) of basic surveying and levelling in the field, followed by one 3 hour session of design work involving catchment area calculation, stormwater run-off estimation, longitudinal section plotting, and pipe gradient design using basic formulae. This segment serves as an introduction to surveying, hydrology and urban stormwater management subjects.

Seminar Presentation: two sessions of (2 hours duration each) for presentation of a short discussion paper on a civil engineering topic of individual choice. Use of audio-visual aids is encouraged.

Laboratory Sessions: two sessions of 1-1/2 hours duration involving demonstration of water engineering and building dynamics (Shaker table).

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 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

CE, BE (CE) BA
6cp; prerequisites: 48310 Introduction to Civil Engineering
FIELDS OF PRACTICE

The objectives of this subject are to enable students to achieve the following: become competent in the theory and practice of basis 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 following engineering applications of surveying – horizontal curves, vertical curves, and areas and volumes; 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

CE, CEE, BE (CE, CEE) BA
6cp; corequisites: 33130 Mathematical Modelling 1, 68037 Physical Modelling
FIELDS OF PRACTICE

A hallmark of civil engineers is their ability to design and supervise the construction of major projects, such as multistorey buildings, bridges, wharves and jetties, off-shore oil platforms, airports, roads, railways, tunnels, dams, telecommunication towers etc. The failure of any of these projects would have grave social, economic and political consequences, particularly when such failures result in the loss of life. Civil engineers must ensure the safety, integrity and serviceability of all civil engineering structures they are entrusted with.

In order to ascertain that a structure can perform satisfactorily under its design loads, the civil engineer must be able to analyse the structural behaviour under severe loading conditions. Civil engineering graduates must possess adequate knowledge in the structural mechanics area to competently analyse and design simple structures. By completing this subject, students will: acquire 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 should be acquired early on. 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, vector addition, resultants and components of 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, moving a force to a parallel position; resultant of a force/couple system, equivalent force couple systems, support reactions on 2D bodies; equilibrium of 2D bodies, alternative sets of equilibrium equations; equilibrium of two and three force bodies, statically indeterminate systems – partial and improper constraints; 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, three-pin arches, curved and bent beams; properties of plane areas – centroid, first and second moment of area, moment of inertia, polar moment of inertia, radius of gyration; concept of stress, uniaxial stresses, shearing stresses, ultimate and allowable stress, factor of safety; concept of strain, normal strain and axial loading, stress-strain diagram, Hook's law, modulus of elasticity, Poisson's ratio, generalised Hook's law; and design of a complete truss structure (e.g. roof truss, footbridge truss) given a set of specifications.

48330

Soil Behaviour

CE, CEE, BE (CE, CEE) BA
6cp; corequisite: 48331 Mechanics of Solids
FIELDS OF PRACTICE

The objective of this subject is to give a broad based introduction to the geo-sciences and a more rigorous introduction to soil as an engineering material. The subject concludes with a detailed study of the problem of soil settlement behaviour. At the completion of the subject students should: be familiar with the natural processes occurring on the surface of the earth; be able to communicate with geologists, earth scientists and others involved in studying the ground; understand the fundamentals of the behaviour of soil as an engineering material; be aware of those aspects of soil behaviour which have a significant environmental impact; be able to solve a range of soil related problems especially those involving water flow and soil settlement; have a solid basis for further formal study and self-study in the geotechnical area.

Topics include: introduction to soil engineering – typical problems, the engineer's role; geological fundamentals – classification, composition and structure of rock, engineering properties; geomorphology – soil formation, landforms; nature of soil – particulate nature, classification, clay mineralogy; introduction to soil mechanics – overview, state of vertical stress, effective stress; water in soil – groundwater, seepage and permeability; soil environmental impacts – problems, environmental behavioural aspects and properties; settlement of soils – settlement theory, consolidation testing, stresses under loaded areas, 1D settlement estimation, elastic deformations, rate of settlement.

48331

Mechanics of Solids

CE, CEE, ME, BE (CE, CEE, ME) BA
6cp; prerequisites: either 48321 Statics and Introduction to Design Process, or 48620 Fundamentals of Mechanical Engineering 1
FIELDS OF PRACTICE

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 model and analyse the behaviour of structural and machine components subjected to various loading and support conditions; raise confidence and skill in the use of the principles

of equilibrium and material constitutional relationships to develop the basic tools and formulae to facilitate analysis and design of structural and machine components; understand the limitations of what has been learned in this subject.

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 – maximum allowable load in beams; composite beams – composite 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 stresses in thin walled sections – shear centre; transformation of plane strains – measurement of strains – strain rosette – relationship between elastic modulus, shear modulus and Poisson's ratio.

48340

Construction

CE, CEE, BE (CE, CEE) BA
6cp; prerequisite: 48310 Introduction to Civil Engineering
FIELDS OF PRACTICE

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 solving construction problems.

Topics include initial site establishment; earthmoving grading and compaction equipment; shoring of excavations, underpinning; pumps and ground water control; compressors and air tools; formwork and falsework equipment performance, the repetitive cycle of operations and fleet operation; preliminary and detailed estimates and bid considerations.

48341

Structural Mechanics and Component Design

CE, CEE, BE (CE, CEE) BA
6cp; prerequisites: 33230 Mathematical Modelling 2, 48331 Mechanics of Solids
FIELDS OF PRACTICE

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 conservation of energy 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 the stresses and deformations of structural components and of simple redundant frames. The subject also introduces the fundamental concepts of limit state design of structures in concrete steel and timber. 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 statical indeterminacy and degrees of freedom – kinematic indeterminacy, support conditions, displacement constraints, multiple load paths; method of consistent deformations; compatibility equations, analysis of 1& 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

CE, BE (CE) BA

6cp; prerequisite: 60101 Chemistry and Materials Science

Fields of practice

This subject introduces civil engineering students to basic environmental concepts and the environmental consequences of typical engineering activities. It applies material learnt in 48210 Engineering through History and towards Sustainable Futures 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 & 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; project case studies emphasising environmental issues.

48351

Structural Analysis and Component Design

CE, CEE, BE (CE, CEE) BA

6cp; prerequisite: 48341 Structural Mechanics and Component Design

Fields of practice

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 indeterminancy, 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

CE, BE (CE) BA

6cp; prerequisite: 60101 Chemistry and Materials Science

FIELDS OF PRACTICE

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

CE, BE (CE) BA

6cp; prerequisites: 48330 Soil Behaviour, 48340 Construction

FIELDS OF PRACTICE

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

CE, BE (CE) BA
6cp; prerequisites: 48351 Structural Analysis and Component Design, 48240 Uncertainties and Risks in Engineering
FIELDS OF PRACTICE

This subject has analysis and design components. 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 for verification of 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.

The 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.

Computer analysis and behaviour of skeletal structures: Revision of computer modelling of structures – coordinate systems, nodal coordinates and degrees of freedom; beam connectivity codes and orientation of local coordinate system; section properties; loading and load combinations. Introduction to the concept of stiffness method of analysis of plane frames and derivation of important equations for continuous beams – comparison of analyses approaches by means of compatible deformations versus force equilibrium; 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; introduction to basic 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; application of computer modelling to structural behaviour – plane frames (sway vs. non-sway frames); simple three dimensional frames; plane frames subjected to support settlement and temperature loading; 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; analysis of rectangular frames subject to horizontal loads by the portal and cantilever method.

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

CE, CEE, BE (CE, CEE) BA
6cp, prerequisites: 48641 Fluid Mechanics
FIELDS OF PRACTICE

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; integration of hydraulics and hydrology – case studies.

48370

Transport in the Environment

CE, CEE, BE (CE, CEE) BA
6cp; prerequisite: 33230 Mathematical Modelling 2
FIELDS OF PRACTICE

The objectives of this subject are to enable students to: understand the relationship between transport and land use; understand and use the basic concepts of transportation relating to modelling and design; understand the relationship between urban form, energy use and sustainability; design feasible transport schemes using a variety of modes; evaluate transportation projects in terms of their capacity, cost, environmental impact and equity.

Topics include: landuse 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

CE, BE (CE) BA
6cp; prerequisites: 48361 Behaviour of Structures and Design, 48360 Geotechnical Engineering, 48352 Construction Materials, 48250 Engineering Economics and Finance
FIELDS OF PRACTICE

The objective of this subject is to involve students in the total design process as encountered in a 'true to life' project by taking on the role of a design engineer within a project design team. This process will simulate what happens in multidisciplinary engineering consultancies. The subject will challenge students to consider the interests of all the stakeholders in the formulation of the hierarchy of design goals. It will aim to provide an opportunity to devise creative 'concept designs' and to develop, prepare and document a final design proposal to meet the functional objectives having regard to environmental guidelines, economic constraints and community values. The subject will foster skills and confidence to use all aspects of prior studies and experience to devise, analyse, assess and refine alternative designs.

The subject has as its core the design and documentation of a major civil and environmental engineering project that draws for input on all the main strands of knowledge and competencies developed throughout the course. Typically, the project will involve the design of a major entity and associated facilities and services (e.g. solid waste collection and transfer station; multi-purpose sporting complex; elevated parking station to serve an airport or railhead etc). The project is defined to the student design team by a design brief similar to that which would be supplied to consulting engineers by a client or architect. The project contains four stages:

Stage 1 Following receipt of the design brief students will be required to assess the information provided, refine the design objectives and criteria. They will then prepare and evaluate feasible conceptual design options and prepare preferred option as the conceptual scheme for the final design. Students will be provided with guidance through this process, similar to that which would be given by a senior project engineer or a director of a consulting engineering practice.

Stage 2 Students prepare a preliminary design for each major component of the project based on the approved preferred concept. Each design team makes a presentation describing and assessing their preliminary design schemes in terms of the design objectives and criteria.

Stage 3 Students develop detailed final designs and documentation for selected components of the scheme, within the context of the overall project, addressing the design objectives and complying with the agreed design criteria and constraints.

Stage 4 Each group prepares a presentation of their design to a panel of staff to discuss the rationale which underlies the final design. The designs and the content of the presentations will be subjected to critical discussion as part of the oral examination.

48401

Aerospace Operations 1

BT

6cp

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

BT

6cp; prerequisite: 48401 Aerospace Operations 1

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

BT

6cp; prerequisite: 48402 Aerospace Operations 2

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

BT

6cp; prerequisite: 48403 Aerospace Operations 3; corequisite: 48070 Engineering Materials

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

BT
6cp; prerequisites: 48070 Engineering Materials; 48404 Aerospace Maintenance and Management; corequisite: 48075 Engineering Management

This subject provides the student an understanding and appreciation of the design process in general and 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 for the following technology management subjects. 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.

48501

International Practice of Engineering 1

BE BA DipEngPrac (all majors)
8cp; prerequisites: 97xxx International Studies: Language and Culture 4; 50140 Modernisation and Social Change
subject coordinator: Mr P Maloney

This subject will be undertaken while at an overseas location. It will feature a total immersion approach to cultural awareness and language skills development will be linked to the study of the practice of engineering in the overseas location. Where possible, it will include practical work experience.

48502

International Practice of Engineering 2

BE BA DipEngPrac (all majors)
24cp; prerequisite: 48501 International Practice of Engineering 1; subject coordinator: Mr P Maloney

This subject will be undertaken while at an overseas university as an exchange student studying subjects relevant to the study of the practice of engineering in the host country and to the engineering studies of the student's major.

48503

Review of Overseas Experience

BE BA DipEngPrac (all majors)
3cp; prerequisite: 48502 International Practice of Engineering 2

This subject guides students through the process of experiential learning to ensure that they achieve the maximum benefit from their international experience, and provides them with opportunities to draw on the overseas experiences of other students.

The subject provides a forum for both entering and returning students to share their international experiences, to draw on their collective resources, to support and encourage each other, and to contribute to planning for the ongoing development of the course. Professional career planning and life-long learning techniques are developed.

48504

Australian Engineering on the International Scene

BE BA DipEngPrac (all majors)

This subject explores concepts of engineering ethics and professionalism, legal, political and commercial systems, and economics in an international context. Issues in diversity, leadership and sustainable development are discussed. Past and present engineering developments are evaluated and their impact on the world discussed. The subject extends the cultural awareness developed throughout the course to help students consider possible and probable futures. The subject will draw from a number of resources including the expertise of Australian engineers working in the international scene.

48505

Project (BE BA DipEngPrac)

10cp; prerequisite: 48502 International Practice of Engineering 2; subject coordinator: Mr P Maloney

This subject provides students with an opportunity to focus attention and work on an issue of relevance to the practice of professional engineering in an international or global setting.

The project may include any aspect of the international practice of engineering relevant to the cultural studies and/or engineering interests of the student. The project may be linked to the BE project component, but in such cases the BA component of the project must be readily identifiable and assessable. The project will be developed in consultation with the Program Director. Students may work on a project either individually or in groups. These groups might include non-engineering students enrolled in relevant Institute for International Studies programs.

48997

Industrial Experience (BE BA DipEngPrac)

BE BA DipEng Prac students only

BE BA DipEng Prac students must enrol in Industrial Experience each time they undertake a period of work experience, whether in Australia or overseas.

48430

Software Development

CSE, EE, TE, BE (CSE, EE, TE) BA, BScBE
6cp, prerequisite: 48220 Informatics
FIELDS OF PRACTICE

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; equip them with the ability to acquire new software development skills as required by specific development projects.

Topics include: introduction to the software development life cycle and development processes and models (such as the waterfall model, incremental and iterative development, and the spiral model); introduction to software paradigms and detailed consideration of the purpose and underlying principles of the structured and Object Oriented paradigms; introduction to concepts of development methodologies and detailed coverage of one specific methodology (including analysis, design and implementation aspects of this methodology); principles and procedures for software testing, verification, validation and debugging; approaches to algorithm design and problem solving; software coding – introduction and detailed coverage of a programming language in order to develop specific skills related to above elements.

Students would have developed fundamental programming skills in the prerequisite subject 48220 Informatics. In order to further develop their programming skills, and to understand the relationships between different programming paradigms, they will be required to develop a deeper understanding of a different language from that covered in Informatics. Further, this language will be applied to both structured and Object Oriented paradigms.

48440

Software Engineering

CSE, TE, BE (CSE, TE) BA
6cp; prerequisite: 48430 Software Development
FIELDS OF PRACTICE

The objectives of this subject are to: develop in students a critical understanding of issues related to the engineering of software systems and to bring students to the point where they are fluent in the objectives of software engineering; ensure that students are competent in techniques to realise software systems utilising appropriate software engineering approaches, tools, and techniques. This will include coverage of developing a set of requirements, application of rigorous software analysis, design, coding and testing techniques. 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 project planning, budgeting, quality

assurance (including walkthroughs and reviews, etc.); software development CASE tools.

48441

Real-time Software and Interfacing

CSE, EE,TE, BE (CSE, EE,TE) BA, BScBE
6cp; prerequisites: 48520 Electronics, 48430 Software Development; corequisite: 48440 Software Engineering
FIELDS OF PRACTICE

The objectives of this subject are to enable students to: master the fundamentals of digital electronic circuits and their applications; appreciate the history of digital computers; master hardware architectures of a typical computer system; understand well the principles of low level programming and gain an ability to write assembly code; design and program a hardware interface to a computer given its specification; appreciate the widespread use of embedded computer systems in engineering applications.

