

INFORMATION DESK



Faculty of **Engineering**  
Handbook

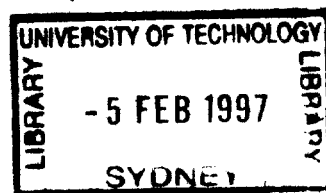


University of Technology, Sydney



**Faculty of  
Engineering  
Handbook  
1997**

The University attempts to ensure that the information contained in this handbook is correct as at 2 December 1996. 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,  
Corporate Responsibilities Unit

**Cover design:**

External Relations Unit

# Table of contents

---

<b>General University information</b>	<b>5</b>
Preface	5
Addresses and telephone numbers	6
Campus maps	7
Applying for UTS courses	11
UTS Information Centres	11
Principal dates for 1997	12
<b>Faculty information</b>	<b>14</b>
Mission	14
History	14
Practice-based engineering education	14
Women in Engineering	15
Operating arrangements	15
Location	16
Principal contacts	17
Associated centres	19
Research programs	20
Professional bodies	21
Engineering clubs and societies	21
Prizes and scholarships	22
Academic staff groups – areas of professional interest	23
List of courses and codes	29
<b>Undergraduate courses</b>	<b>30</b>
Bachelor of Engineering	30
<i>Courses in Civil, Structural and Environmental Engineering</i>	36
Bachelor of Engineering in Civil Engineering	36
Bachelor of Engineering in Civil and Environmental Engineering	38
Bachelor of Engineering in Structural Engineering	41
<i>Courses in Electrical, Computer Systems and Telecommunications Engineering</i>	43
Bachelor of Engineering in Electrical Engineering	43
Bachelor of Engineering in Computer Systems Engineering	47
Bachelor of Engineering in Telecommunications Engineering	49
<i>Courses in Mechanical and Manufacturing Systems Engineering</i>	51
Bachelor of Engineering in Mechanical Engineering	51
Bachelor of Engineering in Manufacturing Systems Engineering	54
Bachelor of Engineering/Bachelor of Arts in International Studies	55
Bachelor of Engineering/Master of Design	56
Bachelor of Applied Science (Physics)/Bachelor of Engineering (Electrical)	59
Bachelor of Technology program	61

<b>Postgraduate courses</b>	<b>63</b>
The Graduate School of Engineering	63
Staff and location of facilities	63
<i>Research degrees</i>	73
Doctor of Philosophy	73
Master of Engineering (by thesis)	75
<i>Coursework awards – General</i>	76
Master of Engineering (by coursework)	76
Master of Technology	78
Master of Engineering Practice	81
Graduate Diploma in Engineering	83
Graduate Certificate in Engineering	83
Graduate program concentrations	85
Subject selection guide	94
Postgraduate subject selection table	97
<i>Specialist coursework awards</i>	101
Master of Engineering Management	101
Master of Engineering in Telecommunications Engineering	102
Master of Engineering in Groundwater Management	103
Master of Local Government Management	104
Graduate Diploma in Engineering in Groundwater Management	105
Graduate Diploma in Local Government Engineering	106
Graduate Certificate in Environmental Engineering and Management	107
<b>Subject descriptions</b>	<b>109</b>
Undergraduate courses	109
Postgraduate courses	165
Subjects taught in the Faculty of Engineering	166
Subjects taught in the Faculty of Business	188
Subjects taught in the Faculty of Science	191
<b>Alphabetical list of subjects</b>	<b>192</b>
<b>Boards and committees</b>	<b>198</b>
<b>Staff list</b>	<b>201</b>

# ***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 St and Harris St, 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 St and Buckland St,  
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

#### 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, 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

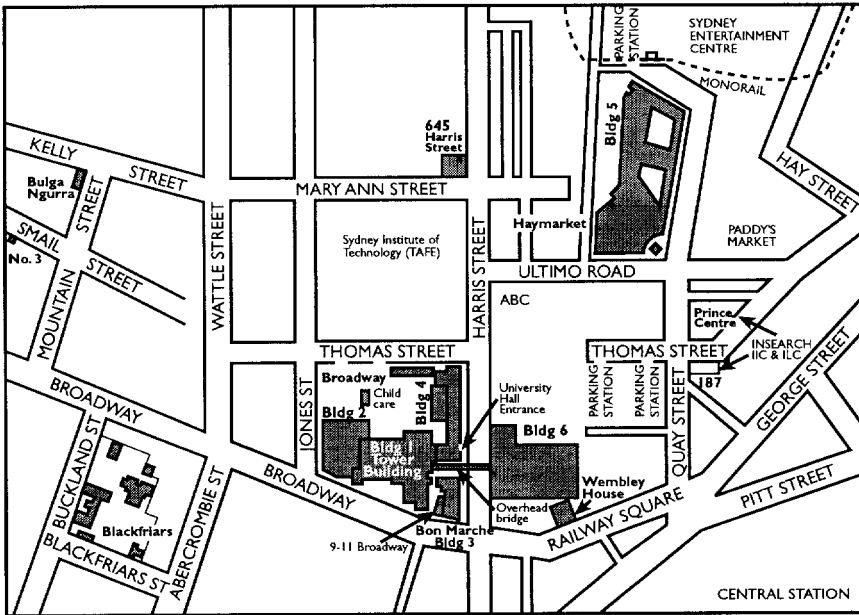
- Hawkesbury Rd  
Yarramundi NSW 2753

#### Stroud Field Station

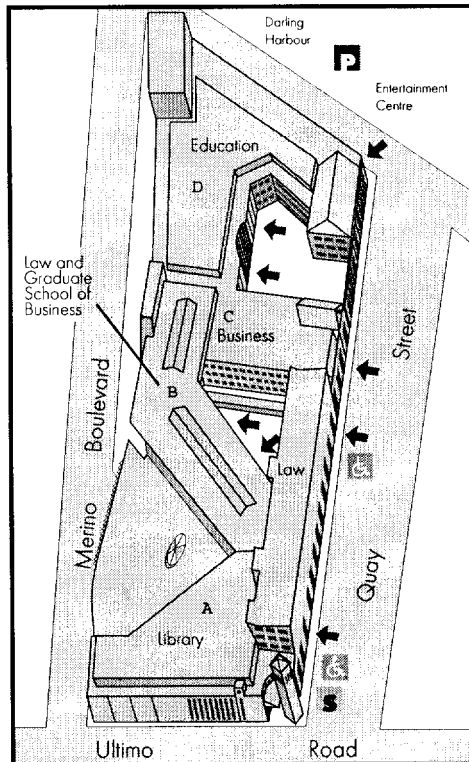
- Lot AFP 161894  
The Bucketts Way  
Booral NSW 2425

# CAMPUS MAPS

## City campus



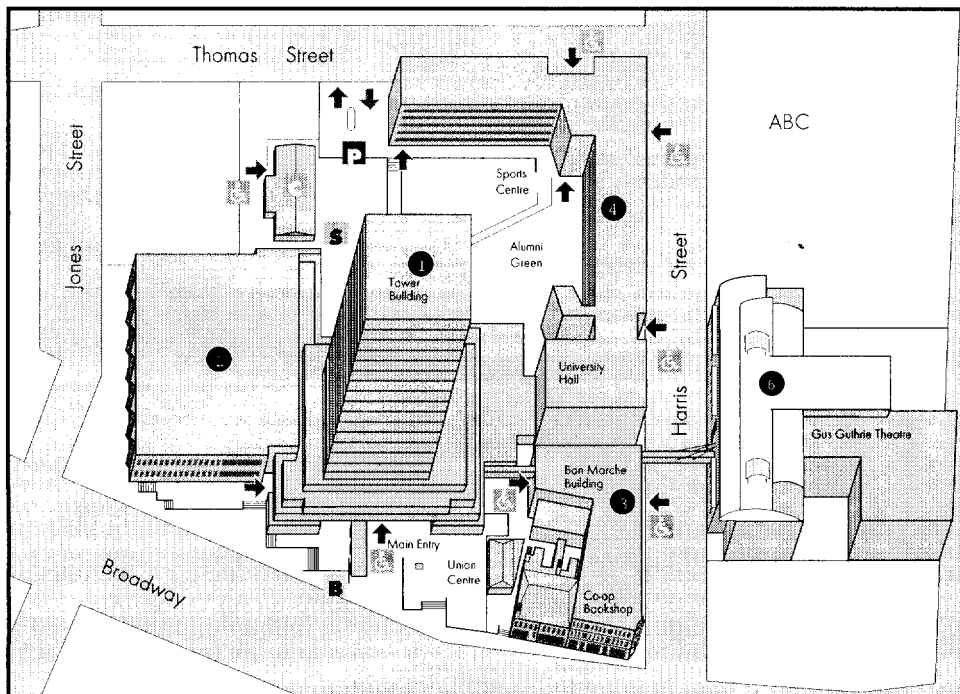
## Haymarket



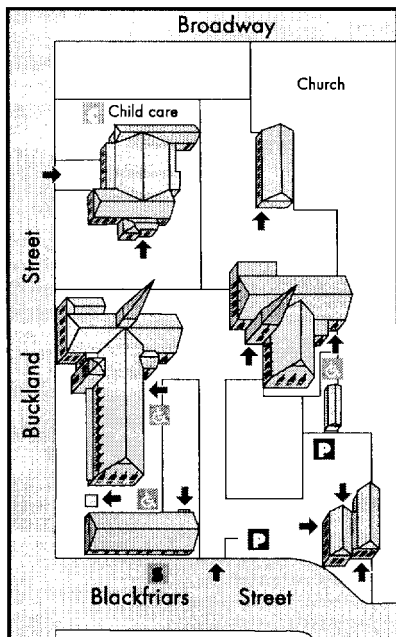
KEY	
	Entry/Exit
	Disabled access
	Main bus stop
	UTS shuttle bus
	Parking
	Building numbers
	Child care



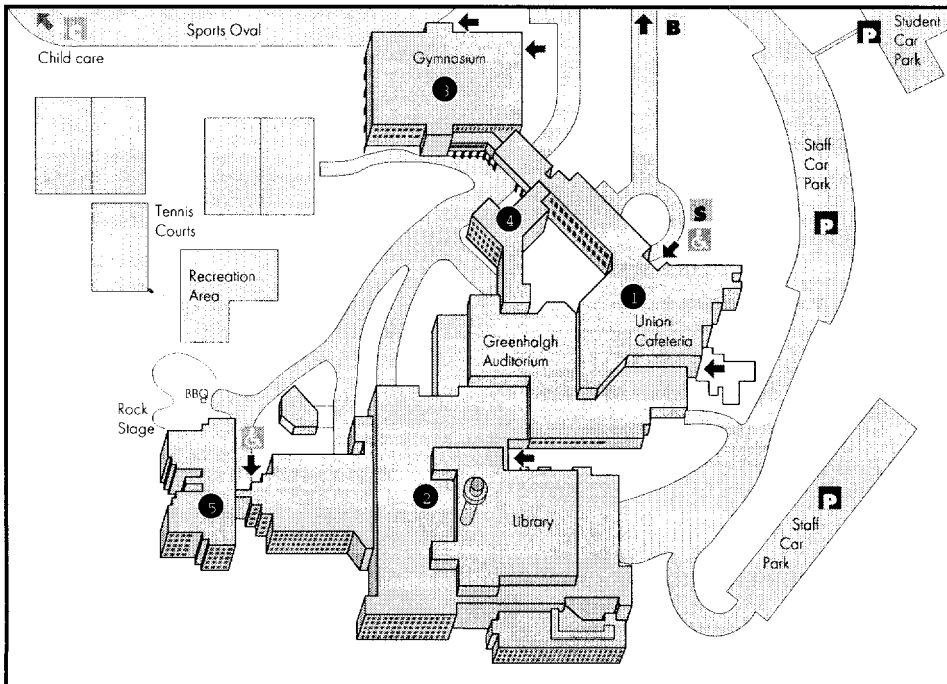
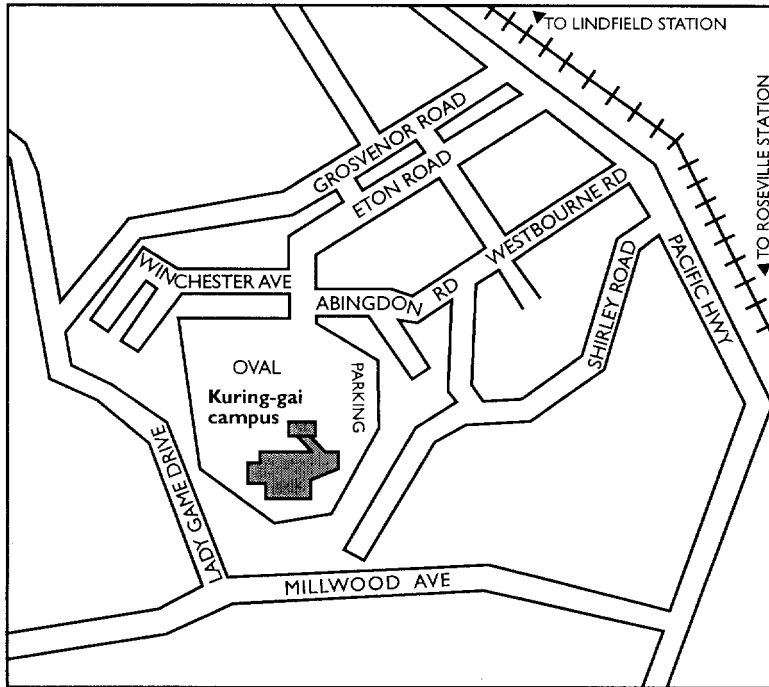
### Broadway