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

48450

Operating Systems

CSE, BE (CSE) BA
6cp; prerequisites: 48440 Software Engineering, 48441 Real-time Software and Interfacing
FIELDS OF PRACTICE

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 (Linux is proposed); know how the centralised operating system functionality can be expanded into a distributed operating system (Windows NT is proposed to be examined in this regard); know the basic principles of Hard Real-time application programming. (Rate monotonic and deadline monotonic to be examed in depth); know how to apply the Hard Real-time principles to existing hard real-time operating system employing the POSIX standard (as a minimum).

Topics include: the use of the Unix operating system and other POSIX defined operating systems as a tool 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.

48451

Digital Systems

CSE, BE (CSE) BA
6cp; prerequisite: 48441 Real-time Software and Interfacing
FIELDS OF PRACTICE

The objectives of this subject are that students should be able to: develop a specification for a digital system based on a user requirement specification; select a suitable implementation technology and portion the system into hardware and software taking into account real-time requirements; develop an architectural design; develop a functional design; implement the system and test it.

Topics include: process models for digital systems design; implementation technologies; architectures for real-time computing; concurrency; instruction set; functional design; VHDL; logic design; testing and implementation.

48470

Computer Systems Analysis

CSE, BE (CSE) BA
6cp; prerequisite: 48440 Software Engineering
FIELDS OF PRACTICE

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 functional 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.

48480

Computer Systems Design

CSE, BE (CSE) BA
6cp; prerequisite: 48470 Computer Systems Analysis
FIELDS OF PRACTICE

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 solutions that meet the system requirements specification and assess each on the basis of functionality, performance and cost; be able to write clear concise documentation of their decisions and the system implementation; and gain the discipline necessary to be an effective team member, understand 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 an ability to write effective documentation.

48510

Introduction to Electrical Engineering

CSE, EE, ME, TE, BE (CSE, EE, ME, TE) BA, BScBE
6cp; corequisite: 48210 Engineering for Sustainability
FIELDS OF PRACTICE

The objective of this subject is to give students an understanding of the scope and methods of electrical and computer systems engineering. In particular the notion of design, the technologies involved, the approach to problem solving, and the skills and tools used will be introduced. On completion of the subject students will 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 is made up of a five week module on electrotechnology – including generation of electrical energy, domestic electrical energy distribution and consumption, electrical safety and a number of six week modules, for which students are able to select one module from a particular research and development field within the Faculty for investigation during the six weeks. Possible topics include autonomous robots, software, and telecommunication protocols.

48520

Electronics

CSE, EE, TE, BE (CSE, EE, TE) BA, BScBE
6cp; prerequisites: 48510 Introduction to Electrical Engineering, 33130 Mathematical Modelling I or 33132 Mathematical Modelling I (2 semester mode)
FIELDS OF PRACTICE

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

CSE, EE, TE, BE (CSE, EE, TE) BA, BScBE
6cp; prerequisite: 48520 Electronics
FIELDS OF PRACTICE

The objectives of this subject are to: acquire reasonable proficiency in the circuit analysis and an understanding of the place of the rigorous analysis of real world models in the practice of engineering; learn how to evaluate whether one has the necessary skill level to be competent to undertake a specific design or analysis task and, if not, how to build up a skill level to the required level; be aware of good and bad practice in problem solving and learn how to improve 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 world phenomena themselves and the models that are used to represent them.

Topics include: linear, time invariant models of real world one-ports using ideal resistors, inductors and capacitors; modelling sources, including ideal controlled source elements; development of circuit equations from interconnection constraints – Kirchhoff's laws; analysis of dc circuits using shortcuts – Thevenin's and Norton's theorems, divider rules, virtual short in op-amp circuits, symmetry, circuit transformation, superposition; ac steady state analysis using phasors (including graphical solutions using phasor diagrams); definitions of power and ac circuits; general methods for setting up and solving circuit equations – mesh, node analysis; transient analysis of first order circuits; solution of complete response using Laplace Transform methods; transfer and immittance functions, poles zeros , s-plane; steady state sinusoidal response from s-plane; Bode plots; response to an arbitrary input using convolution; coupled circuits and transformers; linear models of two ports; two port parameters; two port behaviour; three phase circuits.

48531

Electromechanical Systems

CSE, EE, ME, BE (CSE, EE, ME) BA
6cp; prerequisites: 48510 Introduction to Electrical Engineering, 33230 Mathematical Modelling 2
FIELDS OF PRACTICE

The objectives of this subject are to familiarise students with the fundamental laws of electromagnetism, magnetic and electrostatic field concepts, basic ac circuit analysis, how electric and magnetic energy are interchanged, and to be able to model a selection of electromechanical systems and understand their applications.

The technical and theoretical content 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:

Know:

- Laws – Faraday, Ampere, Gauss, Coulomb, Lorentz.
- Magnetic fields – B, H, M, permeability, flux, energy.
- Magnetic circuits – permeance, reluctance, mmf, flux, inductance, energy, field plots, calculation of permeance from flux lines.
- Electrostatic fields – E, D, P, permittivity, flux, energy.
- Electrostatic circuits – capacitance, potential, flux, energy, field plots, calculation of capacitance from flux lines, calculation of E in series circuit.
- ac circuits – phasor notation, 3-phase system, S, P, Q, pf, rms value.
- Force/torque – rate of change of energy (co-energy).
- Moving circuit models – voltage equations, emf.
- Mechanical models – mass, inertia, Newton 2.
- Solution of coupled equations – state equations, numerical method.
- Conservation of energy – input/output/losses.

Familiar:

- Soft magnetic materials – domains, 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, watthour meter.
- Electrostatic machines – Van der Graaf, Whimshurst, water drop.
- Control – motor speed and position control requirements.
- Electromechanical energy conversion applications – e.g. disc drive, printer, CD player, washing machine, robot, CNC machine, servo motor, electric car, electric train, rolling mill, power station, 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

CSE, EE,TE, BE (CSE, EE,TE) BA, BScBE
6cp; prerequisites: 48220 Informatics, 33230 Mathematical Modelling 2
Fields of practice

The objectives of this subject are to equip students with the analytical tools used to characterise signals and systems in both the time and frequency domains, and to enable them to put into practice the theory learned by designing part of a real-life system.

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.

48550

Power Systems

EE, BE (EE) BA, BScBE
6cp; prerequisites: 48531 Electromechanical Systems, 48530 Circuit Analysis, 68038 Advanced Mathematics and Physics
FIELDS OF PRACTICE

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.

The technical and theoretical content 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, pollution control.

Familiar:

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

Aware (exposure technologies):

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

Laboratory skills

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

48560

Analogue and Digital Control

EE, BE (EE) BA, BScBE
6cp; prerequisite: 48540 Signals and Systems
FIELDS OF PRACTICE

The objective of this subject is to enable students to model with validation control systems, to analyse, design, and implement both analogue and digital controllers so that the controlled systems conform with given specifications. Emphasis is placed on laboratory work, the theoretical content of the subject being only that required to produce successful designs. Students are required to work on reduced scale models of actual industrial processes. The equipment is based upon experience gained with authentic control applications and is suitably modified for student use. Students follow the usual sequence adopted in industry, i.e. they start with the calibration of transducers and actuators leading on to dynamic response testing, physical modelling, model verification and finally to controller design, implementation, and testing.

Topics include: linear and nonlinear modelling of control systems using Newton's rules, analogous networks or Lagragian techniques; linearisation and development of linear, time-invariant transfer functions; development of lead-lad compensators or PID controllers using

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

48561

Power Electronics

EE, BE (EE) BA
6cp; prerequisite: 48530 Circuit Analysis
FIELDS OF PRACTICE

The objectives of this subject are to enable students to: acquire reasonable proficiency in power electronics and its applications; gain confidence and expertise in the use of power semiconductor devices; have some understanding of rigorous analysis using computer simulation of real power electronic systems; be aware of the electromagnetic interference problems associated with power electronic systems and how these problems can be overcome; be aware of the inter-disciplinary nature of power electronics; be aware of the enormous potential this area has for development and exploitation; learn how to evaluate whether one has the skills to undertake a specific design or analysis task and, if not, how to build up the required skill level; be aware of good and bad practice in problem solving and learn the art of improving on practice whenever a weakness is revealed; develop validation strategies that enable one to have sufficient confidence to analyse one's own readiness to accept professional responsibility for conclusions reached; be aware of the importance of continually seeking improved analytical methods and computational tools that will give results more expeditiously and with reduced chance of errors; have a clear conceptual understanding of the difference between real practical systems and the models that are used to represent them.

Topics include: external characteristics, operation and gate drive circuit design of modern power semiconductor devices; protection circuits and thermal design for power devices; power conversion circuits including rectifiers, choppers, inverters, and cycloconverters; pulse-width modulation techniques; harmonic and voltage control of inverters; applications such as switch-mode power supplies, dc drives, ac drives, UPS systems, HVDC; recent advances in device technology; using microcontroller for power electronic applications; EMC and electromagnetic interference in power electronics; use of linear electronics for control of power electronic systems; Opamps, and power amplifiers; feedback strategies.

48610

Introduction to Mechanical Engineering

CSE, EE, ME, BE (CSE, EE, ME) BA
6cp
FIELDS OF PRACTICE

The objectives of this subject are that students: have a clear idea of where mechanical engineering fits in the profession and in society; have a clear idea of the career options open to mechanical engineers and the sorts of problems that mechanical engineering addresses; have an idea of how mechanical engineering is conducted in the 'real world'; be aware of the engineering method and systematic approaches to the design process; be able to perform and explain simple mechanics problems and perform the required calculations; be able to graphically represent objects by sketching, using drawing instruments and/or computer methods using standard representation techniques such as orthographic projection; be aware of different materials and be able to make selections based on fundamental material properties and required uses; be 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; electro-mechanical devices; rotating machinery; lubrication and wear.

48620

Fundamentals of Mechanical Engineering

ME, BE (ME) BA
6cp; prerequisites: 48610 Introduction to Mechanical Engineering, 68036 Physical Modelling (2 semester mode) or 68037 Physical Modelling, 33130 Mathematical Modelling I or 33132 Mathematical Modelling I (2 semester mode)
FIELDS OF PRACTICE

The objectives of this subject are to extend further the engineering science fundamentals that were introduced in Introduction to Mechanical Engineering and which are required for later subjects, and to consolidate 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; 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; area moments of inertia.

48621

Manufacturing Engineering

ME, BE (ME) BA
6cp; prerequisite: 48610 Introduction to Mechanical Engineering
FIELDS OF PRACTICE

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 acquire knowledge of 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

ME, BE (ME) BA
6cp; prerequisite: 48620 Fundamentals of Mechanical Engineering
FIELDS OF PRACTICE

The objectives of this subject are to give students an understanding of kinematics and dynamics of rigid bodies in general planar motion which are typically encountered in design and analysis of mechanical systems, and to have 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: present rigid body planar and spatial kinematics; present rigid body planar dynamics; understand energy methods in contrast to direct applications of Newton's second Laws of Motion for setting up a model; understand the physics of a problem formulated from a real mechanical system and obtain multiple solutions to each problem; appreciate the role of vibration in machines and structures in the engineering world; understand the procedures required to evaluate a vibration problem; analyse the dynamic response of single degree of freedom mechanical systems.

Content covers 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 3-dimensional problems; F=ma applied to a rigid-body-dynamics, significance of 'centre of mass', the 'moment' relationship ($M=I\alpha$ 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 of vibration theory, free vibration of undamped single degree of freedom system; free decay vibration of damped single degree of freedom system; forced vibration of single degree of freedom system.

48641

Fluid Mechanics

CE, CEE, ME, BE (CE, CEE, ME) BA
6cp; prerequisites: 33230 Mathematical Modelling 2 (CE, CEE); 48260 Fundamentals of Mechanical Engineering (ME); corequisite: 48331 Mechanics of Solids (CE)
FIELDS OF PRACTICE

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; 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

ME, BE (ME) BA
6cp, prerequisites: 60101 Chemistry and Materials Science, 48331 Mechanics of Solids
FIELDS OF PRACTICE

This subject draws on, and brings together, the knowledge and skills developed in earlier subjects such as Fundamentals of Mechanical Engineering, Engineering Chemistry and Materials, and Solid Mechanics. 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, fracture-mechanism maps.

48650

Mechanical and Manufacturing Design

ME, BE (ME) BA
6cp; prerequisites: 48640 Machine Dynamics, 48621 Manufacturing Engineering, 48210 Engineering for Sustainability, 48642 Strength of Engineering Materials, 48510 Introduction to Electrical Engineering, 48230 Engineering Communication
FIELDS OF PRACTICE

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 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; 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; using standards, codes and handbooks.

48651

Thermodynamics

ME, BE (ME) BA
6cp, prerequisites: 48641 Fluid Mechanics, 33230 Mathematical Modelling 2, 68036 Physical Modelling (2 semester mode) or 68037 Physical Modelling, 48620 Fundamentals of Mechanical Engineering
FIELDS OF PRACTICE

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; 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

ME, BE (ME) BA
6cp; prerequisite: 48640 Machine Dynamics
Fields of practice

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

ME, BE (ME) BA
6cp; prerequisites: 48641 Fluid Mechanics, 48651 Thermodynamics
Fields of practice

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; axial-flow turbines.

48662

Mechanical Applications

ME, BE (ME) BA
6cp; prerequisites: 48642 Strength of Engineering Materials, 48640 Machine Dynamics
Fields of practice

The objectives of this subject are that students be able 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 have developed 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; modelling and computer methods including Finite Element Analysis.

48663

Advanced Manufacturing

ME, BE (ME) BA
6cp; prerequisites: 48621 Manufacturing Engineering, 48650 Mechanical and Manufacturing Design
FIELDS OF PRACTICE

The objectives of this subject are to: understand the design and manufacturing processing of sheet metal products using a CAD/CAM system (flatpattern, nesting & 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 system to evaluate how well manufactured parts meet design criteria; demonstrate good technical writing skills by completion of specified laboratory reports; demonstrate advanced problem solving skills relating to manufacturing and production.

There are three CAD/CAM modules. Module 1: Sheet metal operations which include flatpattern, nesting and punchpress/laser. Module 2: CAD/CAM tool path generation for milling machine operations including point-to-point machining, planar milling, surface milling, and cavity milling. Machining parameters such 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

ME, BE (ME) BA
6cp; prerequisites: All of Stage 5
FIELDS OF PRACTICE

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: The identification of need is broadened to encompass engineering ethics, risk, health and safety, sustainability and the environmental impact of engineering design. 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; the wider context of design, including ethics in design and design for sustainability.

Topics include: design methodology; materials and processes in design; engineering ethics; safety in design; designing for sustainability.

48720

Introduction to Telecommunications Engineering

TE, BE (TE) BA
6cp
FIELDS OF PRACTICE

The objectives of this subject are: to introduce the basic concepts and terminology used in telecommunications engineering; to give basic, up-to-date, 'hands-on', technical skills to assist in finding employment in the field as part of their degree program; to familiarise students with the telecommunications degree program and the rationale behind its structure; and to meet staff involved in telecommunications engineering and become aware of current research activities in the field.

Topics include the following (ones marked with an asterisk (*) are covered in more depth). Telephony – the public switched telephone network; mobile telephone networks. Computer communications – modems; host computers* (PCs, and workstations); networks*; the Internet*; mobile communications. Broadcast systems – radio and television; satellite and cable TV. Integrated networks – ISDN & ATM.

48730

Authentication and System Security

TE, BE (TE) BA
6cp; prerequisites: 48720 Introduction to Telecommunications, 33230 Mathematical Modelling 2, 48220 Informatics, corequisites: 48430 Software Development
FIELDS OF PRACTICE

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; channel verification.

48740

Communication Networks

CSE,TE, BE (TE) BA
6cp; prerequisite: 48430 Software Development
FIELDS OF PRACTICE

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 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 narrowband and broadband switching technologies, network design concepts and performance measures associated with integrated services networks.

Topics include: data Communications; data transmission, transmission media, data encoding, line coding; data communication interface; data link control, multiplexing; Wide Area Networks; circuit switching, packet switching, frame relay, ATM; Local Area Networks; LAN systems, bridges; communications architecture and protocols; protocols and architecture, Internetworking , Internet Protocol, Transport protocols; network security, distributed applications, ISDN and Broadband ISDN.

48750

Network Planning and Management

TE, BE (TE) BA
6cp; prerequisites: 33230 Mathematical Modelling 2, 48740 Communication Networks
FIELDS OF PRACTICE

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 I 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 II: 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 III: Performance Analysis and Management of Networks – continuous time queuing theory; network of queues. Additional applications: performance analysis of medium access control protocols; computer communications networks; statistical multiplexing. Advanced applications: traffic management in ATM; teletraffic considerations in PCs; network Management principles. Part IV: Network Simulation and Modelling Validation – overview of discrete event system modelling; tutorial on SIGMA; selected topics including, 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; individual service utilisation.

48770

Signal Processing

EE,TE, BE (EE,TE) BA, BScBE
6cp; prerequisite: 48540 Signals and Systems
FIELDS OF PRACTICE

The objectives of this subject are to enable students to: develop insight into the discrete implementation of signal theory; develop engineering judgement in analysing signal processing problems; become familiar with practical techniques of 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; decimation and interpolation.

48771

Communication Theory

TE, BE (TE) BA
6cp; prerequisite: 48540 Signals and Systems
FIELDS OF PRACTICE

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 Communication Systems

TE, BE (TE) BA
6cp; prerequisites: 48540 Signals and Systems, 48720 Introduction to Telecommunications Engineering
FIELDS OF PRACTICE

The objectives of this subject are to: develop the basic conceptual foundations in the science of electrical communications and its implications and uses for telecommunication and wireless applications; appreciate the origin of the various tools and formulae applied to circuit analysis, electrical, electronic and telecommunications design as well as other branches of engineering and science in which three-dimensional remote actions are described by simplified models; understand the conceptual difference between lumped-element and distributed circuit behaviour; develop an appreciation of the role of electromagnetic wave propagation in explaining 'action at a distance' concepts involved in many real life telecommunication engineering applications; possess a conceptual basis for mathematical tools applied in the spatial modelling of electromagnetic waves; reinforce the comprehension of the inter-relationships between different fundamental quantities and concepts, and be able to apply the concepts to solve practical problems; acquire mastery over 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 overaching framework. In this module, spatial vector operators will need to be introduced and their physical meanings understood. 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 to 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 introduced as special cases of dynamic fields. Introduces polarization, wave propagation through multiple conducting and dielectric regions, reflection, refraction, Snell's laws, critical angle, brewster angle and diffraction, discuss TEM, TE and TM waves, introduce phase and group velocities and dispersion, discuss propagation characteristics of microwaves with reference to mobile communications. Application to guided waves – introduce the concepts of guided-wave propagation using field model , metallic and dielectric guiding structures, hybrid modes and optical fibers. The fundamental dispersion and attenuation limits applicable to an optical communication channel; a comparison with analogous but different mechanisms applying to copper signal lines, transmission lines, microwave and radio systems of communication. System budgeting in optical links, and some overview of future trends of application of the optical spectrum in telecommunications and computing and signal tranducing. Application to transmission lines (particular to communications applications) – introduce the transmission line as the major example of distributed network pertinent to electrical communication engineer, analyse the behaviour of the transmission line in the time-domain and frequency domain, inter-relate circuit and field concepts, discuss impedance, reflection, transmission and standing wave concepts, introduce impedance matching and Smith chart , discuss the use a transmission line sections for realising distributed reactive circuit elements, and resonators. Introduce transmission line as a communication channel. Laboratory experiments on microstripline and co-axial line passive devices. Application to antennas and radiation – introduce electromagnetic interference, discuss antenna as a transducer, discuss antenna characteristics, analyse monopole, dipole, slot and loop antennas, discuss design issues of printed antennas, introduce array antennas – binomial and chebyshev array synthesis and discuss the design of base station antennas. Derive link equation and discuss fixed and mobile communication link design fundamentals.

48820

Introduction to Environmental Engineering

CEE, BE (CEE) BA
6cp
FIELDS OF PRACTICE

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

CEE, BE (CEE) BA
6cp; prerequisites: 60101 Chemistry and Materials Science, 48820 Introduction to Environmental Engineering
FIELDS OF PRACTICE

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

At the completion of this subject, students 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 reuse 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 reuse technologies; cases studies on water reclamation projects, small community and large potable water treatment plants; laboratory laboratory sessions to determine flocculation, sedimentation, and filtration performance.

48850

Environmental Planning and Law

CEE, BE (CEE) BA
6cp; prerequisites: 48820 Introduction to Environmental Engineering, 48120 Review of Engineering Practice I
FIELDS OF PRACTICE

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 to land use planning; to develop skills to identify and deal with legal problems confronting engineers in industry; to develop capacity to communicate in both written and verbal form when dealing with legal matters relating to the environment and land use planning; 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.

Topics include: environmental Law – 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, operation of the Land and Environment Court of NSW.

Tutorial sessions will be scheduled twice a week where environmental law and planning issues are addressed in workshop forums embracing 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 audio-visual equipment usage skills, as well as developing inter-disciplinary teamwork skills.

48860

Pollution Control and Waste Management

CEE, BE (CEE) BA
6cp; prerequisites: 48120 Review of Engineering Practice 1, 48840 Water Supply and Wastewater Engineering or 48350 Environmental and Sanitation Engineering
FIELDS OF PRACTICE

The main objective of this subject is to provide an opportunity to understand the principles of pollution control and waste management in a modern society. The subject develops an understanding of air and noise pollution control technologies, 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. Control of generation of specific air pollutants from manufacturing industry and from automobile industry and an overview of indoor air pollution problem and its control. Environmental regulation and air quality standards; noise pollution sources, effect of noise on people, noise measurements, traffic noise predictions, noise control and related regulation.

50140

Modernisation and Social Change

BE BA DipEngPrac (all majors)
8cp; 4hpw; coordinated by the Institute for International studies and the Faculty of Humanities and Social Sciences

The importance of the comparative analysis of social change has been emphasised since the late 1980s with the end of the Cold War, as well as rapid social, economic and political change in Eastern Europe, East and South-East Asia. There have been various claims for the inevitable triumph of the homogenising influences of capitalism and democracy; renewed emphasis on cultural determinism; and questioning of the Eurocentricity of the social sciences. Through an examination of key elements of modernisation and social change this subject provides an introduction to social change in Western Europe, Latin America, East and South-East Asia, as well as the academic discussions about the processes of social change.

There are no prerequisites for this subject. It is intended primarily for students in the International Studies program, but can be taken by any student interested in the comparative analysis of social change.

60101

Chemistry and Materials Science

CE, CEE, ME, BE (CE, CEE, ME) BA
6cp
Whilst there are no prerequisites for this subject, it is expected that students preparing to undertake the subject will have passed NSW HSC 2 Unit Chemistry, the UTS Chemistry bridging course or equivalent
FIELDS OF PRACTICE

On completion of the subject students should: understand why engineers require a fundamental understanding of chemistry and materials; have a solid science foundation (theory) for further engineering studies (application); understand the fundamentals of chemistry and materials terminology and nomenclature in order to facilitate the working relationship of engineers, chemists and materials scientists; understand the role of chemistry in engineering processes and enterprises in general; be able to identify and solve chemical problems in engineering projects; relate properties of engineering materials to their structure and bonding; relate properties of engineering chemicals/materials important in the environment to structure/

bonding; relate properties of engineering chemicals/materials important in manufacturing to structure/bonding; be aware of economic, environmental and societal factors/impacts of chemistry and materials in engineering; be able to interpret and discuss results or advice obtained from a chemical/materials laboratory/chemist/materials scientist; appreciate the role of a chemist/materials scientist; have a disciplined, scientific approach to problem solving.

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, composites, materials degradation and materials selection; Industrial organic chemistry – hydrocarbons, functional groups, polymers, energy and fuels; Electrochemical processes – reduction-oxidation reactions, spontaneous reactions, electrochemical cells, electrolysis, electroplating, industrial processes, corrosion – theory, applications and protection. In covering these topics specific applications in engineering design, manufacturing, maintenance and operations will be emphasised.

68036

Physical Modelling (2 semester mode)

CE, CEE, CSE, EE, ME, TE, BE BA
6cp; prerequisites: NSW HSC 2 Unit Mathematics is assumed, and HSC 2 Unit Physics is recommended; corequisites: 33132 Mathematical Modelling 1 (2 semester mode)
Core

The objectives of this subject are to provide students with: a conceptual basis in mechanics, thermal physics, waves and optics, electric and magnetic fields; problem solving skills through practice in selected problems; an appreciation of the role of modelling, and hence mathematics, in understanding and describing the natural world; the basic techniques of physical measurement, data analysis and verification of models; technical communication skills; an understanding of nature through its natural components with an emphasis on vector methods and modes (including frames of reference, coordinate systems and orthogonality); an appreciation of the nature of physics as a professional discipline of great importance to engineering innovation; an ability to use physical concepts in a mathematical formulation and hence be able to apply those concepts to engineering problems.

Lectures

Mechanics (including fluids) (11 lectures): Introduction (SI system, dimensions etc.), vectors, motion (linear and rotational), Newton's laws, circular motion, friction, energy, momentum, elasticity and fluids at rest and in motion; Heat and Thermodynamics (8 lectures): kinetic theory, temperature, heat capacity, heat transfer, ideal gas, 1st law and Carnot cycle; Waves (4 lectures): Introduction to waves, waves, superposition of waves, light and EM spectrum; Optics (4 lectures): Mirrors, lenses, optical instruments, optical and wave behaviour; Electric and Magnetic Fields (7 lectures): Electrostatics, magnetism and magnetic materials, magnetic fields & optical and wave behaviour, electromagnetism and electromagnetic applications; Special Topics (3 lectures).

Laboratory program

Basis of Experimentation (3 sessions) basic measurements; data, uncertainties, graphs; and modelling data; Oscillations & Vibrations (2 sessions) introduction to oscillations; and damped & forced oscillations.

Thermal Physics (2 sessions); Optics (2 sessions); Fields (3 sessions).

Notes

– Topics covered in the mechanics, and heat and thermodynamics lectures, and the associated laboratory sessions, form a conceptual basis for much of the subject mathematical modelling

– The names in the lecture schedule are topic names. different topics will be taught at different levels. Problem solving will only occur in select areas, other areas will be qualitative.

– The pivotal role of modelling complex physical systems using vectors, suitable coordinate frames and other decomposition techniques, such as normal modes, will be demonstrated wherever suitable. The reverse process of combining components to show observed behaviour will also feature. This will be followed up in Mathematical Modelling 2 and various Engineering subjects.

– The Special Topics lectures will cover a wide range of material and will be assessed in the final examination. The topics will include issues such as historical perspectives, current social issues related to Science, and the latest physics research.

68037

Physical Modelling

CE, CEE, CSE, EE, ME,TE, BE BA
6cp; prerequisites: NSW HSC 2 Unit Mathematics is assumed, and HSC 2 Unit Physics is recommended; corequisite: 33130 Mathematical Modelling 1
CORE

Refer to 69036 Physical Modelling (2 semester mode) for subject description.

68038

Advanced Mathematics and Physics

EE, BE (EE) BA
6cp; prerequisites: 68036 Physics Modelling, 33130 Mathematical Modelling 1, 33230 Mathematical Modelling 2, 48510 Introduction to Electrical Engineering, 48520 Electronics
CORE

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; Cuachy's integral theorem and integral formula; Taylor and Laurent series; singular points and their use in contour integration; inverse Laplace transforms. Advanced Physics – photons and electrons as quantum entities, basic quantum concepts, simple solutions of the Schroedinger equation; energy levels in atoms, molecules and semiconductors, absorption and emission transitions and electron momentum, the p-n junction. Selection of two from: laser, optical absorption and emission, optical sensors, or magnetisation and dielectric polarisation fundamentals, or forroelectrics, piezoelectrics, dielectric breakdown, or basis of some everyday transducers (e.g. temperature, pressure, force, velocity).

79370

Law and Contracts

BT
3cp; prerequisites: 48074 Engineering Communication and Documentation
subject coordinator: Mr M Adams (Faculty of Law)

The objectives of this subject are to familiarise students 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 students for the procedures and processes of operating and negotiating contractual matters as a client, consultant or contractor.

Topics 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.

Assessment: 2 assignments of 25 per cent; class participation 10 per cent; examinations 40 per cent.

91150

Biology and Ecology

CEE, BE (CEE) BA
6cp
FIELDS OF PRACTICE

The principal objective of this subject is to provide a sound background in biology and ecology relevant to students majoring in Environmental Engineering and related fields. It will also provide the foundation for later subjects, such as Introduction to Environmental Engineering and Water Supply and Wastewater Engineering.

Students will have a good understanding of key concepts, including: structure and function of cells, cell division and the role of genetic material in cell function; biodiversity – the classification and 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 principles of population and community ecology; the structure and function of aquatic

and terrestrial ecosystems; and the effects of and management of human impacts on natural ecosystems.

Topics include: Introduction: What is biology? What is ecology? Contribution to biology and ecology from other disciplines. Role of engineers and physical scientists in environmental management and pollution control. Living things contrasted with non-living things. Viruses. Origins of life.

Cellular basis of life: Cells as the basic unit of life and their functions. Use of light and electron microscopy as tools for studying cells. Prokaryotic and eukaryotic cells and their ultrastructure. Organelles in eukaryotic cells, their structure and function.

Role of genetic material in cell function: Role of genetic material in cell function and heredity. Structure of DNA and RNA. Process of enzyme synthesis in cells. Enzymes as catalysts in biochemical reactions. One gene one enzyme theory. Causes and consequences of mutation.

Cell Divisions: Biological significance of cell divisions. Cell division in prokaryotes. Cell division in eukaryotes – mitosis. Sexual reproduction in eukaryotes – meiosos and its function in the life cycle of eukaryotes. Significance of sexual and asexual means of reproduction in life history and the long term survival of populations and species. Causes and effects of errors in the mitotic and meiotic processes.