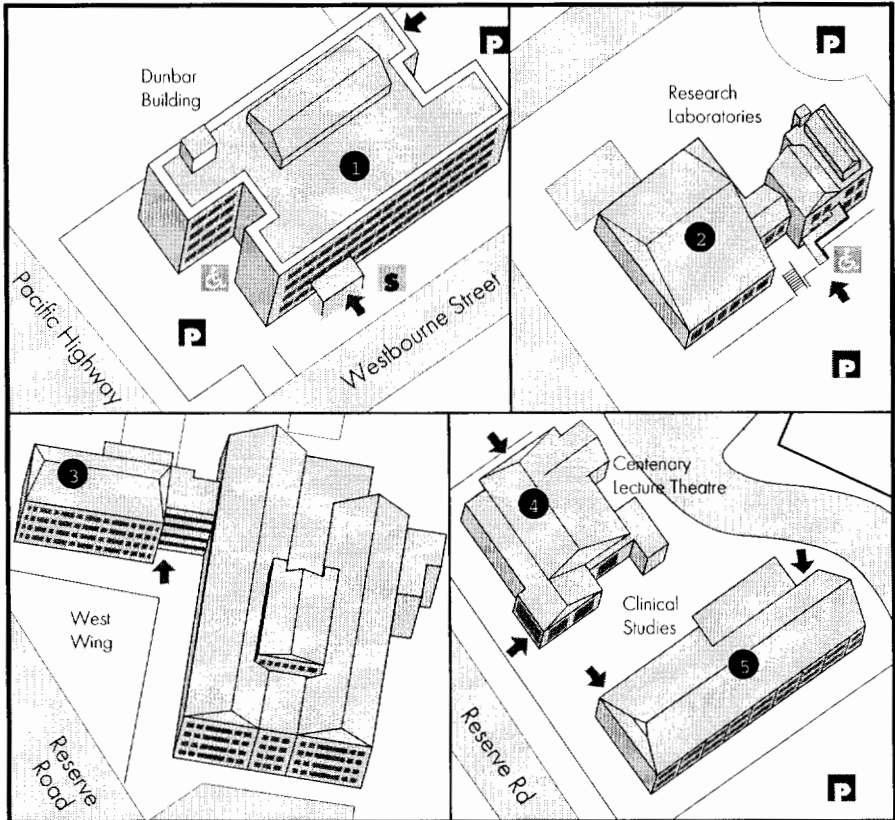
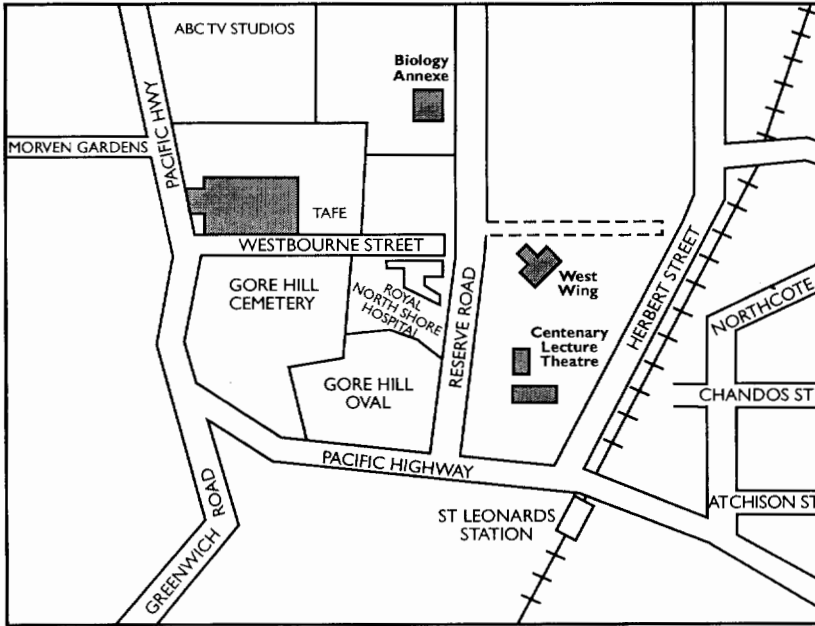
### Blackfriars



### 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
<i>City campus</i>		
Foyer, Tower Building 1 Broadway	UTS Information Service PO Box 123 Broadway NSW 2007	Telephone: (02) 9514 1222 Fax: (02) 9514 1200
<i>Kuring-gai campus</i>		
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
<i>International Programs</i>		
Level 5, Tower Building 1 Broadway	International Programs PO Box 123 Broadway NSW 2007	Telephone: (02) 9514 1531 Fax: (02) 9514 1530

### *E-mail inquiries*

Within Australia – [info.office@uts.edu.au](mailto:info.office@uts.edu.au)

International – [intlprograms@uts.edu.au](mailto:intlprograms@uts.edu.au)

## PRINCIPAL DATES FOR 1997

### Autumn semester

#### January

- 7 Release of HSC results
- 10 Formal supplementary examinations for 1996 Spring semester students
- 10 Closing date for changes of preference to the Universities Admissions Centre (UAC) from 1996 NSW and ACT HSC applicants
- 21–28 Enrolment of students at City campus
- 24 Main Round of offers to UAC applicants
- 27 Australia Day – public holiday
- 29–31 Enrolment of new undergraduate students at City campus (and 3 February till noon)
- 31 Public school holidays end

#### February

- 3 Enrolment of new undergraduate students at City campus till noon (and 29–31 January)
- 3–26 Enrolment of students at City campus

#### March

- 3 Classes begin
- 14 Last day to enrol in a course or add subjects
- 27 Last day to apply for leave of absence without incurring student fees/charges<sup>1</sup>
- 27 Last day to withdraw from a subject without financial penalty<sup>1</sup>
- 28 Public school holidays begin
- 28 Good Friday – public holiday
- 31 HECS census date
- 31 Easter Monday – public holiday
- 31 Vice-Chancellors' Week (non-teaching) begins

#### April

- 1 Graduation period begins
- 4 Public school holidays end
- 4 Vice-Chancellors' Week (non-teaching) ends
- 11 Last day to withdraw from a course or subject without academic penalty<sup>1</sup>
- 24 Provisional examination timetable available

- 25 Anzac Day – public holiday
- 30 Last day to apply to graduate in Spring semester 1997

#### May

- 1 Applications available for undergraduate courses
- 6 Applications available for postgraduate courses
- 9 Graduation period ends
- 16 Examination Masters due
- 30 Final examination timetable available
- 30 Closing date for undergraduate and postgraduate applications for Spring semester

#### June

- 9 Queen's Birthday – public holiday
- 13 Last teaching day of Autumn semester
- 14–30 Formal examination period (and 1–4 July)
- 30 Public school holidays begin

#### July

- 1–4 Formal examination period (and 14–30 June)
- 4 Autumn semester ends
- 7–11 Vice-Chancellors' Week (non-teaching)
- 11 Public school holidays end
- 14–18 Formal alternative examination period for Autumn semester students
- 25 Release of Autumn semester examination results
- 28 Formal supplementary examinations for Autumn semester students
- 30–31 Enrolment of new and readmitted students and students returning from leave/concurrent study (and 1 August)

#### August

- 1 Enrolment of new and readmitted students and students returning from leave/concurrent study (and 30–31 July)
- 1 Applications available for undergraduate and postgraduate courses for Autumn semester 1998

## Spring semester

### August

- 4 Classes begin
- 8 Last day to withdraw from full year subjects without academic penalty<sup>1</sup>
- 15 Last day to enrol in a course or add subjects
- 29 Last day to apply for leave of absence without incurring student fees/charges (Spring enrolments only)<sup>1</sup>
- 29 Last day to withdraw from a subject without financial penalty<sup>1</sup>
- 29 Last day to apply to graduate in Autumn semester 1998
- 31 HECS census date

### September

- 12 Last day to withdraw from a course or subject without academic penalty<sup>1</sup>
- 26 Provisional examination timetable available
- 29 Public school holidays begin
- 29 Graduation period begins
- 29 Vice-Chancellors' Week (non-teaching) begins
- 30 Closing date for undergraduate applications via UAC (without late fee)
- 30 Closing date for postgraduate applications (some courses may have a later closing date)
- 30 Closing date for inpUTS Special Admission Scheme applications

### October

- 3 Graduation period ends
- 3 Vice-Chancellors' Week (non-teaching) ends
- 6 Labour Day – public holiday
- 10 Public school holidays end
- 17 Examination Masters due
- 31 Final examination timetable available
- 31 Closing date for undergraduate applications via UAC (with late fee)
- 31 Closing date for undergraduate applications direct to UTS (without late fee)

- 31 Closing date for Australian Postgraduate Award (research and coursework), the R L Werner and University Doctoral Research Scholarships

### November

- 14 Last teaching day of Spring semester
- 15–28 Formal examination period (and 1–5 December)

### December

- 1–5 Formal examination period (and 15–28 November)
- 5 Spring semester ends
- 15–19 Formal alternative examination period for Spring semester students
- 19 Release of Spring semester examination results
- 22 Public school holidays begin

---

<sup>1</sup> HECS/postgraduate course fees will apply after the HECS census dates (31 March and 31 August or last working day before).

**Note:** Information is correct as at 28 October 1996. The University reserves the right to vary any information described in Principal Dates for 1997 without notice.

# Faculty information

---

## MISSION

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

## HISTORY

The Faculty began teaching in 1965 as part of a new institute, later 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 the Faculty of Engineering has continued in essentially the same form since its establishment.

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 1996 the Faculty has some 2,750 undergraduate students and 500 postgraduate students. Of the latter, some 80 are candidates for higher degrees by research, and 420 are enrolled for postgraduate awards by coursework.

## PRACTICE-BASED ENGINEERING EDUCATION

Since its beginnings, the Faculty has believed strongly in the need to educate for professional practice. It has seen engineering as something that cannot be fully expressed in a classroom or a research laboratory, but must be

experienced in the real world where engineers are responsible, amid the pressures of time scales and budgets and the uncertainties of business policy and public opinion, for producing outcomes of lasting value to society.

Australian Bachelor of Engineering courses normally occupy four years of full-time study. At UTS, in addition to completing the academic program, all BE students must gain a total of 90 weeks of approved experience in industry. This must be distributed over the period of the course and must meet standards of level, quality, and relevance – details are given later in this handbook. This means that the course lasts five-and-a-half or six years, instead of the normal four.

Graduates of most university engineering courses need up to two years' experience in industry, after graduation, before they are able to assume real responsibility. At UTS, we believe there is great benefit in gaining this industrial experience *concurrently* with the degree course, so that it reinforces and enriches the academic program and provides motivation and context. It also enables students to earn income while studying. UTS engineering graduates are able to undertake real responsibility immediately upon graduating, and have the highest employment rate of any engineering graduates in Australia.

The requirement for concurrent industrial experience is called *Cooperative Education*, denoting cooperation between university, student, and employer. UTS Engineering is by far the largest co-op faculty in Australia, in any discipline. It is the only Australian engineering faculty where co-op is mandatory for all BE students. UTS is a member of the World Council for Cooperative Education.

Practice-based engineering education means much more than just adding some industrial experience to a conventional degree course in engineering theory. It embraces the whole continuum of professional formation and lifelong extension. It requires academic staff to have experience in industry as well as in universities, to keep their industrial experience up to date, and to undertake industry-linked research and consultancy. Increasingly, it will involve the integration of formal work-based learning into engineering programs – postgraduate as well as undergraduate, and

research as well as coursework. The Faculty expects to take a leading role in advancing these concepts, and is planning major developments in its courses in 1998.

The Faculty also seeks to promote better understanding of the role of engineering in society. Many people equate engineering with science and technology, but it is much more than this. Engineering is about *using* science and technology to create real wealth – sustainable economic and social benefit. As well as excellent technical capability, engineers must have highly developed understanding of social, environmental, and business issues, professional ethics, risk and project management, interpersonal and team skills. They must be excellent communicators. They must be good at interacting with other professionals and with the community, to maximise the engineering contribution to the global economy and to the great issues of our time.

Finally, the Faculty promotes the international character of engineering. It offers every student the opportunity to take an international placement as part of their course, with full credit towards their UTS award, and strongly encourages students to take advantage of this experience. It welcomes international students, both through exchange programs and as candidates for UTS degrees. It encourages staff exchanges and international linkages in education and research, and works to build relationships with international as well as Australian leaders in engineering practice and practice-based education.

## 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 13 per cent of enrolments in engineering degree courses nationally. The Women in Engineering Program at UTS aims to promote a broadened conception of the engineering role which is inclusive of the talents, interests and capabilities of a diverse range of students, especially women. The Program works towards attracting women students into undergraduate and graduate courses at UTS and into engineering practice. Student support initiatives include liaison with academic staff, organising extracurricular and professional

activities, and advising on industrial experience placements.

The Program is well recognised in engineering education and professional circles through its inauguration of the annual Australasian Women in Engineering Forum, tertiary and secondary curriculum development initiatives and more recently its contributions to the National Review of Engineering Education. It has had a major influence on the philosophy of engineering at UTS and is centrally involved in the redesign of the BE courses for 1998.

The Faculty has the highest proportion of women academic staff of any Australian engineering faculty, many of whom have been creatively engaged with the initiatives of the Women in Engineering Unit.