Biodiversity: The ecological significance of biodiversity. The need to classify. Concept of species, bionomial nomenclature. Hierarchy in classification. The distinguishing characteristics, classification, and the medical and economic importance of organisms in the plant and animal kingdoms.

Environmental microbiology: The nature of microorganisms and their contribution to biological relationships and processes in aquatic and terrestrial ecosystems. Stable and unstable microbial communities. The impact of environmental microbiology on economic activities – waste disposal practices, metal corrosion and others.

Plant physiology and the effects of environmental pollution and disturbance: Photosynthesis; soil and water relationships and evapotranspiration; mineral nutrition; reproduction; regulation of plant development; plant hormones. Effects of air and water pollution or salinisation. Soil erosion.

Animal physiology and the effects of environmental pollution: Structures of the organ systems and their functions – respiratory, circulatory, digestive, reproductive, nervous, hormonal, immune, muscular and skeletal systems in the human. Effects of environmental pollution and personal life style on the occurrence of disease.

Ecology: General principles of ecology: its scope, the definition of autecology, synecology, populations, community, ecosystems, biome and biosphere. Structural components of ecosystems – producers, consumers and decomposers. Biotic and abiotic factors, climatic regions. Energy flow in ecosystems: trophic levels, food webs, pyramids of biomass, energy and numbers. Contrast of one-way energy throughput with biogeochemical cycles. Succession to stability. The climax concept, community development, habitat, niche, and spatial diversity. Classification of terrestrial biomes. Detailed examination of the structure, function and vulnerability of a terrestrial ecosystem and an aquatic ecosystem. Human impacts on natural ecosystems – air and water pollution, soil erosion and toxic contamination. Management and control of impacts.

POSTGRADUATE SUBJECTS

Subjects offered to students enrolled in the Graduate School of Engineering are listed in numerical order below. Subjects taught in the Faculty of Engineering are listed first, then those taught in other faculties.

Subjects are listed in alphabetical order in the next section.

Most subjects can be taken as electives, provided prerequisite requirements are satisfied. However, the availability of subjects which are core to specialist (specific award) courses may be affected by policies on class size.

All postgraduate subjects are open to a limited number of senior undergraduates. This ensures the viability of some specialist subjects with limited postgraduate demand. Whenever possible, if subjects are popular with both groups, separate classes will be held for undergraduates. Not all subjects will be offered this year.

Specialist (specific award) courses are identified as follows:

Master of Engineering Management	MEM
Master of Engineering in Groundwater Management	ME(GWM)
Master of Environmental Engineering Management	MEEM
Graduate Diploma in Engineering in Groundwater Management	GDE(GWM)
Graduate Diploma in Local Government Engineering	GD(LGE)
Graduate Certificate in Environmental Engineering and Management	GC(EEM)
Graduate Certificate in Engineering Management	GC(EM)

Research Degrees

Students undertaking PhD or ME by Thesis must enrol in the appropriate subject number as listed below:

41777 ME Thesis (Electrical – F/T)
41778 ME Thesis (Electrical – P/T)
41987 PHD Thesis (Electrical – P/T)
41988 PHD Thesis (Electrical – F/T)
42777 ME Thesis (Mechanical – F/T)
42778 ME Thesis (Mechanical – P/T)
42987 PHD Thesis (Mechanical – P/T)
42988 PHD Thesis (Mechanical – F/T)
43777 ME Thesis (Civil – F/T)
43778 ME Thesis (Civil – P/T)
43987 PHD Thesis (Civil – P/T)
43988 PHD Thesis (Civil – F/T)
44777 ME Thesis (Groundwater MGT – F/T)
44778 ME Thesis (Groundwater MGT – P/T)
44987 PHD Thesis (Groundwater MGT – P/T)
44988 PHD Thesis (Groundwater MGT – F/T)
49777 ME Thesis (Eng – F/T)
49778 ME Thesis (Eng – P/T)
49987 PHD thesis (Eng – P/T)
49988 PHD thesis (Eng – F/T)

Coursework awards – general and specialist

Credit point values (cp) and contact hours per week (hpw) are indicated against each subject.

Coordinator and assessment details may vary from semester to semester.

49001

Judgment and Decision Making

Availability: all courses (core for MEM)
6cp; 3hpw/distance mode
subject coordinator: A/Prof J V Parkin

This subject develop students' 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: three assignments 20 per cent each; one quiz 40 per cent.

49002

Project Management

Availability: all courses (core for MEM)
6cp; 3hpw/distance mode
subject coordinator: Mr D M Eager

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

Availability: all courses (core for MEM)
6cp; 3hpw/distance mode
subject coordinator: Dr 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

Availability: all courses (core for MEM)
6cp; 3hpw; prerequisite: Judgment and Decision Making or equivalent; corequisite: 49002 Project Management
subject coordinator: Prof 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 assignments (relating to case studies) 30 per cent; individual project (including seminar) 50 per cent.

49005

Technological Change

Availability: all courses
6cp; 3hpw
subject coordinator: Dr R B Ward

In this subject the results of introduction of technological innovations into society are examined, using both historical and contemporary examples. The potential effects of emerging technologies are considered with the possibilities of facilitating planned and desirable technological developments. The subject is also seen as a key element in the development of communication skills at a professional level, orally in small and large groups and in written work.

Assessment: four essays 20 per cent each; student seminar 20 per cent.

49006

Risk Management in Engineering

Availability: all courses
6cp; 3hpw; prerequisite: 49145 Engineering Statistics, or equivalent
subject coordinator: Mr J L 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 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.

49009

Engineering in Australian Society

Availability: all courses
6cp; 3hpw
subject coordinator: A/Prof S F Johnston

This subject deals with the nature of the engineering profession and its various interactions with society in Australia. Attention is given to the historical development of engineering practice in Australia, current trends, and issues for the future. The philosophical basis of the profession and its relationship with the environment, industry and the community are explored. Engineering policy development processes and their recent outcomes are discussed.

Assessment: introductory exploration 10 per cent, participation in workshops and group discussions 10 per cent, major assignment 40 per cent, minor assignment 20 per cent, seminar or debate 20 per cent.

49010

Engineering Ethics

Availability: all courses
6cp; 3hpw
subject coordinator: A/Prof S F Johnston

This subject deals with professionalism, the roles of codes of ethics, and the responsibilities of professional engineers. It systematically introduces students to the concepts of honesty, truthfulness and reliability; to ways of thinking about moral issues; and to methods of solving moral problems. It also deals with risk, safety and liability in engineering, and the promotion and enforcement of ethical standards.

Assessment: introductory exploration 5 per cent participation in workshops and group discussions 20 per cent major assignment 40 per cent minor assignment 15 per cent seminar or debate 20 per cent.

49011

International Engineering

Availability: all courses
6cp; 3hpw
subject coordinator: A/Prof S F Johnston

The subject deals with the international nature of engineering and the ways in which it is changing. Attention is given to both current trends and issues for the future. Processes of accreditation of professional engineers are reviewed, with a view to expanding on the details of Australian practice and locating it in its global context. New models of organisation of engineering activity are reviewed, including 'virtual enterprises'. Practical workshops are included to explore some of the problems associated with working across cultures.

Assessment: introductory exploration 5 per cent; participation in workshops and group discussions 20 per cent; minor assignment 15 per cent; seminar or debate 20 per cent; major assignment 40 per cent.

49012

Project Management Support Systems

Availability: all courses
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
subject coordinator: Mr P Mallon

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; stimulating 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

Availability: all courses
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
subject coordinator: Mr P Mallon

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, decision 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.

49021

Evaluation of Infrastructure

Availability: limited (core in Energy Planning and Policy programs for ME, Mtech)
6cp; 3 modules, each 2 days; prerequisite: introductory course in probability and statistics, or equivalent
subject coordinator: Dr 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

Availability: limited (core in Energy Planning and Policy programs for ME, MTech)
6cp; block attendance
subject coordinator: Dr D Sharma

Energy resources and reserves; concepts and principles of resource assessment; regional, national and international resource requirements and availability; resource technology evaluation; economic and environmental impacts of resource use.

Assessment: assignments 40 per cent; quizzes 60 per cent.

49023

Energy and Environmental Economics

Availability: limited (core in Energy Planning and Policy programs for ME, Mtech)
6cp; 3 modules, each 2 days; prerequisite: introductory course in microeconomics, or equivalent; corequisite: 49021 Evaluation of Infrastructure
subject coordinator: Dr 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

Availability: limited (core in Energy Planning and Policy programs for ME, Mtech)
6cp; 3 modules, each 2 days; prerequisites: 49023 Energy and Environmental Economics, 49021 Evaluation of Energy Investments (recommended)
subject coordinator: Dr D Sharma

Models and modelling; macroeconomic settings of energy-economy modelling; energy balances; energy input-output analysis; energy aggregation; 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 Aanalysis

Availability: limited
3cp; 3hpw
subject coordinator: Dr D Sharma

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; exams 40 per cent.

49026

Electricity Sector Planning

Availability: limited (see prerequisites)
6cp; 3 modules, each 2 days; prerequisites: 49021 Evaluation of Energy Investments, 49023 Energy and Environmental Economics (recommended)
subject coordinator: Dr D Sharma

Topics include: nature of electricity planning; planning perspective; economic and technological dimensions of power system operation, reliability and integrity; generation planning and production costing; demand-side management planning; integrated resource planning; selected topics on issues relating to the environment, institutional structures, renewable resources, regulation, etc. Emphasis is placed on all aspects of electricity sector planning 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

Availability: limited (see prerequisites)
6cp; block attendance; prerequisites: 49023 Energy and Environmental Economics, 49024 Energy Modelling, or equivalents
subject coordinator: Dr D Sharma

Theoretical and analytical concepts and tools for the understanding of energy demand generation and evolution in relation to socio-economic development; methods and models of energy demand projections; considerations about 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

Availability: limited (see prerequisite)
6cp; block attendance; prerequisite: 49021 Evaluation of Energy Investments, or equivalent
subject coordinator: Dr D Sharma

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

Environment Policy for Energy Systems

Availability: limited (see prerequisites)
6cp; block attendance;
prerequisite: 49021 Evaluation of Energy Investments; corequisites: 49023 Energy and Environmental Economics; 49024 Energy Modelling (recommended)
subject coordinator: Dr D Sharma

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; institutional and regulatory issues.

Assessment: assignments 40 per cent; quizzes 60 per cent.

49031

Information Structures, Perception and User Interface Design

Availability: all courses
6cp; 3hpw or block attendance
subject coordinator: Dr D B Lowe

This subject will look at how authors create information and how users access it. It will introduce methodologies to structure the information to facilitate creation and access. Existing information classification and indexing schemes will be studied and extended to meet demands imposed by hypermedia systems. User interface design issues based on how we perceive and access information, and how different media can be used to effectively communicate a message, will also be studied in this subject.

Assessment: assignments and project 100 per cent.

49032

Sustainable Technological Development

Availability: all courses
6cp; 3hpw or block release
subject coordinator A/Prof 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 within 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.

49033

Combined and Cogeneration Power Plants

Availability: all courses
6cp; 3hpw or block release; prerequisites: 46421 Thermodynamics, 46431 Heat Transfer, 46444 Power Cycles, or equivalents
subject coordinator: Dr G Hong

This subject introduces students to concepts and principles of combined and cogeneration power cycles and recent applications to increase thermal efficiency and improve economic and environmental benefits. Students develop an understanding of thermodynamic theory and practice involved, and ability in designing and evaluating advanced power cycles.

Assessment: two quizzes 25 per cent each; project one 20 per cent; project two 30 per cent.

49040

Graduate Seminar

Availability: all coursework award courses
3cp; 3 hour sessions at intervals over two or more semesters
coordinators: Prof W R Belcher, A/Prof B Samali

This subject enhances professional communication skills, in written and oral English, through the preparation, presentation and defence of a topic being studied at advanced level in two or more public seminars. It also develops understanding of professional expectations and communication possibilities through attendance at other nominated seminars. It provides opportunities to present research or project work to an audience of peers, academic staff and professional practitioners, making use of modern technologies for presentation and audience participation within and beyond UTS. (Seminars are normally presented in rooms permitting full audio/video interaction.) Guidance in preparation is offered, and structured feedback from advisers and audience, on content and presentation.

Assessment is criterion referenced and ungraded, and requires the submission of written materials, seminars relating to the candidate's concurrent research, or project work.

49041

Engineering Research Methodology

Availability: All coursework
6cp; 3hpw; prerequisites: enrolment in a UTS research or coursework program at master's or doctoral level
subject coordinators: Prof W R Belcher and A/Prof B Samali

This subject familiarises students with a range of approaches used in engineering research, with an emphasis on approaches used in professional practice. Topics include the advantages and limitations of different research approaches and their applicability in different engineering contexts, the recognition and protection of intellectual property, and the boundaries and interdependencies between research, development, design and innovation. Research ethics in engineering are also reviewed.

Students learn how to design research programs and to analyse and interpret data and reports. Participants solve problems creatively, access and utilise information resources, and critically evaluate research work.

Assessment is criterion referenced and ungraded, and based on assignments requiring preparation of a research critique, a research plan, a discussion group assignment and a seminar presentation.

49044

Engineering Communication and Documentation

Availability: all courses
6cp; 3hpw or blocks
subject coordinator: Mrs H T McGregor

High level communication skills are essential for professional engineers. This subject explores communication theories which support effective practice. It investigates the role of information as an engineering resource. The increasing importance of engineering documentation is analysed and strategies for producing and managing documentation are developed.

Assessment: continuous assessment of a variety of assignments.

First assignment 10 per cent; research project and class presentation 50 per cent (oral presentation 25 per cent, written presentation 25 per cent); team project (40 per cent).

49045

Engineering for Lawyers

Availability: Graduate Certificate in Law for Court Referees only
6cp; 3hpw; prerequisites: postgraduate enrolment in a Faculty of Law research or coursework program
subject coordinator: Prof W R Belcher

Many disputes require that referees have an overview of issues and concepts which relate to engineering. This subject will enable referees to develop an understanding of engineering practice.

Assessment: participation 10 per cent; preliminary assignment 30 per cent; final assignment 60 per cent.

49047

Finite Element Applications in Structural Mechanics

Availability: all courses
6cp; 3hpw or block release; prerequisites: 46240 Solid Mechanics 3 or 47151 Structural Analysis 2 (or equivalent)
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 geometrical and material non-linearity; and dynamic analysis and stability. Each is 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.

49052–76

Graduate Project

Availability: ME, MTech only
18–24cp, individual supervision over 1, 2 or 3 semesters; prerequisites: completion of all other subject requirements of the course in which the student is enrolled, apart from those taken as corequisites. Corequisites: any outstanding subject requirements for the course in which the student is enrolled; 49040 Graduate Seminar may be one of them
subject coordinators: Associate Professor J V Parkin (first semester); Dr H W Chung (second semester)

The project is a capstone 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 Head of the Graduate School of Engineering. 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 usually based on the preparation of a written report and a seminar presentation.