## OPERATING ARRANGEMENTS

Until 1996, the Faculty's operating structure was based on three teaching schools and (since 1993) a Graduate School of Engineering.

From 1 January 1997, the Faculty will operate as a single entity. All operations will be conducted through Programs, each with a designated Director who is responsible for leading and managing the Program. Programs are grouped into four areas, each headed by an Associate Dean:

- Undergraduate Programs
- Graduate Coursework Programs
- Research
- Development

The Graduate School of Engineering (GSE) remains in being, 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.

The Dean retains overall responsibility for the Faculty, and the Faculty Administrator is responsible for administrative arrangements.

Members of academic and general staff belong to one of ten staff Groups, reflecting their professional interests and expertise. The inaugural Group titles (from 1 January 1997) are as follows; it is expected that these will evolve with time:

- Administration and Information
- Civil and Mechanical Engineering Laboratories



Civil Engineering  
 Computer Systems Engineering  
 Electrical Engineering  
 Engineering Management and Practice  
 Environmental Engineering  
 Manufacturing  
 Mechanical Engineering  
 Telecommunications Engineering

The structure is essentially a matrix, in which 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 are several advisory committees with membership drawn from industry, the profession and the community, of which details are also given later.

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

## LOCATION

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

Dean, Faculty Administrator, Faculty Office, Undergraduate Student Centre, Graduate School of Engineering, 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.

Staff locations are not rigidly demarcated, but as a general guide:

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 and Manufacturing Engineering: academic staff on Levels 6 and 4, Building 2; laboratories mainly on Levels 2 and 3, Building 2, and some on Levels 4 and 6.

Undergraduate Learning 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	Ext
<i>Dean of Engineering</i> Professor P J Parr	2/7092	2599
<i>Faculty Administrator</i> Ms D J Carraro	2/7093	2594
<i>Associate Dean, Undergraduate Programs</i> Professor K W Yates	1/2427	2436
<b>Program Directors, Bachelor of Engineering:</b>		
<i>Civil, Structural, and Civil and Environmental Engineering</i> Mr E A Brady	2/511A	2627
<i>Computer Systems Engineering</i> Professor C R Drane	1/2221A	2390
<i>Electrical Engineering</i> Dr D Webster	1/2520B	2453
<i>Telecommunications Engineering</i> Associate Professor A Seneviratne	1/2431	2441
<i>Mechanical and Manufacturing Engineering</i> Mr K A Stillman	2/612C	2667
<b>Sub-Deans, Bachelor of Engineering:</b>		
<i>Civil, Structural, and Civil and Environmental Engineering</i> Mr E A Brady	2/511A	2627
<i>Electrical, Computer Systems, and Telecommunications Engineering</i> Dr J G Nicol	1/2428	2438
<i>Mechanical and Manufacturing Engineering</i> Associate Professor H T McGregor (to 30.6.97)	2/620	2678
Mr G M Marks (from 1.7.97)	2/609	2683
<i>Director, Bachelor of Technology Program</i> Mr D M Eager	2/629	2687
<i>Director, Bachelor of Technology in Aerospace Operations</i> Mr L E Reece	2/416	2587
<i>Director, Inter-Faculty Undergraduate Programs in Engineering</i> Professor K W Yates	1/2427	2436
<i>Coordinator, Learning and Design Centres</i> Dr K Yasukawa	1/2200	2437
<i>Manager, Undergraduate Student Centre</i> To be advised	2/7105	
<i>Associate Dean Graduate Coursework Programs</i> Associate Professor J V Parkin	2/7078	2638
<i>Director, Graduate Projects</i> Dr H W Chung	2/519	2637
<b>Directors, graduate coursework programs in:</b>		
<i>Control Engineering</i> Associate Professor H T Nguyen	1/2517	2451
<i>Energy Planning and Policy</i> Dr D Sharma	2/7088	2422
<i>Engineering Management</i> Associate Professor R M Spencer	2/606	2660

## 18 FACULTY INFORMATION

	Building/Room	Ext
<i>Environmental Engineering</i> Dr P Hazelton	2/512	2661
<i>Groundwater Management</i> Professor M J Knight	1/1715	2692
<i>Information Systems Engineering</i> Associate Professor A Ginige	1/2224	2393
<i>Local Government Engineering</i> Mr K J Halstead	2/522	2640
<i>Local Government Management</i> Associate Professor K W Sproats	1/1714	2643
<i>Manufacturing Engineering and Management</i> Associate Professor R M Spencer	2/606	2660
<i>Professional Practice</i> Associate Professor R M Spencer	2/606	2660
<i>Software Engineering</i> Mr J R M Leaney	1/2221A	2389
<i>Structural Engineering</i> Associate Professor B Samali	2/513	2632
<i>Telecommunications Engineering</i> Associate Professor A Seneviratne	1/2431	2441
<i>Water Engineering</i> Associate Professor G G O'Loughlin	2/tba	2644
<i>Graduate Studies Officer</i> Ms B Buckenmaier	2/7083	2606
<i>Associate Dean Research</i> Professor J A Reizes	2/511C	2742
<b>Coordinators, research students in:</b>		
<i>Civil, Structural, and Environmental Engineering</i> Associate Professor B Samali	2/513	2632
<i>Electrical, Computer Systems and Telecommunications Engineering</i> Mr C A Scott	1/2545	2397
<i>Mechanical Engineering and Manufacturing</i> Dr G Hong	2/619	2677
<i>Coordinator, Inter- and Intra-Faculty Research Students</i> Professor J A Reizes	2/627	2742
<i>Directors, Research Concentrations</i>		
tba		
<i>Associate Dean Development</i> Professor W R Belcher	2/511B	2423
<i>Director, Industrial Liaison</i> Mr J G Crowe	2/7097	2592
<i>Director, International Engineering Program</i> Mr P Maloney	2/7100	2591
<i>Director, Women in Engineering Program</i> Ms B Holland	2/707	2601
<i>Director, Community Service Programs</i> Associate Professor P Bryce	1/2420A	2425

**Note:** In the Bachelor of Engineering Program, Directors are responsible for teaching arrangements and staff. Sub-Deans are responsible for advising students.

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.

## 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.

### The Australian Graduate School of Engineering Innovation Ltd

The Australian Graduate School of Engineering Innovation Ltd 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.

### The 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.

### The Centre for Biomedical Technology

The Centre for Biomedical Technology is a multifaculty 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.

### The 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.

### Cooperative Research Centre for Aquaculture

Cooperative Research Centre for Aquaculture includes participants from UTS and five other universities, and other research institutions and commercial groups. The Faculty is involved in the Production Efficiency and Environmental Management Program together with CSIRO, James Cook University, Central Queensland University and others.

### Cooperative Research Centre for Cardiac Technology

Cooperative Research Centre for Cardiac Technology includes UTS and three other university participants, CSIRO, three

companies and three hospitals, and 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.

### **Cooperative Research Centre for Distributed Systems Technology**

Cooperative Research Centre 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.

### **Cooperative Research Centre for Renewable Energy**

Cooperative Research Centre 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.

### **The 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.

### **The 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.

### **The 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.

The Faculty also attaches great value to its interactions 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*.

## **RESEARCH PROGRAMS**

An outline of the Faculty's research interests and strengths appears in the Postgraduate courses section of this handbook under the headings 'Current research' and 'Research centres', together with further details of some of the centres noted above.

## PROFESSIONAL BODIES

### 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. It has its headquarters 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.

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 a 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 BE graduates may expect to receive credit towards this requirement for the industrial experience gained during their degree, although some further experience is normally needed.

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).

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 1997.

### 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 effect them as professional engineers. For more information and student membership application forms call APESMA on (02) 264 9500.

## ENGINEERING CLUBS AND SOCIETIES

Engineering clubs and societies at UTS include:

- The Faculty of Engineering Speakers Club
- UTS Engineering Society
- Civil and Structural Engineering Society (CASES)
- Electrical Engineering Society (EES)
- Mechanical and Production Engineering Society (MECHPAS)
- UTS Amateur Radio Society

For more information contact the Faculty Office.

## 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

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

### Civil Engineering programs

- Smorgon ARC Engineering Prize
- 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

- CSE Forum Prize for Outstanding Industrial Experience
- Electricity Supply Engineers' Association of New South Wales Prize
- Institution of Electrical Engineers, NSW International Centre Prize
- The Institution of Electrical Engineers, UK Prize
- The Institute of Instrumentation and Control, Australia Prize
- The Sydney Electricity 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 (Stage 7) Prize
- Society of Manufacturing Engineers (Stage 8) Prize

### Engineering Co-op scholarships

Sponsored scholarships are offered annually to candidates entering the BE program from the Higher School Certificate. Details appear in the Undergraduate courses section.

### Postgraduate scholarships

Details appear in the Postgraduate courses section under the heading Charges and fees.

## ACADEMIC STAFF GROUPS – AREAS OF PROFESSIONAL INTEREST

(The staff list at the rear of the handbook includes all staff)

	Building/Room	Ext
<b>Civil Engineering</b>		
<i>Professor</i>		
Professor S L Bakoss Structural Mechanics	2/528	2629
<i>Associate Professors</i>		
Associate Professor T A Anderson Construction and Management	2/521	2639
Associate Professor M R Hausmann Soil Engineering	2/527	2545
Associate Professor G G O'Loughlin Water Engineering	tba	2644
Associate Professor B Samali Structural Dynamics and Structural Mechanics	2/513	2632
<i>Academic staff</i>		
Dr S C Beecham Water Engineering	2/507	2623
Mr E A Brady Surveying	2/612B	2627
Dr H W Chung Construction Materials	2/519	2637
Mr K E Crews Timber Engineering	2/503	2619
Mr K J Halstead Local Government Engineering	2/522	2640
Dr M R Karim Structural Mechanics	2/505	2621
Mr P J Kenny Roads and Transport	2/502	2618
Dr K L Lai Structural Mechanics Design and Construction	2/510	2626
Dr S Parsanejad Design of Steel Structures and Structural Analysis	2/504	2620
Dr R Sri Ravindrarajah Concrete Technology	2/509	2625
Dr G J Ring Soil Engineering	2/506	2622
Dr A Saleh Structural Mechanics	2/517	2635
Mr C Wilkinson Structural Mechanics, Fabric Structures	2/518	2631
<i>Research Fellow</i>		
Dr J Li	2/536	2651



	Building/Room	Ext
<b>Environmental Engineering</b>		
<i>Professors</i>		
Professor S Vigneswaran Environmental Engineering	2/523	2641
Professor M J Knight (Director, National Centre for Groundwater Management)	1/1715	2692
<i>Associate Professors</i>		
Associate Professor J V Parkin Engineering Management	2/7087	2638
Associate Professor K W Sproats Local Government Management (Director, Centre for Local Government Education and Research)	1/1714	2643
<i>Academic staff</i>		
Ms R Crichton Local Government Management (Deputy Director, Centre for Local Government Education and Research)	1/1714	2597
Dr P Hagare Environmental Engineering	2/520	1952
Dr P Hazelton Environmental Engineering	2/512	2661
Ms B Holland Environmental Engineering (Director, Women in Engineering Program)	2/7071	2601
Mr J L Irish Environmental Engineering	2/501	2617
Dr R G McLaughlan (National Centre for Groundwater Management)	1/1715	2614
Mr N P Merrick Groundwater Modelling (National Centre for Groundwater Management)	1/1715	2612
Dr W A Milne-Home (National Centre for Groundwater Management)	1/1715	2654
K Walsh Site Rehabilitation (National Centre for Groundwater Management)	1/1715	1984
<i>Engineer</i>		
Dr H H Ngo Environmental Engineering	2/547	2653
<b>Electrical Engineering</b>		
<i>Professor</i>		
Professor V S Ramsden Electrical Machines, Electrical Variable Speed Drives, Electromagnetics	1/2417C	2420
<i>Associate Professors</i>		
Associate Professor R Stere Instrumentation and Control, Data Acquisition Systems, Electronic Measurements, Engineering Education	1/2315	2401

	Building/Room	Ext
Associate Professor H T Nguyen Biomedical Engineering, Neural Networks and Fuzzy Systems, Power Electronics and Machine Control	1/2515	2451
<i>Academic staff</i>		
Ms V McKain Instrumentation and Control, Biomedical Engineering	1/2433	2443
Mr P McLean Power and Machines, Power System Protection, Numerical Methods, Parallel Processing, Electromagnetic Communications	1/1921	2339
Dr J G Nicol Control Theory, Optimal Control, Multivariable Control	1/2428	2438
Dr V Ramaswamy Power Electronics, Electrical Machines, Variable Speed Drives, Computer Simulation and Modelling	1/2417A	2418
Dr B S Rodanski Numerical Methods, Computer-aided Design, Device Modelling for CAD, Software Engineering	1/2420B	2426
Dr P A Watterson Electromagnetics, Engineering Mathematics, Numerical Methods	1/1823	2319
Dr D Webster Estimation and Detection Theory, Sensors and Transducers, Radar, Sonar	1/2520B	2453
Dr J G Zhu Electromagnetics, Electrical Machines and Drive Systems, Power Electronics	1/1823	2318
<b>Computer Systems Engineering</b>		
<i>Professor</i>		
Professor C R Drane Positioning Systems, Intelligent Vehicle Highway Systems, Software Engineering	1/2221A	2390
<i>Associate Professors</i>		
Associate Professor A Ginige Digital Systems, Image Processing Medical Imaging, Hypertext and Hypermedia Systems	1/2224	2393
Associate Professor C E Peterson Research Policy, Computer-integrated Manufacturing, Image Analysis, Process Control, Robotics	1/2220A	2392
<i>Academic staff</i>		
Mr A J Boswell Safe Intelligent Autonomous Robots, Safe Software	1/2222	2382
Mr N C Carmody Microcomputer System Design, Operating Systems, Computer Architecture, Digital Control Systems	1/2221B	2391
Mr K K Fung Parallel Processing, Software Engineering, Computer Simulation, Microcomputer Engineering, Digital Systems	1/2225	2394