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

Availability: all courses
2, 3, 4 or 6cp; normally block release; prerequisites: appropriate to the agreed learning contract
subject coordinator: A/Prof J V Parkin

These subjects offer 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 Head of the Graduate School, on the coursework recommendation of the relevant Coursework Director, for a program of study to be undertaken and assessed within a prescribed period. 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

Groundwater Projects

44152

Groundwater Engineering Project (FT)

44156

Groundwater Engineering Project (PT)

Availability: ME(GWM) only 24cp

44153

Groundwater Engineering Project (FT)

44157

Groundwater Engineering Project (PT)

Availability: GDE(GWM) only 12cp
subject coordinator: Prof M J Knight, National Centre for Groundwater Management.

49102

Traffic and Transportation

Availability: all courses
6cp; block release
subject coordinator: Mr P J Kenny

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. The influence of environmental and political aspects will be analysed as well as technical aspects.

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

49103

Management and Industrial Relations

Availability: all courses (core for GD(LGE))
6cp; block release
subject coordinator: Mr K J Halstead

The objective of this subject is to examine the concept of management: its principles, functions, structures, processes, systems and their application; and how management systems can be operated in a cohesive fashion to achieve effectiveness, efficiency and economy in 'real world' situations.

Its subjects include Management Concepts, Principles and Systems, Management Process, Organisational Behaviour, Functional Management, Managing Effectiveness.

Assessment: major assignment 50 per cent of class mark; examination 40 per cent; class work 10 per cent.

49104

Asset Maintenance Management

Availability: all courses (core for GD(LGE))
6cp; block release
subject coordinator: Mr K J Halstead

This subject aims to enhance the skills and capacity of the local government engineer to: develop an awareness of the real cost of owning, operating and maintaining assets and services; gain an understanding of the planning, design, maintenance, and monitoring concepts and methods, with a view to optimising life cycle cost/benefits; develop knowledge of the methods for assessing and controlling potential losses and risks; and understand how these aims interact with and support the requirements of the management, logistics, reporting and accounting guidelines.

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

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

49105

Water Supply and Wastewater Management

Availability: all courses (core for GD(LGE))
6cp; block release
subject coordinator: Prof 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 processes, performance monitoring, sewerage and water reticulation systems, trouble-shooting and problem solving.

Assessment: two assignments 30 per cent, mid-semester exam 25 per cent, formal final exam 45 per cent.

49106

Road Engineering Practice

Availability: all courses (core for GD(LGE))
6cp; block release
subject coordinator: Mr P J Kenny

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

Availability: all courses
6cp; block release
subject coordinator: A/Prof G G O'Loughlin

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 exam 50 per cent.

49108

Local Government Law

Availability: all courses (core for GD(LGE))
6cp; block release
subject coordinator: Mr K J 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; the 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

Availability: all courses
6cp; 3hpw; prerequisite: sound knowledge of Mathematics and Fluid Mechanics as part of a first or higher degree in Engineering or a cognate discipline
subject coordinator: A/Prof G G O'Loughlin

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; physical and computer models.

Assessment: assignments/reports 60 per cent; examinations 40 per cent.

49112

Urban Stormwater Flood Management

Availability: all courses
6cp; block release typically 3 sessions of 1.5 days each; prerequisite: 47155 Hydrology or equivalent
subject coordinator: A/Prof G G O'Loughlin

The subject provides a strong grounding in the design and analysis of urban stormwater drainage systems for protection against flooding and safe removal of water likely to cause inconvenience. Students consider flood protection systems in terms of social, economic and environmental requirements, and the rationale for their design and operation. They are required to understand the integration between flood protection and the pollution prevention measures covered in a companion subject 49113 Urban Stormwater Pollution Management. By performing exercises (mostly using software packages) students become familiar with standard design procedures and aware of problems encountered in practice.

Assessment: continuous assessment involving eight assignments.

49113

Urban Stormwater Pollution Management

Availability: all courses
6cp; 3 blocks of 1 day sessions with optional tutorials; prerequisites: 47155 Hydrology, 47152 Public Health Engineering, or equivalent
subject coordinator: A/Prof G G O'Loughlin

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. They are also to understand the integration between pollution prevention and the flood protection measures covered in the companion subject 49112 Urban Stormwater Flood Management. 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

Availability: all courses
6cp; block release totalling 30 hrs; prerequisites: 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
subject coordinator: Mr J L 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 each 20 per cent and end-of-semester examination 40 per cent.

49121

Environmental Assessment and Planning

Availability: all courses (core for GC(EEM))
6cp; 3hpw
subject coordinator: Mr K J 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: two essays 20 per cent; class exercises 30 per cent; formal examination 50 per cent.

49122

Ecology and Sustainability

Availability: all courses (core for GC(EEM))
6cp; 3hpw
subject coordinator: Prof S Vigneswaran

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 ecosystem (forest and agriculture land), aquatic ecosystem (lake, river and ocean), bio-diversity; 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; case studies.

Assessment: assignments 30 per cent; examinations 70 per cent.

49123

Waste and Pollution Management

Availability: all courses (core for GC(EEM))
6cp; 3hpw
subject coordinator: Prof 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 minimisation and pollution control; reviews of advanced technology and management practices adopted in domestic waste pollution control; economic considerations; case studies: pulp and paper industry, metal plating industry, food and dairy industry, household waste, waste recycling in buildings.

Assessment: assignments and class presentations 50 per cent; examinations 50 per cent.

49124

Water Quality Management

Availability: all courses (core for GC(EEM))
6cp; 3hpw
subject coordinator: A/Prof G G O'Loughlin

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

Availability: all courses
6cp; 3 blocks, each of 2 days
subject coordinator: Mr J L 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; exam 40 per cent.

49126

Environmental Management of Land

Availability: all courses
6cp 3hpw or block release
Prerequisite: 47142 Environmental Engineering, or equivalent
subject coordinator: Dr P A 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.

49131

Medium Span Bridges

Availability: all courses
6cp; 3hpw; prerequisite: strong background in the design of civil engineering structures
subject coordinator: Prof S L Bakoss

This subject develops competence in the area of bridge design and analysis. It includes 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: three major design assignments 35 per cent; investigation, report and/or design of a modern bridge structure 30 per cent; 2 quizzes 35 per cent.

49132

Stability of Structures

Availability: all courses
6cp; 3hpw
subject coordinator: Dr A Saleh

The behaviour of slender members subjected to compression and/or flexure is examined in this subject. Factors which contribute to the onset of buckling in single members and slender frames are analysed to develop an understanding of structural loads and their effects. 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

Availability: all courses
6cp; 3 blocks of 1.5 days each; prerequisite: 47171 Steel Structures and Concept Design
subject coordinator: Dr S Parsanejad

This subject provides an understanding of web buckling and post-buckling behaviour 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 30 per cent; plastic design projects 20 per cent; two quizzes each 25 per cent.

49134

Structural Dynamics

Availability: all courses
6cp; 3hpw or block release; prerequisites: 47133 Numerical Methods, 47151 Structural Analysis 2, or equivalents.
subject coordinator: A/Prof 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, produced by wind, earthquake, rotating machinery, trains, human beings and other sources; 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 40 per cent, three quizzes 60 per cent.

49135

Wind Engineering

Availability: all courses
6cp; 3hpw or block release; prerequisites: 47133 Numerical Methods, 47277 Loading on Building Structures, or equivalents.
subject coordinator: A/Prof 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, stability 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

Application of Timber in Engineered Structures

Availability: all courses
6cp; 3hpw; prerequisites: 47127 Mechanics of Solids, 47141 Structural Analysis, or equivalents.
subject coordinator: Prof S L Bakoss

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 large span industrial structures (including connection design), multi-storey buildings and bridges and the use of the limit states version of AS1720 will be addressed.

Assessment: assignments 30 per cent; quizzes 30 per cent; seminar 10 per cent; major project 30 per cent.

49141

Advanced Geomechanics

Availability: all courses
6cp; 3hpw
subject coordinator: Dr G J 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.

49142

Advanced Ground Modification

Availability: all courses
6cp; 3 blocks of 1.5 days each; prerequisite: 47156 Soil Engineering, or equivalent
subject coordinator: A/Prof M R Hausmann

The subject provides practical guidelines and methods of analysis for improving the engineering properties of soils and rocks – for example, by increasing strength, reducing compressibility, controlling permeability and volume change, or reducing liquefaction potential and variability. The main topics covered are compaction, dewatering, admixtures, grouting, anchorage and soil reinforcement. In addition, the theoretical principles and preloading, electro-osmosis and soil heating and freezing are introduced.

Assessment: classwork, assignments and quizzes 50 per cent; project requiring laboratory testing programs or literature review 50 per cent.

49151

Advanced Concrete Technology

Availability: all courses
6cp; 3 blocks of 1.5 days each; prerequisite: 47154 Concrete Technology, or equivalent
subject coordinator: Dr R Sri Ravindrarajah

This subject develops advanced engineering knowledge and capabilities pertaining to the specification, production, testing and application of concrete as a construction material. It also provides opportunity to gain research experience through a mini-project focusing on recent advances in concrete construction technology and practice.

Topics include: supplementary cementing materials; rheology of concrete; design of normal and special concrete mixes; concrete production and quality control; control and in-situ testing of concrete; cracking and failure of concrete; high-performance concrete; fibre-reinforced concrete; polymer concrete, and lightweight concrete.

Assessment: assignments 30 per cent; quizzes 30 per cent; major report 40 per cent.

49152

Damage and Repair of Concrete Structures

Availability: all courses
6cp; 3 blocks of 1.5 days each; prerequisite: 47154 Concrete Technology, or equivalent
subject coordinators: Dr R Sri Ravindrarajah and Dr H W Chung

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 30 per cent; quizzes 30 per cent; seminar 10 per cent; major report 30 per cent.

49201

Integrated Services Networks

Availability: all courses (core for ME(TE))
6cp; 3hpw; prerequisite: 45661 Communications Networks, or equivalent
subject coordinator: Dr M P Eckert

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

Availability: all courses (core for ME(TE))
6cp; 3hpw; prerequisites: 45661 Computer Networks or equivalent
subject coordinator: DR M P Eckert

To 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

Availability: all courses (core for ME(TE))
6cp; 3hpw; prerequisite: 45152 Signal Theory 2 or equivalent
subject coordinator: Dr M P Eckert

Extraction of information contained in samples of an analogue signal. Analysis of discrete systems. DSP Hardware. FIR and IIR filter design. Advanced topics in filter design. Detection, estimation, Wiener filtering. Spectral estimation. Speech coding algorithms. Image coding. Adaptive signal processing. Communications signal processing. Case study: DSP modem. The implementation of a complete DSP modem will be reviewed (V.29). DSP implementation of fast transforms.

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

49204

Advanced Teletraffic Engineering

Availability: all courses (core for ME(TE))
6cp; 3hpw; prerequisites: 45145 Engineering Statistics, 45176 Systems Engineering, or equivalents; corequisite: 49201 Integrated Services Networks
subject coordinator: Dr J Daba

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

Availability: all courses (core for ME(TE))
6cp; 3hpw; prerequisites: 49203 Telecommunications Signal Processing, or equivalent
subject coordinator: A/Prof S Reisenfeld

The subject covers major aspects of digital transmission systems at an advanced level; including modulation, coding, synchronisation, and multiple access. Case studies of optical and satellite links demonstrate how the effects of performance degradations are incorporated into the link budget. The subject involves lectures supported by assignments and project work using laboratory facilities.

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

49206

Advanced Studies in Electromagentic Compatibility

Availability: all courses
6cp; 3hpw; prerequisite: 45264 Fields and Waves, or equivalent
subject coordinator: Dr A M Sanagavarapu

Compliance with Electromagnetic Compatibility regulation is becoming mandatory for engineering products. This course provides an understanding of the underlying concepts for the analysis, modelling and design for achieving electromagnetic compatibility.

Assessment: continuous assessment of a variety of assignments negotiated by the student with the coordinator.

49207

Wave Propagation for Microwave and Mobile Communications

Availability: all courses
6cp; 3hpw' prerequisite: 45264 Fields and Waves, or equivalent
subject coordinator: Dr A M Sanagavarapu

Information transmission using radio propagation is becoming increasingly significant with the introduction of mobile communication services. This course explores the fundamental issues of microwave propagation in typical communication environments and introduces channel modelling and design methodologies.

Assessment: continuous assessment of a variety of assignments negotiated by the student with the coordinator.

49208

Telecommunications Management

Availability: all courses
6cp; 3hpw or full day block modes; prerequisite: 45145 Engineering Statistics, or equivalent
subject coordinator: A/Prof S Reisenfeld

The subject provides an integrated technology management perspective on communications infrastructure and services and the changing telecommunications and information technology environment. It focuses on techniques and tools for strategic telecommunications planning, and covers the evaluation of systems and selection procedures. Software packages are used for network modelling, dimensioning and performance evaluation.

On completion, students are able to assess corporate telecommunications requirements, to collect statistical data required for corporate telecommunications planning, to prepare a strategic telecommunications plan capitalising on technology and market trends, and to evaluate the performance and cost of the planned system.

Assessment: Assignments 60 per cent; mid-semester quiz 10 per cent; final exam 30 per cent.

49211

Software Engineering Principles

Availability: all courses (core for SEP Graduate Certificate)
6cp; 3hpw; prerequisite: Some programming experience, ideally in industry
subject coordinator: Mr J R M Leaney

This subject introduces 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 realtime project (a device driver written in C). The subject assumes significant programming experience in a first degree.

Assessment: classwork, assignments, essay, exams 50 per cent; major project (industry involvement where possible) 50 per cent.

49212

Object-oriented Languages

Availability: all courses (core for SEP Graduate Certificate)
6cp; 3hpw; prerequisites: 49211 Software Engineering Principles, or equivalent
subject coordinator: Mr J R M Leaney

A subject to introduce object-oriented principles in design, and to gain competence in programming techniques using object-oriented languages. The subject 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

Availability: all courses
6cp; 3hpw; prerequisites: 49211 Software Engineering Principles, 49212 Object-Oriented Languages and 49214 Unix and C
subject coordinator: Mr J R M 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 principally 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

Availability: all courses (core for SEP Graduate Certificate)
6cp; 3hpw or block release; prerequisites: 45123 Software Development I or equivalent
subject coordinator: Dr C A Scott

A subject to develop understanding and competence in the use of Unix for a software engineer, as well as sharpening C skills. Includes Unix shell, utilities, programming, the development of appropriate data structures, data visibility and especially good programming practices. The subject assumes significant undergraduate experience in Unix and C.

Assessment: individual assignment 20 per cent; group assignment 20 per cent; examination 60 per cent.

49217

Software Verification and Validation

Availability: all courses (core for SEP Graduate Certificate)
6cp; 3hpw/block release; prerequisites: 49211 Software Engineering Principles, or equivalent
subject coordinator: Mr J R M Leaney

This subject develops an understanding of verification and validation in the context of differing international processes and lifecycles, 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 lifecycle, involving the client wherever possible. Particular techniques include requirements validation; walkthroughs and inspections (throughout the lifecycle); 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 exams 50 per cent; major project (industry involvement where possible) 50 per cent.

49225

Software Project Management

Availability: all courses (core for SEP Graduate Certificate)
6cp; 3hpw/block release or part-time; prerequisite: 49211 Software Engineering Principles, or equivalent
subject coordinator: Mr J R M 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. It covers such concepts as team constitution, business aspects, technical organisations charts and cost estimates, scheduling and monitoring, and maintenance. The subject 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).

49233

Software Requirements Specification

Availability: all courses
(core for SEP Master's degree)
9cp; block release
subject coordinator: Mr J R M Leaney

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

Secondly, it develops 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

Availability: Software Engineering Program only
9cp; block release
subject coordinator: Mr J R M Leaney

This subject establishes competency in the design and implementation of realtime object based systems. It 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 realtime 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 4x15 per cent.

49235

Real-time Operating Systems

Availability: Software Engineering Program only
6cp; block release
subject coordinator: Mr J R M Leaney

This subject establishes understanding of the issues in realtime operating systems and competency in the use of them in a project. It covers realtime kernels and realtime Unix systems, using POSIX to illustrate various concepts. Concepts include management of signals, communication, shared memory and flags.

Assessment: C++ development learning contract 25 per cent; realtime Ada learning contract 25 per cent; realtime Unix learning contract 25 per cent; application learning contract 25 per cent.

49236

Software Development Project

Availability: Software Engineering Program only
6cp; block release
subject coordinator: Mr J R M 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 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 as way that cost is not critical but deadlines are critical, 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

Availability: Software Engineering Program only
3cp; block release
subject coordinator: Mr J R M Leaney

This course develops an understanding of software quality issues, and develop 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 subject covers the use of a typical configuration management tool.

49241

Hypermedia Technologies

Availability: all courses
6cp; 3hpw or block release
subject coordinator: Dr R Meesoda

This subject provides an introduction to Hypermedia. It introduces basic components and the structure of hypermedia systems, underlying technologies for capturing, compressing, structuring and authoring of different media (text, images, video and sound). Issues related to storage and transmission of large volumes of data are discussed, including temporal media and synchronisation. The Internet and the World Wide Web are studied in detail.

Assessment: assignments 30 per cent; mini project 40 per cent; quiz 30 per cent.

49242

Mono Media Technologies

Availability: all courses
6cp; 3hpw or block release; prerequisites: Students are assumed to have appropriate background knowledge in the following areas: mathematics; software; information and systems
subject coordinator: Dr D B Lowe

This subject introduces engineering issues and state-of-the-art solutions related to capturing, representation, storage, compression and presenting digital media. Special emphasis is placed on images, video and audio. Topics such as colour space, image video and audio compression techniques and standards (JPEG, MPEG), processing of visual information for applications such as image and video databases will be studied.

Assessment: major development project 50 per cent; learning contract 50 per cent.

49243

Development of Hypermedia Information Systems

Availability: all courses
6cp; 3hpw or block release; prerequisite: 45241 Hypermedia Technologies, 49242 Image Computing; corequisite: 49242 Mono Media Technologies, 49031 Information Structures, Perception and User-interface design, or equivalents
subject coordinator: Dr R Meegoda

In this subject, students will learn how to develop large complex hypermedia information systems that need to be maintained and updated over a period of time. Students will learn how to extract the structure of information and develop a document using SGML. Students will then develop programs to convert the marked up documents into formats suitable for different browsers (such as HTML) and applications.

The topics will also include life cycle considerations project management in Hypermedia Systems Development, and new technical issues such as copyright and social impact.

In this subject industry standard application development tools will be used for practical work.

Assessment: project 75 per cent; quiz 25 per cent.

49261

Biomedical Instrumentation

Availability: all courses
6cp; 3hpw; prerequisites: 45562 Data Acquisition and Distribution Systems, or equivalent
subject coordinator: A/Prof H T Nguyen

This subject covers general concepts applicable to the design of all medical instrumentation systems, the measurement of biopotentials and critical-care analytes 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 exam 25 per cent.

49271

Computer Architecture

Availability: all courses
6cp; 3hpw; prerequisite: 45143 Computer Hardware, or equivalent
subject coordinators: 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 systems 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

Availability: all courses
6cp; 3hpw; prerequisites: 45581 Analogue and Digital Control, or equivalent
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 2 seminar presentations 50 per cent; 3 out of 4 assignments 50 per cent.

49273

Random Signal Theory

Availability: all courses
6cp; 3hpw; prerequisites: 45145 Engineering Statistics, or equivalent
subject coordinator: A/Prof S Reisenfeld

This subject provides fundamental background in probability theory, random variables, random processes, random sequences and the characteristics of special classes of random processes. It establishes the mathematical modelling prerequisites for practice and research in signal detection, estimation and stochastic control.

Assessment: assignments 50 per cent; final examinations 50 per cent.

49274

Advanced Robotics

Availability: all courses
6cp; 3hpw or block release; prerequisites: 45123 Software Development, 45342 Electromechanical Systems, or equivalents
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 2-dimensional (terrestrial) and 3-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

Availability: all courses
6cp; 3hpw; prerequisite: 45581 Analog and Digital Control or equivalent
subject coordinator: A/Prof H T 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

Availability: all courses
6cp; 3hpw or block release; prerequisite: 45581 Analog and Digital Control or equivalent
subject coordinator: A/Prof 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 Systems – Implementation and Accreditation

Availability: all courses
6cp; 3hpw or block mode
subject coordinator: A/Prof R M Spencer

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 hightlights the use of an effective quality system for continuous quality improvements.

Assessment: assignments 30 per cent; projects 30 per cent; written exam 40 per cent.

49307

Internal Combustion Engines and Environmental Issues

Availability: all courses
6cp; 3hpw or block release
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.

49308

Rapid Response Manufacturing

Availability: all courses
6cp; 3hpw or block mode; prerequisites: 46710 Materials Processing, or equivalent
subject coordinator: A/Prof R M Spencer

World best practice in rapid response manufacturing is benchmarked for applicability to Australian industry. Rapid response is linked through project and operational strategies in design and manufacture with time to market, concurrent engineering, forecasting uncertainty, lead time reduction, group technology, flexibility and modularity of products and processes.

Assessment: group activities 20 per cent; projects and assignments 60 per cent; tests 20 per cent.

49309

Quality Planning and Analysis

Availability: all courses
6cp; 3hpw/distance mode; prerequisites: 46820 Engineering Statistics, or equivalent
subject coordinator: A/Prof R M Spencer

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 complying 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

Availability: all courses
6cp; 3hpw; prerequisite: A completed first or higher degree in Engineering or a cognate discipline
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 exam.

49312

Computational Fluid Dynamics

Availability: all courses
6cp; 3hpw; prerequisites: 46430 Thermofluids, 46830 Numerical Analysis, 46811 Computer Programming (Fortran or Pascal or C), or equivalent
subject coordinator: Dr A N F Mack

This subject develops an appreciation of the nature of computational fluid dynamics (CFD), its advantages and disadvantages, its capabilities and limitations. It provides exposure to the numerical methods in CFD computer codes and experience in the practical application of commercial CFD packages. It develops skill in the evaluation of solution integrity. On completion, students should have proficiency to undertake leadership roles in this fast developing field.

Assessment: projects 80 per cent; oral examination 20 per cent.

49316

Bulk Materials Handling

Availability: all courses
6cp; 3hpw or block release
subject coordinator: Mr W J Dartnall

The subject gives an overview of the techniques available for the transport and storage of particulate solid materials handled in bulk, and enables students to select appropriate approaches and specify equipment requirements.

Aspects of bulk materials handling to be dealt with include material characteristics; systems approach; storage systems; self conveyors; pneumatic conveying; quality considerations; mechanical handling; feeding, discharge and transfer systems; environmental aspects. Site visits and practical examples and exercises are included. The subject is strongly supported by the National Committee on Bulk Materials Handling of the Institution of Engineers, Australia.

Assessment: quizzes 30 per cent; assignments and visit reports 40 per cent; projects 30 per cent.

49317

Design and Manufacture with Adhesives

Availability: all courses
6cp; 3hpw; prerequisite: 67061 Materials Engineering 2 or equivalent
subject coordinators: Mr T A Brown

This subject presents the use and integration of adhesives and sealants in engineering design and the manufacturing process. Topics include the theories and properties of adhesives, joint design, the structural response of bonded structures and methods of integrating adhesives into a manufacturing process. A feature of the course is case studies involving the design of joints for strength and manufacture and demonstrating the potential for adhesives to provide an alternative to conventional mechanical joints.

Assessment: four assignments dealing with specific aspects of the application and selection of adhesives 50 per cent; a student based design project 50 per cent.

49318

Manufacture Systems Management

Availability: all courses
6cp; 3hpw or block release; prerequisite: 46710 Materials Processing or equivalent
subject coordinator: A/Prof R M Spencer

The subject is structured around three modules: marketing; development and manufacture. The marketing module identifies and specifies quantitative product function in response to qualitative customer requirements. The development module integrates innovation, research and development to evolve solutions in response to functional product specifications. The manufacturing module develops process capability for quality, robust, functional, aesthetic products.

Assessment: each module is assessed by formative projects totalling 100%. Depending on project results, an optional summative test is available for module integration and grade clarification.

49319

Product Modelling and Analysis

Availability: all courses
6cp; 3hpw or block release; prerequisite: 46321 Computer Aided Drafting or equivalent
subject coordinator: Prof F B Swinkels

Emphasis is on surface and solid modelling of parts and assemblies, parametric/associate design, mass and surface properties analysis, and interfacing to manufacturing and analysis programs. This subject enables students to understand and use advanced computer modelling methods, design tools, and analysis techniques and their application to other areas of design and manufacturing. Models of mechanical parts are developed using advanced surfacing and solid modelling tools including associativity and parametrics.

Assessment: four assignments dealing with specific aspects of the applications with an integrative project.

49320

Industrial Tool Design and Manufacture

Availability: all courses
6cp; 3hpw or block release; prerequisite: 46321 Computer Aided Drafting or equivalent
subject coordinator: Prof F B Swinkels

This subject will examine off-line Numerical control (NC) programming for production tooling (such as jigs and fixtures) and mould and die manufacture. The subject would also develop an in-depth understanding of sheet metal operations such as flat pattern, nesting, and punch press/laser cutting programming. The concepts and principles of electrical discharge machining (EDM) would be developed for mould and die manufacture.

Assessment: four assignments dealing with specific aspects of the applications with an integrative project.

49377

Process Control Studies

Availability: all courses
6cp; 3hpw or block release; prerequisites: 46531 Control Engineering I or equivalent
subject coordinator: Mr K A Stillman

This subject examines the instrumentation and control of modern process systems, focusing on advanced design practice and its industrial application. The subject covers constraint control, statistical process control, override control, on-line optimisation and adaption. It includes visits to automated industrial plants to study their design and performance.

Assessment: assignments 25 per cent; reports 35 per cent; final examination 40 per cent.

49381

Applications of Optimisation in Engineering

Availability: all courses
6cp; 3hpw or block release; prerequisites: 46830 Numerical Analysis, or equivalent
subject coordinator: Mr K A Stillman

Following a review of the theoretical background of a selection of standard optimisation procedures, this subject applies the procedures to engineering problems. Software packages are used for generating and testing the solutions. On completion, students should be able to formulate the objective function and constraints for a problem, make an informed choice of an appropriate algorithm and validate the solution in terms of sensitivity and local optimums. Contents include: linear programming and its extensions, unconstrained and constrained continuous problems, discontinuous problems and 'genetic' algorithms.

Assessment: assignments 70 per cent; final exam 30 per cent.

49453

Infrastructure Management

Availability: all courses
6cp; block release; prerequisite: 21731 Resource Management or equivalent
subject coordinator: Mr K J Halstead

This subject examines current and likely future roles of local government in the provision of urban and regional infrastructure. Future infrastructure technologies are examined (such as information transfer), as are methods of public and private provision.

Assessment: essay on infrastructure 25 per cent; project 35 per cent; major assignment 40 per cent.

49550

Computing for Groundwater Specialists (non credit)

Availability: ME(GWM), GDE(GWM) only (nocp); block release totalling 24 hours
subject coordinator: Prof M J Knight, National Centre for Groundwater Management

This subject provides the computing background needed for students with varying degrees of computer literacy. Topics covered include introduction to FORTRAN programming, mainframe, microcomputer operation 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

Availability: all courses (core for ME(GWM) and GDE(GWM))
6cp; block release totalling 36 hours
subject coordinator: Prof 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

Availability: all courses (core for ME(GWM) and GDE(GWM))
6cp; block release
subject coordinator: Prof M J Knight, 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 FORTAN programming, mainframe, microcomputer operation 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

Availability: all courses (core for ME(GWM) and GDE(GWM))
6cp; block release totalling 36 hours; corequisite: 49550 Computing for Groundwater Specialists
subject coordinator: Prof M J Knight, National Centre for Groundwater Management

The subject provides the computer modelling tools required for practical groundwater resource management underpinned by an adequate appreciation of the underlying theory and computer algorithms. Topics include conceptual modelling, analytical modelling, numerical modelling and solution algorithms applied to the governing differential equations. Emphasis is placed on finite difference and finite element methods. Applications to groundwater resource studies, borefield management, optimisation problems.

Assessment: continuous assessment involving assignments, problems and short examinations.

POSTGRADUATE SUBJECTS TAUGHT IN THE FACULTY OF BUSINESS

21813

Managing People

Availability: MEM core subject
6cp; 3hpw/distance
subject coordinator: Mr R Connor

Theory and research from the social sciences are used to explore human behaviour at work. Students are introduced to the basics of individual psychology which is then critically applied to the fields of motivation and job design. The work of social psychology on group dynamics is presented and applied to the management of work groups and committees. Various theories of leadership are examined and critically assessed. The question of intergroup behaviour and conflict is discussed as is power and politics in organisations. The question of change in organisations draws upon much of the foregoing. The subject takes a critical approach to management theory and practice.

Assessment: case study 30 per cent; seminar paper and presentation 30 per cent; exam 40 per cent.

22747

Accounting for Managerial Decisions

Availability: MEM core subject
6cp; 3hpw/distance
subject coordinator: Mr L Moysa

Introduces accounting to those who are not preparing for a career in accounting, but are going to use accounting information in their roles. Topics include both financial and management discounting; financial statements; balance sheet and income statement; financial statement analysis and understanding financial statements; the nature of management accounting; cost behaviour; differential accounting; capital budgeting; responsibility accounting; and budgeting.

Assessment: class tests 40 per cent; assignment 20 per cent; final exam 40 per cent.

POSTGRADUATE SUBJECTS TAUGHT IN THE FACULTY OF SCIENCE

66014

Hydrogeology

Availability: ME(GWM) and GDE(GWM) core subject
6cp; block release
subject coordinator: Prof M J Knight, National Centre for Groundwater Management

This subject provides a knowledge of geological occurrence and hydraulics of groundwater flow, exploration techniques, extraction engineering and resource management.

66015

Hydrochemistry

Availability: ME(GWM) and GDE(GWM) core subject
6cp; block release
subject coordinator: Prof M J Knight, National Centre for Groundwater Management

The subject 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

Availability: ME(GWM) and GDE(GWM) elective subject
6cp; block release
subject coordinator: Prof M J Knight, National Centre for Groundwater Management

This subject examines both theoretically and practically the geophysical and remote sensing techniques applicable to groundwater resources evaluation and other environmental problems.