	Building/Room	Ext
Mr J R M Leaney Software/System Engineering, Real-time Computing, Intelligent Instrumentation, Robotics	1/2221A	2389
Dr D B Lowe Image Processing and Analysis, Object-oriented Software Development, Software System Specification	1/2226	2526
Dr R Meegoda Computer Systems Engineering, Robotics, Software Engineering, Software Quality, Multimedia, Systems Engineering	1/2227	2396
Mr S Murray Embedded Systems, Real-time Systems, Operating Systems, Computer Systems Engineering	1/2222	1553
Mr C A Scott Intelligent Transport Systems, Motor Vehicle and Robotic Navigation	1/2220D	2397
Mr M J Sifer Software Engineering, CASE Tools, Visual Notations, Formal Specification and Functional Programming	1/2545	2460
Ms K Yasukawa Mathematics Education, Nonlinear Systems and Control, Numeracy and Engineering	1/2200	2437
<b>Telecommunications Engineering</b>		
<i>Professor</i>		
Professor K W Yates Signal Processing, Communication System Theory, Packet Radio Communications, Spread Spectrum Communications, Synchronisation Issues in Communications	1/2427	2436
<i>Associate Professors</i>		
Associate Professor S Reisenfeld Communications Systems, Satellite Communication, Information Theory, Modulation, Channel Coding, Synchronisation, Mobile Communications, Wireless Networks, Neural Networks	1/2512B	2448
Associate Professor A P Seneviratne Protocol Design, Software Engineering, Computer Networks, Data Communications, Operating Systems	1/2431	2441
<i>Academic staff</i>		
Mr T A Aubrey Antenna and Propagation, Microwave Engineering	1/2417B	2360
Dr J S Daba Teletraffic Engineering, Telecommunication Systems, Analysis and Design, Image Processing, Radar Remote Sensing	1/2420C	2530
Dr M P Eckert Human Visual Perception, Medical Processing, Biomedical Signal Processing, Signal Compression	1/2420D	2428
Ms T Ginige Protocol Design, Computer Networks, Data Communications	1/2323B	1911
Mr A Kadi Real-time Signal Processing, Ultrasound Signal Processing, Signal Theory, Hardware Design and Construction	1/2420E	2459

	Building/Room	Ext
Dr A M Sanagavarapu High Frequency Electromagnetics, Wave Propagation, Microwave Engineering, Mobile Communication	1/2512A	2447
<b>Mechanical Engineering</b>		
<i>Professor</i>		
Professor J A Reizes Computational Fluid Dynamics, Thermodynamics, Heat Transfer, Engineering Ethics	2/511C	2742
<i>Associate Professor</i>		
Associate Professor S F Johnston Design, Ergonomics, Social Context and Philosophy of Technology	2/610	2663
<i>Academic staff</i>		
Mr T A Brown Experimental and Computer-aided Stress Analysis and Design, Adhesives	2/604	2658
Dr G Hong Turbulence Transition, Internal Combustion Engines, Thermodynamics, Engineering Statistics	2/619	2677
Dr B P Huynh Computational Mechanics, Fluid Mechanics, Heat Transfer	2/616	2675
Dr A N F Mack Computing, Aerodynamics, Finite Element Methods, Computational Fluid Dynamics	2/626	2684
Dr J Madadnia Computational Fluid Dynamics, Thermodynamics, Heat Transfer	2/607	2740
Mr G M Marks Appropriate Technology, Industry Development Policy, Mechanics, Engineering Education	2/625	2683
Dr F C O Sticher Advanced Kinematics and Dynamics, Instrumentation	2/623	2681
Mr K A Stillman Control Engineering, Chemical Engineering, Real-time Computing, Simulation, Optimisation	2/624	2682
Mr R M Wiltshire Stress Analysis, Structural and Vehicle Dynamics, Machine Design, Computer-aided Engineering	2/416	2586
Dr N Zhang Vibration Analysis, Machine and Rotor Dynamics	2/608	2662
<b>Manufacturing</b>		
<i>Professor</i>		
Professor F B Swinkels Design for Manufacturing, Materials, Computer-aided Design and Computer-aided Manufacturing	2/416	2588
<i>Associate Professors</i>		
Associate Professor R M Spencer Production Planning and Control, Product Process Design and Development, Computer-aided Manufacture, Metrology/CMM, Robotics	2/606	2660

## 28 FACULTY INFORMATION

	Building/Room	Ext
Associate Professor H T McGregor Human Communication, Engineering and Social Issues, Cooperative Education, Engineering Documentation, Professional Development	2/611	2678
<i>Academic staff</i>		
Mr W J Dartnall	2/622	2541
Mr D M Eager	2/629	2687
Ms C P Killen Computer-aided Design, Computer-aided Manufacture	2/624	2697
<b>Engineering Management and Practice</b>		
<i>Professors</i>		
Professor W R Belcher	1/2419C	2423
Professor P J Parr	2/7092	2599
Ms M Boman Coordinator, Women in Engineering Program	2/7072	2602
Associate Professor P Bryce Microhydroelectricity, Appropriate Technology, Fibre Optic Communications, Electromagnetic Theory	1/2420A	2425
Mr J G Crowe (Director, Industrial Liaison)	2/7097	2592
Mr P G Lewis Engineering Education, Engineering Management, Project Management	1/2431	2431
Mr P Maloney (Director, International Engineering Program)	2/7100	2591
Mr R Mellor (Centre for Local Government Education and Research)	1/1714	2595
Ms N Mitchell (Coordinator, Women in Engineering Program)	2/7073	2540
Dr D Sharma Energy Planning and Policy, Energy Economics, Energy Modelling, Institutional Restructuring and Decision Processes, Project Planning and Performance	2/7088	2422
Ms E A Taylor Sociology and Engineering, Engineering Education, Appropriate Engineering and Society, Technology, Law and Society	1/2432	2442
Dr R B Ward Engineering Management, Technical Communication, Maintenance Hazard and Risk	2/621	2679

## LIST OF COURSES AND CODES

### Undergraduate courses

Bachelor of Engineering in Civil Engineering	EC03
Bachelor of Engineering in Civil Engineering (cross-institution)	EC00
Bachelor of Engineering in Civil and Environmental Engineering	EC07
Bachelor of Engineering in Computer Systems Engineering	EE04
Bachelor of Engineering in Electrical Engineering	EE03
Bachelor of Engineering in Electrical Engineering (cross-institution)	EE00
Bachelor of Engineering in Manufacturing Systems Engineering	EM07
Bachelor of Engineering in Mechanical Engineering	EM03
Bachelor of Engineering in Mechanical Engineering (cross-institution)	EM00
Bachelor of Engineering in Structural Engineering	EC04
(continuing students only – no new enrolments in 1997)	
Bachelor of Engineering in Telecommunications Engineering	EE06
Bachelor of Engineering/Bachelor of Arts in International Studies	E003
Bachelor of Engineering/Master of Design	EM06
Bachelor of Applied Science/ Bachelor of Engineering	NP03
Bachelor of Technology in Aerospace Operations	E011
(continuing students only – no new enrolments in 1997)	
Bachelor of Technology in Manufacturing Engineering	E010
(continuing students only – no new enrolments in 1997)	
Bachelor of Technology (with majors in: Aerospace Operations; Heating, Ventilating, Air-Conditioning and Refrigeration; Manufacturing Engineering)	E012

### Postgraduate courses

#### Research awards

Doctor of Philosophy	EP99
Master of Engineering (by thesis)	EP98
Doctor of Philosophy (Groundwater Management)	E055
Master of Engineering (by thesis) (Groundwater Management)	E056

#### Coursework awards

Master of Engineering (by coursework)	EP81
Master of Engineering (by coursework) (Energy Planning and Policy)	EP82
Master of Engineering (by coursework) (UTS–Thomson Software Engineering program)	EP83
Master of Engineering in Groundwater Management	E057
Master of Engineering in Telecommunications Engineering	EP84
Master of Engineering Management	EP85
Master of Engineering Practice	EP86
Master of Local Government Management	EB52
Master of Technology	EP71
Master of Technology (Energy Planning and Policy)	EP72
Master of Technology (UTS–Thomson Software Engineering program)	EP73
Graduate Diploma in Engineering	EP61
Graduate Diploma in Engineering (Energy Planning and Policy)	EP62
Graduate Diploma in Engineering (UTS–Thomson Software Engineering program)	EP63
Graduate Diploma in Engineering in Groundwater Management	E061
Graduate Diploma in Local Government Engineering	EP64
Graduate Certificate in Engineering	EP51
Graduate Certificate in Engineering (Energy Planning and Policy)	EP52
Graduate Certificate in Engineering (UTS–Thomson Software Engineering program)	EP53
Graduate Certificate in Environmental Engineering and Management	EP54

Students who commenced before 1 January 1995 and who are uncertain of their course codes should contact the GSE Graduate Studies Officer, telephone 9514 2606.

# Undergraduate courses

## BACHELOR OF ENGINEERING

Undergraduate courses are available in Civil Engineering, Structural Engineering, Civil and Environmental Engineering, Electrical Engineering, Computer Systems Engineering, Telecommunications Engineering, Mechanical Engineering, and Manufacturing Systems Engineering, and lead to the award of Bachelor of Engineering (BE).

Each course incorporates the principles of cooperative education in which classroom and laboratory work are developed with the needs of professional practice in mind. All students are required to undertake at least 90 weeks of approved work in industry during their course enrolment. Work experience is accumulated in blocks of at least 22 weeks' duration and must satisfy a number of rules covering its quality and timing (see Industrial experience requirements on p.33). The attendance patterns which provide for this are sandwich or part time. There are no full-time students.

Joint programs in Engineering and Arts (BE BA), and in Engineering and Industrial Design (BE MDes) are also available.

### Honours

The Bachelor of Engineering degree may be awarded with First or Second Class Honours for meritorious performance in the course as a whole.

### Attendance patterns

The structure of each course provides for both sandwich and part-time attendance patterns. Combined sandwich and part-time attendance is also possible.

A semester consists of 14 weeks of teaching, a one-week study period prior to exams and a two-week examination period. The actual weekly contact hours for a subject are denoted by semester hours – the hours of attendance each week for one semester.

Sandwich attendance requires the completion of eight academic semesters plus at least 90 weeks of approved work experience. Part-time students must be employed in work relevant to their course for the duration of their course. Part-time students are required to attend

university for up to 15 hours per week, which includes one full day (or equivalent) release from employment each week.

With approval from the Program Director, students are permitted to change their attendance pattern from part time to sandwich or vice versa to suit their circumstances, provided that industrial experience requirements are met.

### Duration of course

Normally, the sandwich attendance program will provide for students to complete the course in eight academic semesters plus four blocks of work experience with an overall duration of six years. The first two academic semesters (Stages 1 and 2) are usually completed in the first year of enrolment. The first period of work experience would normally be undertaken in the second year of enrolment. Sandwich-pattern students who choose to undertake additional subjects on a part-time basis during periods of work experience and can satisfy work experience requirements in three blocks each of at least 30 weeks' duration, can complete the course in a minimum period of five years.

The part-time attendance program provides for an overall course duration of 14 academic semesters or seven years. Part-time students are encouraged to reduce the overall duration of the course by planning for periods of sandwich attendance as they progress through the course.

### Admission

(See also the UTS 1997 *Undergraduate Student Handbook*.)

Each course has an intake of students in March each year, and some courses **may** consider a mid-year intake. Applications for admission in March are made through the Universities Admissions Centre (UAC). Inquiries for admission mid-year should be directed to the Associate Dean, Undergraduate Programs.

### Entry from HSC

Selection is based on a Tertiary Entrance Rank (TER). For admission based on the 1996 NSW HSC examination, the required levels of TER were 70.20 for Civil/Structural Engineering, 77.25 for Civil and Environmental Engineering, 70.05 for Electrical Engineering, 85.25 for

Computer Systems Engineering, 80.10 for Telecommunications Engineering, 67.55 for Mechanical/Manufacturing Systems Engineering and 86.50 for the combined BE BA degree.

Although there are no formal subject prerequisites, UTS engineering courses are taught on the assumption that students will have passed 3-unit Mathematics, 2-unit Physics and 2-unit Chemistry. It is recommended that 2-unit General English be completed as well.

### **Entry with TAFE awards**

Applicants holding approved TAFE awards will satisfy the University's general matriculation requirement. Selection to a particular course will depend, among other things, upon the level of achievement in the appropriate qualification.

### **Other qualifications**

Applications from holders of other qualifications, including TAFE Certificates/Associate Diplomas, will be considered individually on merit.

### **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 admission in a future year.

### **Advanced standing**

Students who have pursued relevant studies at another tertiary institution may be admitted to a course with advanced standing and exempted from certain subjects. Holders of appropriate TAFE Certificates/Associate Diplomas with results of high standard may also qualify for advanced standing. Extensive industrial experience gained prior to admission may qualify a student for exemption from part of the industrial experience requirements.

### **TAFE studies**

UTS has an articulated credit transfer policy with TAFE (NSW) covering advanced standing in engineering undergraduate courses. Holders of a TAFE Associate Diploma in a relevant field of engineering, at Distinction level, will be accorded 25 per cent credit towards the BE degree, subject to the following: the student has passed specified subjects within the Associate Diploma, or has obtained nominated marks in specified subjects in the Higher School Certificate prior to undertaking the Associate Diploma. In offering this

arrangement, the Faculty reserves the right to advise any student who is admitted with 25 per cent credit, and who is not succeeding in the course, to undertake some or all of the subjects from which exemption had been granted.

Students holding an Associate Diploma in an appropriate field, which is not of Distinction level but is of sufficient standard to admit them to a UTS BE course through the normal competitive admissions process, will be given credit in accordance with the Faculty's published guidelines, varying from 12 per cent to 18 per cent in particular courses.

Completion of particular TAFE qualifications does not necessarily mean that applicants with those qualifications will be offered a place at UTS.

### **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. They may be allowed further credit, on a discretionary basis, for up to a maximum of 75 per cent of the academic requirements for the degree. These students may also be accorded credit for up to 75 per cent of the industrial experience requirements for the BE degree, provided their prior industrial experience matches UTS guidelines. The academic and industrial requirements of the UTS BE have to be individually satisfied, and credit towards one does not imply pro rata exemption from the other. Students seeking to transfer to UTS from a full-time course elsewhere will be invited to seek advice.

### **Other studies**

The Faculty will continue its case-by-case examination of applications for advanced standing from entrants in all other circumstances.

### **Engineering/Mathematics bridging courses**

Many students in the Faculty of Engineering have problems with subjects which have a heavy mathematical bias. Students in the following categories are advised to seek help in mathematics.



- HSC entrants with mathematics results of:  
3-unit Mathematics – less than 110/150 (unscaled mark)  
2-unit Mathematics – less than 80/100 (unscaled mark)  
2-unit A Mathematics – any result
- TAFE Certificate entrants with B or C grades in mathematics subjects or who have completed their studies more than two years ago

Other entrants should seek advice on enrolment.

## Electives

### **Regulations for the availability of graduate subjects to undergraduate students are as follows:**

Undergraduate students in the final stages of their course may take graduate subjects, totalling up to 12 credit points, for which they have the necessary prerequisites. In exceptional cases, with approval of their Program Director, this may be extended to 18 credit points. For undergraduate students taking such subjects for credit towards their first degree, enrolment will be on a HECS-liable basis and the tuition fee normally payable by graduate students will not be charged.

Subjects offered in this way will have two components. The core component will be presented and assessed in a mode, and at a standard, appropriate to graduate students. The core component will be supplemented by a support program available to all who need it. Undergraduate students enrolling in these subjects will normally be required to undertake the support program.

A graduate subject which has another graduate subject as a prerequisite is not available to undergraduate students.

## Eligibility for Austudy

Austudy provides financial help to full-time students who meet its income and assets requirements. Application forms and information about Austudy eligibility are available from offices of the Student Services Unit at the City and Kuring-gai campuses. **Students who receive Austudy and decide to drop subjects during the semester need to be aware that to remain eligible for Austudy they must be enrolled in a minimum of 18 credit points or have a HECS liability for the semester of .375.** The only exceptions made are for students with

disabilities which interfere with their studies, students who are single supporting parents or those who have been directed by the University to reduce their study load. Student Welfare Officers in the Student Services Unit can assist students who wish to apply for exceptions on these grounds.

## Engineering Co-op scholarships

About 10 Engineering Co-op scholarships are expected to be awarded in 1997. The scholarships will be awarded to students who are successful in the 1996 HSC examinations (or equivalent) and entering any of the Bachelor of Engineering courses at UTS in 1997. Selection will be 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 an interest in engineering, communication skills, leadership and creativity.

### **Main features of the scholarship**

Scholarships are only available to applicants who satisfy requirements for admission to the sandwich program of any of the Bachelor of Engineering courses at UTS.

Each scholarship is valued at between \$5,000 and \$10,000.

Scholarships are tenable in the first academic year of the course only.

An initial payment (10 per cent of total value) is made to each scholar at the time of enrolment. This is 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, each scholar will be given the opportunity to undertake one period of work experience with the sponsor of his or her scholarship.

### **Sponsors**

In 1996 sponsors of the Engineering Co-op Scholarship program were: Gutteridge, Haskins & Davey; Institute of Municipal Engineering Australia; Keycorp Pty Ltd; Kinhill Engineers; Leighton Contractors; McMillan, Britton & Kell; Ove Arup; Pacific Power; Sydney Electricity; Vodafone; Warman International.

### **Applications**

Application forms will be available from Careers Advisers by August for the following year's intake of students.

## Cooperative education in action

Employment arrangements for sandwich students usually fall into three categories:

### Cadetships

These are made available by employers for student engineers. 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. Cadetships are also available for part-time students.

### Sponsorship

This tends to be a verbal understanding between an employer and a student which means 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. The type of work offered will often be a productive job rather than a training program.

### Freelance

This means that a student may be employed by the same or a different employer during successive industrial experience semesters.

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

In contrast to sandwich students, part-time students are continuously employed for the duration of their course enrolment, and usually have a job before commencing their studies.

Students attending on either the sandwich or part-time pattern take exactly the same subjects, and all course requirements are identical except for timetabling details. The two patterns are seen as alternative ways of meeting the cooperative education ideal and it is normally possible to transfer between attendance patterns to meet the needs of students and employers.

Progression through each course is governed by subject prerequisites and it is not necessary to pass all subjects in one stage before going on to the next stage. This allows students with

special circumstances to take reduced or accelerated programs, with the approval of their Program Director, and still maintain progress in the course. A sandwich student who has failed a subject may repeat it in an evening class during the next industrial semester, with the approval of the Program Director and employer.

## Industrial experience requirements

The following regulations have been confirmed by the Faculty Board in Engineering and are based on the Board's policy document 'Undergraduate Industrial Experience Requirements'. The regulations apply from Autumn semester 1992.

### 1. Work experience

Engineering students must gain relevant work experience throughout their course. This experience must satisfy requirements relating to the type of work, its amount and timing. Also, various enrolment procedures relating to industrial experience need to be followed. Credit will be awarded for work experience only if these requirements and procedures are satisfied.

### 2. Type of work experience

During work experience, students are expected to be engaged in activities and projects relevant to their academic studies. The final period of industrial experience should involve work approaching that likely to be experienced after graduation. The Faculty publishes specific requirements relating to the type of experience required.

### 3. Amount of work experience

The minimum amount of approved industrial experience to be accumulated prior to graduation is 90 weeks. However, most students will obtain more than 90 weeks.

Students enrolled in engineering courses prior to Autumn 1992 will be required to obtain credit for between 90 and 144 weeks of work experience, the actual duration being determined by the effect of these regulations.

Students must enrol in Industrial Experience prior to undertaking work experience for credit.

### 4. Periods of work experience

For sandwich students, work experience will normally include four blocks of

approximately 24 weeks' duration. However, students may elect to obtain their experience in longer blocks, but must take at least three blocks. Periods shorter than 22 weeks will not receive credit unless specifically approved by the Faculty Board. Each period of industrial experience for sandwich students must be preceded and followed by at least one academic semester. Sandwich students whose employers wish them to commence their course with an industrial experience period may do so with the prior approval of the Program Director.

Sandwich students will not be permitted to enrol in more than three consecutive academic semesters.

Sandwich students may in suitable circumstances study academic subjects during a period of industrial experience. Students need, however, to give a high level of commitment to their industrial experience and will be allowed to enrol in academic studies only with the written approval of their employer and the approval of the Program Director. Enrolment in academic subjects during an industrial semester normally will be limited to six hours per week but in no case should exceed two evening sessions.

Part-time students should be employed in work relevant to their course throughout their enrolment. Students who need time either to find initial employment or arrange a change of employment should seek a short exemption from this requirement. Students who remain part-time throughout the course will accumulate much more than the minimum 90 weeks of work experience.

Requirements concerning enrolment in Industrial Experience must be met by all students.

#### 5. **Advanced standing**

Students who have had relevant work experience prior to entering their course can seek advanced standing in Industrial Experience. The level of advanced standing granted will be influenced by factors such as the quality of previous work experience and the level of advanced standing granted for academic studies. Normally advanced standing for Industrial Experience will not exceed 30 weeks. For students granted advanced standing all other regulations will continue to apply.

#### 6. **Recording industrial experience**

Each student will be issued with a log book in which to record industrial experience. This must be kept up-to-date and submitted for assessment. These records and their assessment carry the same weight as academic subjects in determining students' progress. False or misleading claims of work experience will be treated as academic malpractice.

Students are required to submit comprehensive reports on work experience. Report assessments will be included in students' academic records.

### **Industrial Liaison Office**

The Faculty's Industrial Liaison Office maintains contact with industry, registers students' intentions of seeking work experience, files students' resumes, advises students and assists them in obtaining industrial experience. Students seeking work experience should register with the Faculty 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.

#### ***Membership of the Institution of Engineers, Australia***

The Institution has created the title Chartered Professional Engineer, CPEng, to describe an engineer who has completed an accredited undergraduate engineering course, has practised as an engineer, and who can demonstrate his or her competency against the Institution's standards of competency. These standards are detailed by the Institution under 11 'units':

1. Ethics and principles
2. Practice skills
3. Planning and design
4. Business and management
5. Communication
6. Research, development and commercialisation
7. Materials or components
8. Education and training
9. Manufacturing and production
10. Project implementation
11. Asset management

UTS graduates, in general, are likely to be able to meet the Institution's requirements without difficulty as the industrial experience gained during their course equips them to undertake immediate professional responsibility.

The Faculty of Engineering maintains close contact with the Institution on this and other matters, and will advise students whether their experience appears likely to be considered by the Institution as providing a suitable basis for their professional competency. The Institution will also advise students directly in this regard. It is suggested, however, that the request for advice can best be made with Faculty support.

### Exchange programs

UTS Engineering students have the opportunity to study at an overseas university and gain industrial work experience by participating in the Faculty's Student Exchange program. Subject to conditions, students gain 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:

- Institut National des Sciences Appliquées de Lyon (France)
- The University of Waterloo (Canada)
- California State University, Sacramento (USA)
- The Technical University of Budapest (Hungary)
- The University of Electro-Communications, Tokyo (Japan)
- Kyushu Institute of Technology (Japan)
- King Mongkut's Institute of Technology, Thonburi (Thailand)
- Kungl Tekniska Högskolan (Sweden)
- Mahidol University, Bangkok (Thailand)

Each university participating in the Student Exchange program has particular strengths. Selection of a particular university requires careful consideration and planning well in advance. Some universities require participating students to develop foreign language skills prior to departure from Australia.

The 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 last one semester and are rated at eight credit points. Students enrolling in language electives should first seek approval from their Program Director.

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 take out appropriate general and health insurances, and to meet their own living and travel costs. In some cases students can obtain paid work.

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 Faculty Office or their Academic Adviser.

## COURSES IN CIVIL, STRUCTURAL AND ENVIRONMENTAL ENGINEERING

Civil engineers are professionals who develop and manage the major infrastructure of society, such as road networks, buildings and water supplies. While constructing and operating these, they must strive for efficiency and safeguard the environment.

Civil Engineering covers a broad range of activities and working styles. Civil engineers may work on the design, construction, management or renovation of buildings; infrastructure development; transportation; water resources; and waste management. Most engineers possess a combination of scientific, technical, problem-solving and managerial skills and a desire to serve society. They search for cost-effective, safe and environmentally appropriate solutions.

Environmental engineering is a new and evolving field, concerned with tasks such as environmental assessments and audits, remediation of contaminated sites and design of wastewater treatment systems. The Civil and Environmental Engineering course has been introduced to meet the rapidly increasing demand for civil engineers with the broad expertise needed to plan and implement measures for the protection and improvement of the environment. The degree in Civil and Environmental Engineering has a sound environmental engineering specialisation integrated with the Civil Engineering program. Both degrees provide a thorough foundation in physical sciences, mathematics and applied engineering sciences which underpins the engineering practice subjects undertaken in the latter stages of each course. Emphasis is placed on the role of the profession in society and the contexts in which engineering is practised. The courses foster the development of communication skills and the ability to work in multidisciplinary teams with other professionals and technicians, such as architects, environmental scientists, economists and social planners.

The professional experience undertaken throughout the course enables students to combine academic studies with practical experience, and to graduate as mature and aware engineers. Through electives and project work, students can choose studies in areas of special interest to themselves.