66017

Geopollution Management

Availability: ME(GWM) and GDE(GWM) elective subject
6cp; block release
subject coordinator: Prof M J Knight, National Centre for Groundwater Management

This subject studies 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

Availability: ME(GWM) and GDE(GWM) elective subject
6cp; block release
subject coordinator: Prof M J Knight, National Centre for Groundwater Management

This subject presents an advanced application of geophysical techniques for groundwater research and resource management and includes contamination assessment and monitoring.

66025

Contaminated Site Management

Availability: ME(GWM) and GDE(GWM) elective subject
6cp; block release
subject coordinator: Prof M J Knight, National Centre for Groundwater Management

The course content includes: regulatory requirements, site assessment methodology, physical, chemical and biological properties and behaviour of contaminants, health issues, risk assessment, site assessment technology, techniques and operation.

AGSEI SUBJECTS

Availability: all courses
Credit Points: 6 except where stated otherwise
Mode: normally block release. 49601, 49602, 49603 and 49604 also distance
subject coordinator: Associate Professor J V Parkin

49601

Innovation and Technology Management

To remain competitive, companies need to continually introduce new products and services. Commercialisation of new products and services has a very high failure rate and is perceived to be a particular area of weakness for Australian companies. This subject demonstrates how commercialisation can be managed as a structured process, resulting in a significantly improved rate of success. A strong emphasis is placed on tools to identify market needs, including customer supplier mapping and quality function deployment. Issues such as financing of new ventures and intellectual property issues are addressed.

49602

Marketing Engineering Services

The most focused activity of the marketing process in project oriented enterprises occurs in tendering or bidding. The tendering process is in fact a rehearsal of the project, which requires all team members to specify how they would perform their part to the satisfaction of the customer's requirements and to return a profit to the enterprise.

The key decisions relating to product and pricing strategy, promotion, and delivery, are treated as part of the multi-disciplinary team task. From this perspective the customer's needs and wants become integral parts of the design process, and communication with both customers and suppliers becomes paramount.

49603

Communication for Technical Professionals

This subject demonstrates how companies can improve the contribution of their professional employees, by providing them with the ability to:

- manage personal, interpersonal and organisational relationships;
- contribute more effectively to teams as leaders and members;

- communicate innovative ideas to customers and to all levels within the organisation;
- lead change within the organisation; and
- improve technology transfer.

49604

Information Technology in Management

Information technology represents a vital tool in achieving competitive advantage through breakthrough gains in efficiency and the ability to fashion radically new processes and services. Despite the promise of IT, the history of its deployment has been generally disappointing. This subject demonstrates how IT can be aligned with business processes to achieve the promised benefits. Methods of analysing the business case for IT investments are an important element. The subject also addresses issues of IT strategy including the benefits of open systems, and demonstrates the application of IT to the engineering process from design through manufacturing, service and support.

49614

Project Risk Management

There is growing recognition of risk management as a vital skill for all managers. Risks are particularly high in projects, which represent unique activities. This subject considers risk analysis of project proposals, and risk management of projects in process. The former involves consideration of go/no-go decisions of projects based on the evaluated risks and rewards of their outputs. Risk management of current projects involves attention to the risk of their compliance with the project targets of time, cost, and performance. This subject covers the understanding of risk, together with techniques of risk analysis and strategies for risk management.

49615

Value Management

Value management is a structured, systematic and analytical process for assessing engineering projects. It maximises value for money by ensuring the provision of all the necessary functions at the lowest total cost consistent with required levels of quality and performance. This subject is designed to assist organisations to plan for an implement value management within their organisations. It presents a process of value management as prescribed in Australian Standard AS4183 and the NSW Government Handbook on Value Management.

49616

Finance for Technical Managers

This subject provides a pragmatic introduction to management accounting and finance for technical managers. It provides participants with the ability to ascertain the present state of an organisation from an analysis of balance sheets, profit and loss statements, budgets, and other accounting instruments. It also provides a thorough grounding in discounted cash flow (time value of money) techniques assisting participants to develop business cases for their own proposals. The intention is not to develop accountants, but to develop financially literate technical managers who are better able to communicate and contribute in a commercial environment.

49617

Strategic Maintenance Management

This subject provides and understanding of the maintenance of capital assets as a strategic issue for organisations. It is intended to both raise understanding within maintenance managers of the commercial nature of their role, and for other managers to appreciate the implications of asset maintenance for the profitability of their business. The methods of reliability centred maintenance, total productive maintenance, and total life cycle costing models are introduced for managing the maintenance function to achieve commercial objectives.

49618

Process Innovation

This subject provides a broad definition of innovation, and establishes the imperative for innovation in all enterprises. The leading contribution of process innovation in the Australian context is identified, and information technology is investigated as a primary enabler of process innovation. The techniques of business process modelling and re-engineering are presented as a means to apply innovation to existing operations. Through this subject, students will require the vision and skills to act as change agents for innovation within their organisations.

49619

Project Performance Management

This subject is designed so that a manager can appreciate the role of cost and schedule control systems in a project environment. The module will demonstrate how an integrated management system will assist in successful business management through proper partitioning of the project scope, establishment of schedule and budget, correct cost recording, regular cost analysis, diagnosis and appropriate corrective action.

49621

Application Project

The project is agreed upon by the student's organisation, addressing the issues relevant to their organisation. This will be done within the student's organisations and usually takes a minimum of 25 hours over a period of 2 months following completion of the relevant AGSEI short course.

49622

Strategic Asset Planning

There is a growing recognition of the need to support service delivery by organisations in the most cost-effective manner possible. This implies that the assets acquired for the purpose of supporting the service delivery must do so in the most efficient way. A strategic approach to the procurement, operation, maintenance and disposal of assets is necessary. This is done within a total asset management (TAM) framework, which includes the development of a strategic asset plan, a strategic human resources plan and a strategic information plan. Engineers with responsibilities in these areas require particular skills and this subject prepares the student to develop a strategic asset plan for their particular organisation.

49626

Advanced Facilitation

The professional engineer can benefit significantly by having a range of tools and techniques at their disposal which enable an effective facilitation of a situation. This may include a one-on-one facilitation of a mentoring, mediation or counselling session. It includes the facilitation of meetings, where the outcomes and the involvement and commitment of the participants are far superior to the more traditional approach to chairing the meeting. It also involves leading small and large groups through structured workshops. This subject provides the underpinning knowledge and skills, and the student is supported in applying the skills within their organisation.

Alphabetical list of subjects

Boards and committees

FACULTY BOARD IN ENGINEERING

(as at 30 October 1997)

Ex officio members

Dean
Professor P J Parr

Associate Dean Undergraduate Programs
Professor K W Yates

Associate Dean Graduate Coursework Programs
Associate Professor J V Parkin

Associate Dean Research
Professor J A Reizes

Associate Dean Development
Professor W R Belcher

Professors
Professor S L Bakoss
Professor C R Drane
Professor M J Knight
Professor V S Ramsden
Professor F B Swinkels
Professor S Vigneswaran

Faculty Administrator
Ms D J Carraro

Nominated members

Ms A C Newton
Nominee of the University Librarian

Mr S Sheely
Nominee of the Director, CLT

Associate Professor B Hunt
Nominee of the Dean from the Faculty Board in Business

Associate Professor G L Cohen
Nominee of the Dean from the Faculty Board in Mathematical and Computing Sciences

Dr D Green
Nominee of the Dean from the Faculty Board in Science

Registered members

Mr M F Benitez
Mr E A Brady
Mr K E Crews
Mr A C Curgenven
Mr D M Eager
Mr C E Evans
Dr P A Hazelton
Ms B Holland
Mr P G Lewis
Dr D B Lowe
Dr A N F Mack
Dr J Madadnia
Mr P Mallon
Mr P Maloney
Mr W S McKendrick
Dr R Sri Ravindrarajah
Dr C A Scott
Mr K A Stillman
Mr W A Symons
Dr D Webster
Dr K Yasukawa

Elected student members

Mr P Beddoe
Mr T Hoare
Mr P McGregor
Mr K Vijh

ADVISORY COMMITTEES

(as at 30 October 1997)

Civil Engineering Advisory Committee

Chairperson

Mr Neil Turner
Plant Manager,
Tubemakers Water

Industry members

Mr Alan Chappel
Managing Director
Connell Wagner Pty Ltd

Dr John Nutt
Chairman
Ove Arup and Partners

Mr Chris Little
Divisional Manager, Engineering
Hurstville City Council

Mr Terry Gibson
Associate Director
McMillan Britton and Kell Pty Ltd

Ms Sue Ribbons
Engineer
Bewsher Consultants

Mr John Vagulans
NSW Land Manager
A V Jennings

Mr Ray Wedgewood
General Manager, Bridges
Roads and Traffic Authority

UTS staff

Professor Peter Parr
Dean, Faculty of Engineering

Professor Rod Belcher
Associate Dean, Development

Associate Professor Bijan Samali

Mr Alan Brady

Secretary

Ms Deborah Carraro
Faculty Administrator

Observer

Mr John Crowe, Director, Industrial Liaison

Electrical Engineering Advisory Committee

Chairperson

Mr Edwin Matiuk
Managing Director
Siemens Plessey Electronic Systems Pty Ltd

Industry members

Ms Karen Ganschow
Services Product Manager
Optus Communications Pty Ltd

Mr Noel Godfrey
Engineering Manager
BHP Engineering Pty Ltd

Dr Jim Harvey
Managing Director
Microwave Networks Australia Pty Ltd

Mr Ian Stuart
Chief Manager, Engineering
Pacific Power International/Power Engineering

Dr Robert Gill
Project Leader
Ultrasonics Laboratory
CSIRO Division of Radiophysics

UTS staff

Professor Peter Parr
Dean, Faculty of Engineering

Professor Rod Belcher
Associate Dean, Development

Professor Warren Yates
Associate Dean, Undergraduate Programs

Professor Chris Drane

Secretary

Ms Deborah Carraro, Faculty Administrator

Observer

Mr John Crowe, Director, Industrial Liaison

Mechanical Engineering Advisory Committee

Chairperson

Mr Bob McGregor
Director
Hirondelle Engineering

Industry members

Mr Michael Kirby
Marketing Director
James N Kirby Pty Ltd

Mr Paul Dewar
Engineering ManagerÑBoilers, Fuel and Water Systems
Power Plant Engineering
Pacific Power International/Power Engineering

Mr Alan Wightley
General Manager (Development)
Warman International Ltd

Mr John Burke
Manager
EMSYS Coordination
Qantas Airways Ltd

Mr Robert Mander
Manager
Composite Can Division
Containers Packaging

UTS staff

Professor Peter Parr
Dean, Faculty of Engineering

Professor Rod Belcher
Associate Dean, Development

Associate Professor Stephen Johnston

Professor Frank Swinkels

Secretary

Ms Deborah Carraro, Faculty Administrator

Observer

Mr John Crowe, Director, Industrial Liaison

Bachelor of Technology Advisory Committee

Chairperson

Mr Michael Kirby
Marketing Manager
James N Kirby Pty Ltd

Industry members

Mr David Lewis
Manufacturing Systems
Manufacturing Training Division of TAFE

Mr Con Lyras
Manager, Aircraft Planning
Qantas Airways Ltd

Mr Norm Argent
Executive Director
AMCA of NSW Ltd

Mr Warwick Geering
Engineering Services Industry
Training Division
TAFE Southern Sydney Institute

Mr John Green
Chairperson
IEAust National Committee on Building Services

Mr Ian McArthur
Consultant

Mr Bob Paton
National Executive Officer
Manufacturing, Engineering and Related Services
Industry Training Advisory Body Ltd

Mr D Rowe
Department of Architectural and Design Science
Faculty of Architecture
University of Sydney

UTS staff

Professor Peter Parr
Dean, Faculty of Engineering

Mr David Eager
Director and Sub Dean
Bachelor of Technology Programs
Faculty of Engineering

Secretary

Ms Ruth Ciudad

Master of Environmental Engineering Management Advisory Committee

Chairperson

Dr Ian Joliffe
Manager for Water Resources
GHD

Industry members

Mr Chris Davis
Executive Director
Australian Water & Wastewater Association

Mr Steve Clements
Executive Manager of Development and Health
Lane Cove Council

Mr Noel Child
General Manager
Environment Australia

UTS staff

Mr Ken Halstead
Senior Lecturer, Civil Engineering Group
Faculty of Engineering

Dr Pam Hazelton
Program Director, Environmental Engineering
Faculty of Engineering

Associate Professor Jim Parkin
Associate Dean, Graduate Coursework Programs
Faculty of Engineering

Master of Engineering Studies Advisory Committee

Chairperson

Mr Tony Reed
Director of Engineering Services
Ryde City Council

Dr Jim Harvey
Managing Director
Microwave Networks Australia Pty Ltd

Mr Robert Mander
Manager
Composite Can Division
Containers Packaging

Mr Peter Trimmer
Manager
Market Development
TransGrid

Mr Frank Davies
Consultant
Businet Pty Ltd

UTS staff

Professor Peter Parr
Dean, Faculty of Engineering

Associate Professor Jim Parkin
Associate Dean, Graduate Coursework Programs

Staff list

Professor and Dean of Engineering
P J Parr, MSc, PhD (Belf), FIEAust,CPEng

Secretary to the Dean
A Van Eeuwen

Associate Dean, Undergraduate Programs
Professor K W Yates, BSc, BE, PhD (Syd), FIEAust,CPEng, SMIREE, MIEE, SMIEEE

Associate Dean, Graduate Coursework Programs and Head, Graduate School of Engineering
Associate Professor J V Parkin, MSc, MEnvStud, PhD (UNSW), FIEAust,CPEng, FICE

Associate Dean, Research
Professor J A Reizes, BE, ME, PhD (UNSW), FIEAust,CPEng

Associate Dean, Development
Professor W R Belcher, BE, MEngSc (Q'ld), PhD (Lond), DIC, FIEAust,CPEng, MIEE

Faculty Administrator
D J Carraro, BA (UNE)

IT Systems Manager
W S McKendrick, BSc (Hons) (N'cle), MACS

Director, Industrial Liaison
TBA

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
E W Aslaksen, MSc (Swiss Fed IT), PhD (Lehigh), MIEAust, MAIP
V Ireland, BE (UNSW), BA, MEngSc, PhD (Syd), FAIB, MIEAust
R Johnston, BSc (UNSW), PhD (Manc), FTS
D Quail, BE (Syd), MEngSc (UNSW), PEng

Staff Groups

Administration and Information

General staff

S Ali
Administrative Assistant

J Brown
Administrative Assistant

B Buckenmaier, BA (UTS)
Graduate Studies Officer

D J Carraro, BA (UNE)
Faculty Administrator

J Chetcuti
Secretary Word Processor Operator (P/T)

R Ciudad
Undergraduate Programs Officer

R Corran, BE (UTS)
Office Systems Support Manager

L Dixon
Administrative Assistant, National Centre for Groundwater Management

P J Doyle
Industrial Liaison Officer (P/T)