### Bachelor of Engineering in Civil Engineering

**Course code: EC03**

#### Sandwich attendance pattern

#### Academic requirements<sup>1</sup>

		CP	HPW
<b>Stage 1</b>			
33121	Engineering Mathematics 1A	3	3
47110	Introduction to Civil Engineering	3	3
47112	Computer Applications	3	3
47113	Computer Programming	3	3
47117	Statics	4	3
47118	Surveying 1A	3	3
68021	Engineering Physics (Civil)	6	6
<b>Stage 2</b>			
33122	Engineering Mathematics 1B	3	3
47120	Graphics	4	3
47127	Mechanics of Solids 1	4	3
47128	Surveying 1B	3	3
51131	Communications 1	3	3
65023	Engineering Chemistry	6	6
67022	Materials Science for Engineers	3	3
<b>Stage 3</b>			
33221	Engineering Mathematics 2A	3	3
47131	Structural Mechanics	3	3
47133	Numerical Methods in Engineering	3	3
47134	Construction Materials	3	3
47137	Mechanics of Solids 2	3	3
47142	Environmental Engineering	3	3
66032	Geology for Engineers	3	3
<b>Stage 4</b>			
47135	Fluid Mechanics	4	3
47140	Concrete Design 1	3	3
47141	Structural Analysis 1	3	3
47144	Timber Design	3	3
47146	Soil Mechanics	4	3
47149	Construction	3	3
47152	Public Health Engineering	3	3
51161	Communications 2	3	3
<b>Stage 5</b>			
47145	Hydraulics	3	3
47150	Concrete Design 2	4	3
47151	Structural Analysis 2	4	3

47153	Probability and Statistics	3	3
47154	Concrete Technology	3	3
47156	Soil Engineering	3	3
47159	Project Planning	3	3
47168	Surveying 2	3	3

**Stage 6**

47155	Hydrology	3	3
47161	Steel Design 1	3	3
47160	Concrete Design 3	3	3
47162	Advances in Pollution Control	3	3
47164	Metals Technology	3	3
47166	Geotechnical Engineering	3	3
<i>or</i>			
47176	Ground Modification	3	3
47167	Road Engineering	3	3

**Stage 7**

47171	Steel Structures and Concept Design 1	4	3
47175	Water Resources Engineering	3	3
47177	Transportation Engineering	3	3
47178	Project Economics	3	3
47179	Construction Contracts Electives <sup>2</sup> Project <sup>3</sup>	3	3

**Stage 8**

47189	Management for Engineers Project <sup>2</sup> Electives <sup>3</sup>	4	3
-------	--	---	---

**Part-time attendance pattern**

**Academic requirements<sup>1</sup>**

		CP	HPW
<b>Year 1</b>			

**Autumn semester**

33121	Engineering Mathematics 1A	3	3
47117	Statics	4	3
47120	Graphics	4	3
68022	Engineering Physics (part-time)	3	3

**Spring semester**

33122	Engineering Mathematics 1B	3	3
47112	Computer Applications	3	3
47113	Computer Programming	3	3
68022	Engineering Physics (part-time)	3	3

**Year 2**

**Autumn semester**

47110	Introduction to Civil Engineering	3	3
47127	Mechanics of Solids 1	4	3
47118	Surveying 1A	3	3

47133	Numerical Methods in Engineering	3	3
51131	Communications 1	3	3

**Spring semester**

65023	Engineering Chemistry	6	6
33221	Engineering Mathematics 2A	3	3
47142	Environmental Engineering	3	3
47128	Surveying 1B	3	3

**Year 3**

**Autumn semester**

47137	Mechanics of Solids 2	3	3
47149	Construction	3	3
66032	Geology for Engineers	3	3
67022	Materials Science for Engineers	3	3

**Spring semester**

47135	Fluid Mechanics	4	3
47131	Structural Mechanics	3	3
47134	Construction Materials	3	3
47146	Soil Mechanics	4	3

**Year 4**

**Autumn semester**

47140	Concrete Design 1	3	3
47144	Timber Design	3	3
47152	Public Health Engineering	3	3
47153	Probability and Statistics	3	3

**Spring semester**

47145	Hydraulics	3	3
47141	Structural Analysis 1	3	3
47150	Concrete Design 2	4	3
47154	Concrete Technology	3	3

**Year 5**

**Autumn semester**

47151	Structural Analysis 2	4	3
47156	Soil Engineering	3	3
47159	Project Planning	3	3
47168	Surveying 2	3	3

**Spring semester**

47161	Steel Design 1	3	3
47160	Concrete Design 3	3	3
51161	Communications 2	3	3
47162	Advances in Pollution Control	3	3

**Year 6**

**Autumn semester**

47164	Metals Technology	3	3
47166	Geotechnical Engineering	3	3
<i>or</i>			
47176	Ground Modification	3	3
47167	Road Engineering Electives <sup>3</sup>	3	3

**Spring semester**

47155	Hydrology	3	3
47171	Steel Structures and Concept Design 1	4	3
47175	Water Resources Engineering	3	3
47179	Construction Contracts Project <sup>2</sup> Electives <sup>3</sup>	3	3

**Year 7****Autumn semester**

47177	Transportation Engineering	3	3
47178	Project Economics Project <sup>2</sup> Electives <sup>3</sup>	3	3

**Spring semester**

47189	Management for Engineers Project <sup>2</sup> Electives <sup>3</sup>	4	3
-------	--	---	---

<sup>1</sup> Industrial Experience, 47997 (sandwich) and 47999 (part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

<sup>2</sup> Project to be between 9 and 15 credit points over a maximum of three semesters.  
Project subject numbers:

	CP	HPW
47002 Project	2	3
47003 Project	3	3
47004 Project	4	4
47006 Project	6	6
47009 Project	9	9
47012 Project	12	12
47015 Project	15	15

<sup>3</sup> Electives to be between 12 and 18 credit points such that the course requirement of 192 credit points is met. Electives can be selected from the Faculty's postgraduate subjects. Any subjects offered by other faculties of the University may also be taken, with up to 6 credit points being credited to this degree.

## Bachelor of Engineering in Civil and Environmental Engineering

Course code: EC07

### Sandwich attendance pattern Academic requirements<sup>1</sup>

		CP	HPW
<b>Stage 1</b>			
33121	Engineering Mathematics 1A	3	3
47110	Introduction to Civil Engineering	3	3
47117	Statics	4	3
47118	Surveying 1A	3	3
65023	Engineering Chemistry	6	6
68021	Engineering Physics	6	6
<b>Stage 2</b>			
33122	Engineering Mathematics 1B	3	3
47112	Computer Applications	3	3
47113	Computer Programming	3	3
47127	Mechanics of Solids 1	4	3
47128	Surveying 1B	3	3
51131	Communications 1	3	3
67022	Materials Science for Engineers	3	3
91650	Introduction to Environmental Biology	3	3
<b>Stage 3</b>			
33221	Engineering Mathematics 2A	3	3
47120	Graphics	4	3
47133	Numerical Methods in Engineering	3	3
47134	Construction Materials	3	3
47137	Mechanics of Solids 2	3	3
47142	Environmental Engineering	3	3
66032	Geology for Engineers	3	3
91651	Environmental Microbiology for Engineers	3	3
<b>Stage 4</b>			
47131	Structural Mechanics	3	3
47135	Fluid Mechanics	4	3
47140	Concrete Design 1	3	3
47144	Timber Design	3	3
47146	Soil Mechanics	4	3
47149	Construction	3	3
47449	Introduction to Environmental Economics and Law	3	3
<b>Stage 5</b>			
47141	Structural Analysis 1	3	3
47145	Hydraulics	3	3
47152	Public Health Engineering	3	3

47153	Probability and Statistics	3	3
47154	Concrete Technology	3	3
47159	Project Planning	3	3
47450	The Built Environment	3	3
47452	Pollution Control and Management	3	3

**Stage 6**

47151	Structural Analysis 2	4	3
47155	Hydrology	3	3
47156	Soil Engineering	3	3
47161	Steel Design 1	3	3
47162	Advances in Pollution Control	3	3
47168	Surveying 2	3	3
47465	Environmental Hydraulics	3	3
51161	Communications 2	3	3

**Stage 7**

47160	Concrete Design 3	3	3
47167	Road Engineering	3	3
47175	Water Resources Engineering	3	3
47178	Project Economics	3	3
47179	Construction Contracts	3	3
47476	Land Conservation Project <sup>3</sup>	3	3

**Stage 8**

47177	Transportation Engineering	3	3
47189	Management for Engineers	4	3
47482	Waste Minimisation Electives <sup>2</sup> Project <sup>3</sup>	3	3

**Part-time attendance pattern**

**Academic requirements<sup>1</sup>**

CP HPW

**Year 1**

**Autumn semester**

33121	Engineering Mathematics 1A	3	3
68022	Engineering Physics (part-time)	3	3
47117	Statics	4	3
47120	Graphics	4	3

**Spring semester**

47112	Computer Applications	3	3
47113	Computer Programming	3	3
33122	Engineering Mathematics 1B	3	3
68022	Engineering Physics (part-time)	3	3

**Year 2**

**Autumn semester**

47110	Introduction to Civil Engineering	3	3
47118	Surveying 1A	3	3
47133	Numerical Methods in Engineering	3	3
47127	Mechanics of Solids 1	4	3
51131	Communications 1	3	3

**Spring semester**

47128	Surveying 1B	3	3
33221	Engineering Mathematics 2A	3	3
65023	Engineering Chemistry	6	6
91650	Introduction to Environmental Biology	3	3

**Year 3**

**Autumn semester**

47137	Mechanics of Solids 2	3	3
47149	Construction	3	3
67022	Materials Science for Engineers	3	3
66032	Geology for Engineers	3	3
91651	Environmental Microbiology for Engineers	3	3

**Spring semester**

47142	Environmental Engineering	3	3
47131	Structural Mechanics	3	3
47134	Construction Materials	3	3
47135	Fluid Mechanics	4	3

**Year 4**

**Autumn semester**

47140	Concrete Design 1	3	3
47144	Timber Design	3	3
47153	Probability and Statistics	3	3
47449	Introduction to Environmental Economics and Law	3	3

**Spring semester**

47146	Soil Mechanics	4	3
47141	Structural Analysis 1	3	3
47145	Hydraulics	3	3
47450	The Built Environment	3	3

**Year 5**

**Autumn semester**

47152	Public Health Engineering	3	3
47156	Soil Engineering	3	3
47159	Project Planning	3	3
47168	Surveying 2	3	3
47476	Land Conservation	3	3

**Spring semester**

47161	Steel Design	3	3
47162	Advances in Pollution Control	3	3
47452	Pollution Control and Management	3	3
47154	Concrete Technology	3	3

**Year 6**

**Autumn semester**

47151	Structural Analysis 2	4	3
47167	Road Engineering	3	3
47178	Project Economics	3	3
47482	Waste Minimisation	3	3



**Spring semester**

51161	Communications 2	3	3
47160	Concrete Design 3	3	3
47155	Hydrology	3	3
47179	Construction Contracts	3	3
47465	Environmental Hydraulics	3	3

**Year 7**

**Autumn semester**

47177	Transportation Engineering	3	3
	Electives <sup>1</sup>		
	Project <sup>3</sup>		

**Spring semester**

47175	Water Resources Engineering	3	3
47189	Management for Engineers	4	3
	Project <sup>3</sup>		

- <sup>1</sup> Industrial Experience, 47997 (sandwich) and 47999 (part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.
- <sup>2</sup> Electives to be between 6 and 9 credit points so that the course requirement of 192 credit points is met.
- <sup>3</sup> Project to be between 6 and 9 credit points over a maximum of three semesters.

Project subject numbers:

	CP	HPW
47002 Project	2	2
47003 Project	3	3
47004 Project	4	4
47006 Project	6	6
47009 Project	9	9

**Electives**

Subject to approval by the Program Director, students may take elective subjects from the following sources (class sizes permitting):

- special undergraduate elective subjects offered as part of their course;
- subjects offered by other programs in the Faculty of Engineering (with the permission of the Program Directors);
- subjects offered by other faculties within UTS, including language subjects, business studies and science (up to six credit points);
- subjects offered through other BE degree courses which are not a compulsory part of the student's UTS course;
- postgraduate subjects which are available to undergraduates as electives.

Students in the Bachelor of Engineering in Civil Engineering may take core subjects from the Bachelor of Engineering courses in Structural Engineering and Civil and Environmental Engineering as electives. Similarly, students in the latter two courses may take subjects from the Civil Engineering course.

Electives are offered from time to time, subject to the availability of suitable lecturers and student demand. A particular elective class may be run if sufficient numbers are enrolled.

**Undergraduate electives which may be available in 1997**

	CP	HPW
47301 Railway Engineering	3	3
47302 Welding	3	3
47305 Risk and Reliability	3	3
47306 Geomechanics	3	3
47307 Construction Management	3	3
47308 Road Materials	3	3

**Postgraduate subjects which may be available in 1997**

The following subjects may be offered as electives in accordance with the Faculty's regulations for the availability of graduate subjects to undergraduate students (see p.32 of this handbook).

	CP	HPW
49111 Coastal Engineering	6	3
49112 Urban Stormwater Flood Management	6	3
49113 Urban Stormwater Pollution Management	6	3
49130 Marine Structures	6	3
49132 Stability of Structures	6	3
49133 Steel and Composite Design	6	3
49134 Structural Dynamics	6	3
49135 Wind Engineering	6	3
49141 Advanced Geomechanics	6	3
49142 Advanced Ground Modification	6	3
49151 Advanced Concrete Technology	6	3
49152 Damage and Repair of Concrete Structures	6	3

Descriptions of these subjects appear in the postgraduate section of this handbook. Other postgraduate subjects may also be offered in 1997. Further information about graduate subjects can be obtained through the School Office.

# Bachelor of Engineering in Structural Engineering

**Course code: EC04**

This course is being phased out, and no first-year students will be admitted to it in 1997.

**Sandwich attendance pattern**

**Academic requirements<sup>1</sup>**

		CP	HPW
<b>Stage 1</b>			
33121	Engineering Mathematics 1A	3	3
47110	Introduction to Civil Engineering	3	3
47112	Computer Applications	3	3
47113	Computer Programming	3	3
47117	Statics	4	3
47118	Surveying 1A	3	3
68021	Engineering Physics (Civil)	6	6
<b>Stage 2</b>			
33122	Engineering Mathematics 1B	3	3
47120	Graphics	4	3
47127	Mechanics of Solids 1	4	3
47128	Surveying 1B	3	3
51131	Communications 1	3	3
65023	Engineering Chemistry	6	6
67022	Materials Science for Engineers	3	3
<b>Stage 3</b>			
33221	Engineering Mathematics 2A	3	3
47131	Structural Mechanics	3	3
47133	Numerical Methods in Engineering	3	3
47134	Construction Materials	3	3
47137	Mechanics of Solids 2	3	3
47142	Environmental Engineering	3	3
66032	Geology for Engineers	3	3
<b>Stage 4</b>			
47135	Fluid Mechanics	4	3
47140	Concrete Design 1	3	3
47141	Structural Analysis 1	3	3
47144	Timber Design	3	3
47146	Soil Mechanics	4	3
47149	Construction	3	3
47237	Domestic Building Design and Construction	3	3
51161	Communications 2	3	3
<b>Stage 5</b>			
47150	Concrete Design 2	4	3
47151	Structural Analysis 2	4	3
47153	Probability and Statistics	3	3
47154	Concrete Technology	3	3

47156	Soil Engineering	3	3
47159	Project Planning	3	3
47161	Steel Design 1	3	3

**Stage 6**

47160	Concrete Design 3	3	3
47164	Metals Technology	3	3
47171	Steel Structures and Concept Design 1	4	3
47265	Finite Element Analysis	3	3
47267	Approximate Methods in Structural Analysis	3	3
47268	Dynamics of Structures Electives <sup>2</sup>	3	3

**Stage 7**

47178	Project Economics	3	3
47179	Construction Contracts	3	3
47270	Concrete Design 4	3	3
47275	Bridge Design	3	3
47277	Loading on Building Structures	3	3
47278	Structural Stability	3	3
47281	Steel Structures and Concept Design 2 Project <sup>3</sup>	3	3

**Stage 8**

47189	Management for Engineers	4	3
47285	Design Project	6	6
47287	Structural Testing	3	3
47288	High-rise Buildings Electives <sup>2</sup> Project <sup>3</sup>	3	3

**Part-time attendance pattern**

**Academic requirements<sup>1</sup>**

		CP	HPW
<b>Year 1</b>			
<b>Autumn semester</b>			
33121	Engineering Mathematics 1A	3	3
47117	Statics	4	3
47120	Graphics	4	3
68022	Engineering Physics (part-time)	3	3
<b>Spring semester</b>			
33122	Engineering Mathematics 1B	3	3
47112	Computer Applications	3	3
47113	Computer Programming	3	3
68022	Engineering Physics (part-time)	3	3
<b>Year 2</b>			
<b>Autumn semester</b>			
47110	Introduction to Civil Engineering	3	3
47127	Mechanics of Solids 1	4	3

## 42 UNDERGRADUATE COURSES

47118	Surveying 1A	3	3
47133	Numerical Methods in Engineering	3	3
51131	Communications 1	3	3

### Spring semester

65023	Engineering Chemistry	6	6
33221	Engineering Mathematics 2A	3	3
47142	Environmental Engineering	3	3
47128	Surveying 1B	3	3

### Year 3

#### Autumn semester

47137	Mechanics of Solids 2	3	3
47149	Construction	3	3
66032	Geology for Engineers	3	3
67022	Materials Science for Engineers	3	3

#### Spring semester

47135	Fluid Mechanics	4	3
47131	Structural Mechanics	3	3
47134	Construction Materials	3	3
47146	Soil Mechanics	4	3

### Year 4

#### Autumn semester

47140	Concrete Design 1	3	3
47144	Timber Design	3	3
47153	Probability and Statistics	3	3
47237	Domestic Building Design and Construction	3	3

#### Spring semester

47141	Structural Analysis 1	3	3
47150	Concrete Design 2	4	3
47154	Concrete Technology	3	3
51161	Communications 2	3	3

### Year 5

#### Autumn semester

47151	Structural Analysis 2	4	3
47156	Soil Engineering	3	3
47164	Metals Technology	3	3
47159	Project Planning	3	3

#### Spring semester

47161	Steel Design 1	3	3
47160	Concrete Design 3	3	3
47179	Construction Contracts	3	3
47265	Finite Element Analysis	3	3
47268	Dynamics of Structures	3	3

### Year 6

#### Autumn semester

47267	Approximate Methods in Structural Analysis	3	3
47178	Project Economics	3	3
47277	Loading on Building Structures	3	3
47287	Structural Testing	3	3

#### Spring semester

47171	Steel Structures and Concept Design 1	4	3
47189	Management for Engineers	4	3
47270	Concrete Design 4	3	3
47275	Bridge Design	3	3

### Year 7

#### Autumn semester

47278	Structural Stability	3	3
47281	Steel Structures and Concept Design 2 Electives <sup>2</sup> Project <sup>3</sup>	3	3

#### Spring semester

47285	Design Project	6	6
47288	High-rise Buildings Electives <sup>2</sup> Project <sup>3</sup>	3	3

<sup>1</sup> Industrial Experience, 47997 (sandwich) and 47999 (part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

<sup>2</sup> Electives to be between 6 and 9 credit points so that the course requirement of 192 credit points is met.

<sup>3</sup> Project to be between 6 and 9 credit points over a maximum of three semesters.

Project subject numbers:

		CP	HPW
47002	Project	2	2
47003	Project	3	3
47004	Project	4	4
47006	Project	6	6
47009	Project	9	9

## COURSES IN ELECTRICAL, COMPUTER SYSTEMS AND TELECOMMUNICATIONS ENGINEERING

The Electrical Engineering course prepares students for careers in three main areas: electrical power, electronic instrumentation and control, and electrical communication.

The practice of electrical engineering has changed dramatically over the last few decades. Instrumentation systems have always been vital in electrical engineering, since electricity itself cannot be seen. Modern computer-based instruments have in-built sophisticated design tools which enable the engineer to deal effectively and efficiently with electronic and software systems of enormous complexity.

Most engineering activities are of sufficient scope to call on the talents of teams of people from varying professions. The individual engineer must therefore work effectively with such teams. Understanding and acceptance of discipline, management and leadership qualities, and competence in written and spoken communications, are essential.

A typical graduate electrical engineer working in electronics would develop sub-systems. This involves selection of components, designing circuits (often using computer graphics packages), simulating the circuits using computers to ensure correct operation, designing the layout of conducting tracks on printed circuit boards using further computer packages, populating the boards with components and then testing for correct operation.

The Computer Systems Engineering course prepares students for a career in the application of computers for engineering purposes such as industrial control, data acquisition, storage, retrieval and transmission, or computer-aided design and manufacture.

A computer systems engineer is a highly trained professional, who needs to have knowledge not only of software programming, but also of electronics, mathematics and physics. Because of this breadth of training, a computer systems engineer can also work as a software engineer or an electronics engineer.

As we enter the information age there is intense demand for engineers who understand the technology of telecommunications. The Telecommunications Engineering degree has been introduced to meet this need in a new specialisation in engineering. The degree

incorporates studies both in the technology of telecommunications and in the associated social, legal and commercial issues. The course is designed to produce graduates who are highly skilled in the leading edge technologies, yet also have an understanding of policy issues.

All students in the Electrical Engineering, Computer Systems Engineering, and Telecommunications Engineering degrees at UTS are required to complete approved industrial experience as they progress through their course.

### Bachelor of Engineering in Electrical Engineering

**Course code: EE03**

**Sandwich attendance pattern**

**Academic requirements<sup>1</sup>**

		CP	HPW
<b>Stage 1</b>			
35101	Mathematics 1	6	6
35111	Discrete Mathematics	3	3
45113	Digital Techniques	3	3
68031	Engineering Physics 1	6	6
45115	Engineering Practice <sup>2</sup>	3	3
45116	Electrical Engineering 1	3	3
<b>Stage 2</b>			
35102	Mathematics 2	6	6
45123	Software Development 1	6	6
45124	Electrical Engineering 2	6	6
45125	Engineering Discovery <sup>2</sup>	3	3
68032	Engineering Physics 2	3	3
<b>Stage 3</b>			
33310	Engineering Mathematics 3	6	6
45133	Software Development 2	3	3
68033	Engineering Physics 3	3	3
45134	Network Theory	6	6
45135	Engineering Communication	3	3
67023	Materials Technology	3	3
<b>Stage 4</b>			
45141	Continuous and Discrete Systems	6	6
45242	Electromagnetics	3	3
45143	Computer Hardware	3	3

## 44 UNDERGRADUATE COURSES

45144	Electronic Devices and Circuits	6	6
45145	Engineering Statistics	3	3
	Elective	3	3

Subjects in Stages 5 to 8 of the Electrical Engineering degree are selected from one of the following strands:

Telecommunications  
Power and Machines  
Instrumentation and Control

Requirements for each strand are set out below.

### Telecommunications strand

		CP	HPW
<b>Stage 5</b>			
45151	Signal Theory 1	3	3
45264	Fields and Waves	3	3
45252	Power Apparatus and Systems	6	6
45153	Analogue Electronics	6	6
45154	Contextual Studies	3	3
45155	Project A	3	3

#### Stage 6

45152	Signal Theory 2	3	3
45669	Communications Channels	6	6
45163	Real-time Software and Interfacing	3	3
45266	Mathematical Modelling	3	3
45166	Project Management	3	3
45661	Communications Networks	3	3
	Elective	3	3

#### Stage 7

45666	Signal Processing	6	6
	Elective	3	3
45668	Teletraffic Engineering	3	3
45663	Digital Transmission	3	3
45274	Physical Design and Production	3	3
45176	Systems Engineering	4	3
45182	Thesis 1	3	3

#### Stage 8

45681	Communications Systems	6	6
	Social Science elective	6	3
	Social Science elective	6	3
45183	Thesis 2	12	6

### Power and Machines strand

		CP	HPW
<b>Stage 5</b>			
45151	Signal Theory 1	3	3
45265	Numerical Methods	3	3
45252	Power Apparatus and Systems	6	6
45153	Analogue Electronics	6	6

45154	Contextual Studies	3	3
45155	Project A	3	3

#### Stage 6

45463	Power Electronics	6	6
45464	Power Systems	6	6
45264	Fields and Waves	3	3
45163	Real-time Software and Interfacing	3	3
45274	Physical Design and Production	3	3
45166	Project Management	3	3

#### Stage 7

45482	Power Equipment Design	3	3
	Elective	3	3
45473	Project B (P&M)	6	6
45176	Systems Engineering	4	3
45152	Signal Theory 2	3	3
45182	Thesis 1	3	3
68034	Electrical Power Generation	3	3

#### Stage 8

	Electives	6	6
	Social Science Elective	6	3
45183	Thesis 2	12	6

### Instrumentation and Control strand

		CP	HPW
<b>Stage 5</b>			
45151	Signal Theory 1	3	3
45252	Power Apparatus and Systems	6	6
45153	Analogue Electronics	6	6
45154	Contextual Studies	3	3
45155	Project A	3	3
	Elective 2	3	3

#### Stage 6

45152	Signal Theory 2	3	3
45364	Digital Systems	3	3
45581	Analogue and Digital Control	6	6
45166	Project Management	3	3
45265	Numerical Methods	3	3
45274	Physical Design and Production	3	3

#### Stage 7

45662	Signal Processing	3	3
45176	Systems Engineering	4	3
45562	Data Acquisition and Distribution Systems	6	6
45388	Project B (I&C)	6	3
45182	Thesis 1	3	3

#### Stage 8

	Electives	6	6
	Social Science elective	6	3
45183	Thesis 2	12	6

**Part-time attendance pattern**
**Academic requirements<sup>1</sup>**

	CP	HPW
<b>Stage 1</b>		
<b>Autumn semester</b>		
35101 Mathematics 1	6	6
35111 Discrete Mathematics	3	3
45113 Digital Techniques	3	3
<b>Spring semester</b>		
68031 Engineering Physics 1	6	6
45115 Engineering Practice <sup>2</sup>	3	3
45116 Electrical Engineering 1	3	3
<b>Stage 2</b>		
<b>Autumn semester</b>		
35102 Mathematics 2	6	6
45123 Software Development 1	6	6
<b>Spring semester</b>		
45124 Electrical Engineering 2	6	6
45125 Engineering Discovery <sup>2</sup>	3	3
68032 Engineering Physics 2	3	3
<b>Stage 3</b>		
<b>Autumn semester</b>		
33310 Engineering Mathematics 3	6	6
45133 Software Development 2	3	3
68033 Engineering Physics 3	3	3
<b>Spring semester</b>		
45134 Network Theory	6	6
45135 Engineering Communication	3	3
67023 Materials Technology	3	3
<b>Stage 4</b>		
<b>Autumn semester</b>		
45141 Continuous and Discrete Systems	6	6
45242 Electromagnetics	3	3
45143 Computer Hardware	3	3
<b>Spring semester</b>		
45144 Electronic Devices and Circuits	6	6
45145 Engineering Statistics	3	3
Elective	3	3

Subjects in Stages 5 to 8 of the Electrical Engineering degree are selected from one of the following strands:

- Telecommunications
- Power and Machines
- Instrumentation and Control

Requirements for each strand are set out below.