Y Hua, BA (Anhui U), DipMgt (Shenzen U), MBA (CQU)
Administrator, International Engineering Program

K Johnston
Undergraduate Programs Officer

P Johnston, BA (Macq)
Administrator (P/T), Learning and Design Centre

W S McKendrick, BSc (Hons) (N'cle), MACS
IT Systems Manager

C Lew
Finance Officer

G Lye
Secretary to Associate Dean Development, and Associate Dean Research

M Nunan
Administrative Officer, Centre for Local Government Education and Research

R Racas
Secretary

M R Rothery
Manager, Planning and Information

R Saunders, BA (Macq)
Graduate Student Adviser

L B Smith
Undergraduate Programs Officer

S Tanuwijaya
Manager, Undergraduate Programs Office

R L Tay
Administrative Secretary, Associate Dean, Undergraduate Programs

C Taylor
Administrative Officer, Centre for Local Government Education and Research

E Tu
Secretary to Associate Dean Graduate Coursework Programs

A Van Eeuwen
Secretary to the Dean

L Venglinsky
Administrative Officer

Hua P Xu
Office Manager, National Centre for Groundwater Management

Civil and Mechanical Engineering Laboratories

General staff

K C Barnes
Engineer

G Bayley
Senior Tradesperson

M Benitez
Senior Technical Officer

C M Chapman
Scientific Officer

P M Chatfield
Senior Technical Officer

L D'Arcy
Senior Technical Officer

C E Evans
Assistant Laboratory Manager

W Firth
Senior Tradesperson

S E Gabor
Stores Officer

J S Gibson
Senior Tradesperson

S Gordon
Senior Tradesperson

S A Graham
Senior Laboratory Craftsperson

S Griffith
Senior Tradesperson

H J Hefka
Technical Officer

J C Holmes
Senior Technical Officer

D R Hooper
Technical Officer

W Howse
Technical Officer

* I A Hutchings, BE (NSWIT)
Engineer

A Lah, BE (NSWIT)
Engineer

H A Myers
Senior Laboratory Craftsperson

St J Parmigiani
Technical Officer

A Revel, BE (NSWIT), MIEAust,CPEng
Engineer

L Slade
Senior Tradesperson

L S Stonard
Senior Technical Officer

M J Taragel, BSc (Tech) (UNSW), MIEAust,CPEng
Engineer

R J Turnell
Senior Technical Officer

Civil Engineering

Academic staff

T A Anderson, BEng (UNSW), MEngSc (Syd)
Associate Professor

S L Bakoss, BE (Syd), MEngSc (UNSW), MS (Calif), PhD (UNSW), FIEAust,CPEng, MASCE
Professor of Civil Engineering

S C Beecham, BSc, PhD (Manc)
Senior Lecturer

E A Brady, BSurv, MSurvSc (UNSW), MISAust
Senior Lecturer

H W Chung, BSc (Eng), MSc (HK), PhD (Leeds), FIEAust,CPEng, FICE, FHKIE
Senior Lecturer

K E Crews, BE (UNSW), ME (UTS), MIEAust,CPEng
Senior Lecturer

K J Halstead, BE (NSWIT), ME (W'gong), LGE, LGT &CP, MIEAust,CPEng
Senior Lecturer

M R Hausmann, DiplIng (Zur), MSc (Alberta), DipAdmin, PhD (UNSW), MIEAust,CPEng, MASCE
Associate Professor

---

* Group Head

J Li, BSc (Eng), MSc, PhD (TCD)
Research Engineer

M R Karim, BSc (B'desh Engineer), MSc (MEastTU), PhD (Birm), MICE, CEng, MIEAust,CPEng
Senior Lecturer

P J Kenny, BE, MEngSc (UNSW), DipBusStud (UNE), MIEAust,CPEng
Senior Lecturer

K L Lai, BE, PhD (UNSW)
Lecturer

G G O'Loughlin, BE, PhD (UNSW),CPEng, MIEAust, MASCE
Associate Professor

S Parsanejad, BArch (Teheran), BSc (CSU), MSc, PhD (Lehigh)
Senior Lecturer

R Sri Ravindrarajah, BSc (SLanka), PhD (Sheff)
Senior Lecturer

G J Ring, BE, PhD (Syd)
Senior Lecturer

A Saleh, DipIng, DrIng (RWTH Aachen)
Senior Lecturer

* B Samali, BS, MS, DSc (GWU), MIEAust,CPEng, MASCE
Associate Professor

C Wilkinson, BSc, BE, BA (Syd), MIEAust,CPEng
Associate Lecturer

Environmental Engineering

Academic staff

R Crichton, BA (Hons) (Syd), PhC (Vic Coll of Pharmacy)
Deputy Director, Centre for Local Government Education and Research

P Hagare, BSc (Andhra), MSc (Hyderabad), MTech (IIT), PhD (UTS)
Lecturer

P Hazelton, BSc (Syd), DipEd (UNE), PhD (UNSW)
Lecturer

B Holland, BA (Syd), GradDipComm (NSWIT), MScSoc (UNSW)
Coordinator, Women in Engineering Program

J L Irish, BSc, BE, ME (UNSW), FAII
Senior Lecturer

M J Knight, BSc, PhD (Melb), FGS, MIE (Aust), MAIMM
Professor and Director, National Centre for Groundwater Management

R G McLaughlan, BSc (Melb), GradDipCivEng, MAppSc, PhD (UNSW)
Lecturer, National Centre for Groundwater Management

N P Merrick, BSc, MSc (Syd), GradDipDataProc (NSWIT)
Senior Lecturer, National Centre for Groundwater Management

W A Milne-Home, BSc (Leic), MSc (Lond), PhD (Alta), CertEngGCH (UNSW)
Senior Lecturer, National Centre for Groundwater Management

H H Ngo, BSc, MSc (Nat Taiwan), PhD (UTS), MIAWQ, MAAW
Engineer

J V Parkin, MSc, MEnvStud, PhD (UNSW), FIEAust,CPEng
Associate Professor

K W Sproats, BTP, GradDip HNP (UNSW), PhD (UNE), FRAPI, AIMM
Associate Professor and Director, Centre for Local Government Education and Research

* S Vigneswaran, BSc (SLanka), MSc (AIT), DrIng (Montpellier), DSc (Inst Nat Polytechnique, Toulouse)
Professor of Environmental Engineering

K Walsh, BSc (Hons) (UNSW)
Research Microbiologist, National Centre for Groundwater Management

Electrical Engineering

Academic staff

V McKain, BSc, BH MS (Ed) (Q'ld), MS (Penn State), BE (QUT), Graduate Certificate in Higher Education (UTS)
Lecturer

P McLean, BE (UTS)
Associate Lecturer

A N Mears, BE (Hons), ME (N'cle)
Lecturer

H T Nguyen, BE, ME, PhD (N'cle)
Associate Professor

* J G Nicol, BSc (Eng), PhD (Strath), SMIREE, MIEEE
Senior Lecturer

V Ramaswamy, BE, MTech, PhD (Madras)
Senior Lecturer

V S Ramsden, BE, MEngSc (Melb), PhD (Aston)
Professor of Electrical Engineering

---

* Group Head

B S Rodanski, MSc, PhD (Wroclaw), MIEEE
Lecturer

R Stere, DipEng, DEng (Bucharest), MIEEE, MSICF
Associate Professor

P A Watterson, BSc (Hons) (Monash), PhD (Cantab)
Senior Lecturer/Senior Research Fellow

D Webster, BE, PhD (UTS)
Lecturer

J G Zhu, BE (JIT, China), MSc (SUT, China), PhD (UTS)
Senior Lecturer

General staff

A C Curgenven
Laboratory Manager

W M Holliday, BE (UNSW)
Engineer

R C Moore
Senior Technical Officer

G Murphy, BE (UTS)
Engineer

R S Nicholson
Engineer

S Y Shoon, BSc (Coll of Chinese Culture, Taiwan), MSc (Nat Taiwan IT)
Engineer

R Smith
Technical Officer

Computer Systems Engineering

Academic staff

N C Carmody, BE, MEngSc (UNSW)
Senior Lecturer

* C R Drane, BSc, PhD (Syd), MIEEE, MAIP
Professor of Computer Systems Engineering

M Evans, BE (UTS)
Associate Lecturer

K K Fung, BSc (UHK), MSc (Lond), PhD (Syd), MIEE
Senior Lecturer

J R M Leaney, BE, ME (UNSW), SMIREE
Senior Lecturer

D B Lowe, BE, PhD (UTS)
Senior Lecturer

M McBride, BSc, BE (UNSW)
Co-Director, Software Engineering Program

R Meegoda, MSc, PhD (Aston),CPEng, MIEAust, MACS, PCP, AIMM
Senior Lecturer

S Murray, BE (N'cle), MIEEE
Lecturer

C E Peterson, BSc, BE, PhD (Syd)
Associate Professor

C A Scott, BE, PhD (UTS)
Lecturer

K Yasukawa, BA (Hons), PhD (Macq)
Lecturer and Educational Developer

General staff

N Costadopoulos
Technical Officer

M De la Villefromoy
Technical Officer

M Miranda
Senior Technical Officer

H R Wijetilaka, BEng (Warw)
Engineer

P M Yardley
Analyst/Programmer

Telecommunications Engineering

Academic staff

T A Aubrey, BE, PhD (UTS), SIEEE
Lecturer

J S Daba, BSc (Houston), MSc, PhD (Purdue)
Lecturer

M P Eckert, BSE (Tulane), MSE, PhD (Philadelphia)
Senior Lecturer

J Harnett, BA (Hons) (Macq), DipTeach (Tas), PhD (Syd)
Lecturer

A Kadi, BE (UTS)
Associate Lecturer

S Reisenfeld, BScEng (Ill), MSc, PhD (UCLA)
Associate Professor

A M Sanagavarapu, BTech (SVU), ME, PhD (IIT Kharagpur)
Senior Lecturer

*A P Seneviratne, BSc (Hons) (Middx), PhD (Bath)
Associate Professor

K W Yates, BSc, BE, PhD (Syd), FIEAust,CPEng, SMIREE, MIEEE, SMIEEE
Professor of Electrical Engineering

---

* Group Head

General staff

R B Clout
Research Officer

G W Evans
Senior Technical Officer

W Francis
Laboratory Assistant

P T Gimes
Senior Technical Officer

V L Huynh
Technical Officer

K Moore
Network Services Officer

W A Symons, BE (NSWIT)
Engineer and Manager, Research Computing Centre

L Weber
Director, Microelectronics Fabrication Centre

Mechanical Engineering and Manufacturing

Academic staff

T A Brown, BE (UTS), GradIEAust, PEng
Lecturer

W J Dartnall, AIT MechEng, BSc (Curtin), MIEAust,CPEng, MACE, MIMMA
Lecturer

D M Eager, BE (Hons) (NSWIT), MIEAust,CPEng, MAAS, MASME, MAIRAH, MIIAV
Director, Bachelor of Technology Program

G Hong, BE, ME (Huazhong Univ Science & Technology), PhD (Cambridge)
Senior Lecturer

B P Huynh, BE, MEngSc, PhD (Syd), MASME
Lecturer

S F Johnston, BE, ME (UNSW), FIEAust,CPEng
Associate Professor

C P Killen, BSME (Virginia), MEM (UTS)
Lecturer

A N F Mack, BSc, BE, MEngSc, PhD (Syd), SMAIAA
Senior Lecturer

J Madadnia, BE (Sharief), MSc (Lond), DIC, PhD (Liv)
Lecturer

G M Marks, BE (NSWIT),CPEng, MIMarE
Senior Lecturer

H T McGregor, BS (Drexel), MA (Macq)
Associate Professor

J A Reizes, BE, ME, PhD (UNSW), FIEAust,CPEng
Professor of Mechanical Engineering

*R M Spencer, DipME (Q'ld), MSc (UMIST), PhD (UNSW), FIEAust,CPEng
Associate Professor

F C O Sticher, BE, PhD (Syd)
Lecturer

K A Stillman, BE (Syd), MEng (NSWIT), MIICA
Senior Lecturer

F B Swinkels, BE (NSWIT), PhD (Cantab), FIEAust,CPEng
James N Kirby Professor of Manufacturing Engineering

N Zhang, BE (Northeastern Shenyang), ME (Shanghai Jiao Tong), PhD (Tokyo)
Lecturer

Engineering Management and Practice

Academic staff

W R Belcher, BE, MEngSc (Q'ld), PhD (Lond), DIC, FIEAust,CPEng, MIEE
Professor of Electrical Engineering

P Bryce, BSc, PhD (UNSW), FIREE, MSSRE
Associate Professor

P G Lewis, BSc (Tech) (UNSW)
Senior Lecturer

P Maloney, BA (Macq), MA (Syd)
Director, International Engineering Program

R Mellor, MPS (UNSW)
Lecturer/Project Officer, Centre for Local Government Education and Research

P J Parr, MSc, PhD (Belf), FIEAust,CPEng
Professor of Electrical Engineering

D Sharma, BScEng (Punjab), MEng, DEng (AIT), MIEAust,CPEng
Senior Lecturer

E A Taylor, BE (UNSW), MIEAust,CPEng
Senior Lecturer

R B Ward, BE, PhD (UNSW), MBA (Macq), ASTC, MIEAust,CPEng, AAIM
Lecturer

General staff

R Jarman, BE (UTS)
Engineer

P Mallon, BE, BSc (Syd), MEngSc (UNSW)
Engineer

---

* Group Head

Centre for Local Government Education and Research

University Centre with links to several other faculties as well as Engineering. Staff are also members of staff groups within the Faculty of Engineering.

Associate Professor and Centre Director
K W Sproats, BTP, GradDip HNP (UNSW), PhD (UNE), FRAPI, AIMM

Deputy Director
R Crichton, BA (Hons) (Syd), PhC (Vic Coll of Pharmacy)

Manager, Special Projects
R Mellor, MPS (UNSW)

Administrative Officer
C Taylor

Administrative Officer
M Nunan

National Centre for Groundwater Management

Joint Centre of the Faculties of Engineering and Science

Professor and Centre Director
M J Knight, BSc, PhD (Melb), FGS, MIE (Aust), MAIMM

Senior Lecturer and Deputy Director
N P Merrick, BSc, MSc (Syd), GradDipDataProc (NSWIT)

Senior Lecturer
W A Milne-Home, BSc (Leic), MSc (Lond), PhD (Alta), CertEngGCH (UNSW)

Lecturer
R G McLaughlan, BSc (Melb), GradDipCivEng, MAppSc, PhD (UNSW)

Scientific Officer
D Yates, BAppSc (Hons) (UNSW), GradDipEnvStud (Macq)

Research Microbiologist
K Walsh, BSc (Hons) (UNSW)

Office Manager
H P Xu

Administrative Assistant
L Dixon

University of Technology, Sydney
PO Box 123
Broadway NSW 2007
Australia
Telephone (02) 9514 2000

Course inquiries within Australia
Information Service (02) 9514 1222
email info.office@uts.edu.au

International inquiries
International Programs +61 2 9514 1531
email intlprograms@uts.edu.au

World Wide Web http://www.uts.edu.au

ISSN 1328-9276

Price $9