**Telecommunications strand**

	CP	HPW
<b>Stage 5</b>		
<b>Autumn semester</b>		
45151 Signal Theory 1	3	3
45264 Fields and Waves	3	3
45252 Power Apparatus and Systems	6	6
<b>Spring semester</b>		
45153 Analogue Electronics	6	6
45154 Contextual Studies	3	3
45155 Project A	3	3
<b>Stage 6</b>		
<b>Autumn semester</b>		
45152 Signal Theory 2	3	3
45669 Communications Channels	6	6
45163 Real-time Software and Interfacing	3	3
<b>Spring semester</b>		
45266 Mathematical Modelling	3	3
45166 Project Management	3	3
45661 Communications Networks	3	3
Elective	3	3
<b>Stage 7</b>		
<b>Autumn semester</b>		
45666 Signal Processing	6	6
Elective	3	3
45668 Teletraffic Engineering	3	3
<b>Spring semester</b>		
45663 Digital Transmission	3	3
45274 Physical Design and Production	3	3
45176 Systems Engineering	4	3
45182 Thesis 1	3	3
<b>Stage 8</b>		
<b>Autumn semester</b>		
45681 Communications Systems	6	6
Social Science elective	6	3
Social Science elective	6	3
<b>Spring semester</b>		
45183 Thesis 2	12	6

**Power and Machines strand**

	CP	HPW
<b>Stage 5</b>		
<b>Autumn semester</b>		
45151 Signal Theory 1	3	3
45265 Numerical Methods	3	3
45252 Power Apparatus and Systems	6	6
<b>Spring semester</b>		
45153 Analogue Electronics	6	6
45154 Contextual Studies	3	3
45155 Project A	3	3
<b>Stage 6</b>		
<b>Autumn semester</b>		
45264 Fields and Waves	3	3
45163 Real-time Software and Interfacing	3	3
45274 Physical Design and Production	3	3
45166 Project Management	3	3
<b>Spring semester</b>		
45463 Power Electronics	6	6
45464 Power Systems	6	6
<b>Stage 7</b>		
<b>Autumn semester</b>		
45482 Power Equipment Design	3	3
Elective	3	3
45473 Project B (P&M)	6	6
<b>Spring semester</b>		
45176 Systems Engineering	4	3
45152 Signal Theory 2	3	3
45182 Thesis 1	3	3
68034 Electrical Power Generation	3	3
<b>Stage 8</b>		
<b>Autumn semester</b>		
Electives	6	6
Social Science Elective	6	3
<b>Spring semester</b>		
45183 Thesis 2	12	6

**Instrumentation and Control strand**

	CP	HPW
<b>Stage 5</b>		
<b>Autumn semester</b>		
45151 Signal Theory 1	3	3
45252 Power Apparatus and Systems	6	6
<b>Spring semester</b>		
45153 Analogue Electronics	6	6
45154 Contextual Studies	3	3
45155 Project A	3	3
Elective 2	3	3
<b>Stage 6</b>		
<b>Autumn semester</b>		
45152 Signal Theory 2	3	3
45364 Digital Systems	3	3
<b>Spring semester</b>		
45581 Analogue and Digital Control	6	6
45166 Project Management	3	3
45265 Numerical Methods	3	3
45274 Physical Design and Production	3	3
<b>Stage 7</b>		
<b>Autumn semester</b>		
45666 Signal Processing	6	6
45176 Systems Engineering	4	3
<b>Spring semester</b>		
45562 Data Acquisition and Distribution Systems	6	6
45388 Project B (I&C)	6	3
45182 Thesis 1	3	3
<b>Stage 8</b>		
<b>Autumn semester</b>		
Electives	6	6
Social Science elective	6	3
<b>Spring semester</b>		
45183 Thesis 2	12	6

<sup>1</sup> Industrial Experience, 45997 (sandwich) and 45999 (part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

<sup>2</sup> Group 2 students (those who gained admission other than through the HSC) undertake the subject 59325 Science Technology and Human Values instead of Engineering Practice and Engineering Discovery.

# Bachelor of Engineering in Computer Systems Engineering

**Course code: EE04**

## Sandwich attendance pattern

### Academic requirements<sup>1</sup>

	CP	HPW
<b>Stage 1</b>		
35101 Mathematics 1	6	6
35111 Discrete Mathematics	3	3
45113 Digital Techniques	3	3
68031 Engineering Physics 1	6	6
45115 Engineering Practice <sup>2</sup>	3	3
45116 Electrical Engineering 1	3	3
<b>Stage 2</b>		
35102 Mathematics 2	6	6
45123 Software Development 1	6	6
45124 Electrical Engineering 2	6	6
45125 Engineering Discovery <sup>2</sup>	3	3
68032 Engineering Physics 2	3	3
<b>Stage 3</b>		
33310 Engineering Mathematics 3	6	6
45133 Software Development 2	3	3
45143 Computer Hardware	3	3
45134 Network Theory	6	6
45135 Engineering Communication	3	3
67023 Materials Technology	3	3
<b>Stage 4</b>		
45141 Continuous and Discrete Systems	6	6
45342 Electromechanical Systems	3	3
45163 Real-time Software and Interfacing	3	3
45144 Electronic Devices and Circuits	6	6
45145 Engineering Statistics	3	3
Elective	3	3
<b>Stage 5</b>		
45151 Signal Theory 1	3	3
45363 Software Engineering	3	3
45353 Operating Systems	6	6
45153 Analogue Electronics	6	6
45155 Project A	3	3
45364 Digital Systems	3	3
<b>Stage 6</b>		
45152 Signal Theory 2	3	3
45372 Computer Systems Analysis	3	3

31141 Database Structures and Management	3	3
45266 Mathematical Modelling	3	3
45154 Contextual Studies	3	3
45166 Project Management	3	3
Social Science elective	3	3

### Stage 7

45661 Communications Networks	3	3
45562 Data Acquisition and Distribution Systems	6	6
45176 Systems Engineering	3	3
45182 Thesis 1	3	3
Electives	9	9

### Stage 8

45383 Computer Systems Design	6	3
Elective	3	3
31926 Paradigms of Intelligence	4	3
45183 Thesis 2	12	6

## Part-time attendance pattern

### Academic requirements<sup>1</sup>

	CP	HPW
<b>Stage 1</b>		
<b>Autumn semester</b>		
35101 Mathematics 1	6	6
35111 Discrete Mathematics	3	3
45113 Digital Techniques	3	3
<b>Spring semester</b>		
68031 Engineering Physics 1	6	6
45115 Engineering Practice <sup>2</sup>	3	3
45116 Electrical Engineering 1	3	3
<b>Stage 2</b>		
<b>Autumn semester</b>		
35102 Mathematics 2	6	6
45123 Software Development 1	6	6
<b>Spring semester</b>		
45124 Electrical Engineering 2	6	6
45125 Engineering Discovery <sup>2</sup>	3	3
68032 Engineering Physics 2	3	3
<b>Stage 3</b>		
<b>Autumn semester</b>		
33310 Engineering Mathematics 3	6	6
45133 Software Development 2	3	3
45143 Computer Hardware	3	3
<b>Spring semester</b>		
45134 Network Theory	6	6
45135 Engineering Communication	3	3
67023 Materials Technology	3	3



**Stage 4****Autumn semester**

45141	Continuous and Discrete Systems	6	6
45342	Electromechanical Systems	3	3
45163	Real-time Software and Interfacing	3	3

**Spring semester**

45144	Electronic Devices and Circuits	6	6
45145	Engineering Statistics Elective	3	3

**Stage 5****Autumn semester**

45151	Signal Theory 1	3	3
45363	Software Engineering	3	3
45353	Operating Systems	6	6

**Spring semester**

45153	Analogue Electronics	6	6
45155	Project A	3	3
45364	Digital Systems	3	3

**Stage 6****Autumn semester**

45152	Signal Theory 2	3	3
45372	Computer Systems Analysis	3	3
31141	Database Structures and Management	3	3
45266	Mathematical Modelling	3	3

**Spring semester**

45154	Contextual Studies	3	3
45166	Project Management	3	3
	Social Science elective	3	3

**Stage 7****Autumn semester**

45661	Communications Networks	3	3
45562	Data Acquisition and Distribution Systems	6	6
45176	Systems Engineering	3	3

**Spring semester**

45182	Thesis 1	3	3
	Electives	9	9

**Stage 8****Autumn semester**

45383	Computer Systems Design	6	3
	Elective	3	3
31926	Paradigms of Intelligence	4	3

**Spring semester**

45183	Thesis 2	12	6
-------	----------	----	---

<sup>1</sup> Industrial Experience, 45997 (sandwich) and 45999 (part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

<sup>2</sup> Group 2 students (those who gained admission other than from the HSC) enrol in the subject 59325 Science Technology and Human Values instead of Engineering Practice and Engineering Discovery.

# Bachelor of Engineering in Telecommunications Engineering

**Course code: EE06**

## Sandwich attendance pattern

### Academic requirements<sup>1</sup>

		CP	HPW
<b>Stage 1</b>			
35101	Mathematics 1	6	6
35111	Discrete Mathematics	3	3
45113	Digital Techniques	3	3
68031	Engineering Physics 1	6	6
45115	Engineering Practice <sup>2</sup>	3	3
45116	Electrical Engineering 1	3	3
<b>Stage 2</b>			
35102	Mathematics 2	6	6
45123	Software Development 1	6	3
45124	Electrical Engineering 2	6	6
45125	Engineering Discovery <sup>2</sup>	3	3
68032	Engineering Physics 2	3	3
<b>Stage 3</b>			
33310	Engineering Mathematics 3	6	6
45133	Software Development 2	3	3
45143	Computer Hardware	3	3
45134	Network Theory	6	6
45135	Engineering Communication	3	3
67023	Materials Technology	3	3
<b>Stage 4</b>			
45141	Continuous and Discrete Systems	6	6
45163	Real-time Software and Interfacing	3	3
45145	Engineering Statistics	3	3
55080	Information Issues in Telecommunications	6	3
45144	Electronics Devices and Circuits	6	6
<b>Stage 5</b>			
45152	Signal Theory 1	3	3
45266	Mathematical Modelling	3	3
45353	Operating Systems	6	6
45363	Software Engineering	3	3
45364	Digital Systems	3	3
45155	Project A	3	3
45242	Electromagnetics	3	3
<b>Stage 6</b>			
45152	Signal Theory 2	3	3
45264	Fields and Waves	3	3
31141	Database Structures and Management	3	3

45661	Communications Networks	3	3
	Elective	3	3
45166	Project Management	3	3
27001	Commercial Issues in Telecommunications	6	3

### Stage 7

45666	Signal Processing	6	3
45668	Teletraffic Engineering	3	3
45667	Broadband Telecommunications Networks	3	3
45663	Digital Transmission	3	3
45182	Thesis 1	3	3
79371	Legal Issues in Telecommunications	6	3

### Stage 8

45176	Systems Engineering	4	3
	Elective	3	3
45681	Communications Systems	6	6
45183	Thesis 2	12	6

## Part-time attendance pattern

### Academic requirements<sup>1</sup>

		CP	HPW
<b>Stage 1</b>			
<b>Autumn semester</b>			
35101	Mathematics 1	6	6
35111	Discrete Mathematics	3	3
45113	Digital Techniques	3	3
<b>Spring semester</b>			
68031	Engineering Physics 1	6	6
45115	Engineering Practice <sup>2</sup>	3	3
45116	Electrical Engineering 1	3	3
<b>Stage 2</b>			
<b>Autumn semester</b>			
35102	Mathematics 2	6	6
45123	Software Development 1	6	3
<b>Spring semester</b>			
45124	Electrical Engineering 2	6	6
45125	Engineering Discovery <sup>2</sup>	3	3
68032	Engineering Physics 2	3	3
<b>Stage 3</b>			
<b>Autumn semester</b>			
33310	Engineering Mathematics 3	6	6
45133	Software Development 2	3	3
45143	Computer Hardware	3	3
<b>Spring semester</b>			
45134	Network Theory	6	6
45135	Engineering Communication	3	3
67023	Materials Technology	3	3

**Stage 4****Autumn semester**

45141	Continuous and Discrete Systems	6	6
45163	Real-time Software and Interfacing	3	3
45145	Engineering Statistics	3	3
55080	Information Issues in Telecommunications	6	3

**Spring semester**

45144	Electronics Devices and Circuits	6	6
-------	----------------------------------	---	---

**Stage 5****Autumn semester**

45152	Signal Theory 1	3	3
45266	Mathematical Modelling	3	3
45353	Operating Systems	6	6

**Spring semester**

45363	Software Engineering	3	3
45364	Digital Systems	3	3
45155	Project A	3	3
45242	Electromagnetics	3	3

**Stage 6****Autumn semester**

45152	Signal Theory 2	3	3
45264	Fields and Waves	3	3
31141	Database Structures and Management	3	3
45661	Communication Networks	3	3

**Spring semester**

	Elective	3	3
45166	Project Management	3	3
27001	Commercial Issues in Telecommunications	6	3

**Stage 7****Autumn semester**

45666	Signal Processing	6	3
45668	Teletraffic Engineering	3	3
45667	Broadband Telecommunications Networks	3	3

**Spring semester**

45663	Digital Transmission	3	3
45182	Thesis 1	3	3
79371	Legal Issues in Telecommunications	6	3

**Stage 8****Autumn semester**

45176	Systems Engineering Elective	4	3
45681	Communications Systems	6	6

**Spring semester**

45183	Thesis 2	12	6
-------	----------	----	---

<sup>1</sup> Industrial Experience, 45997 (sandwich) and 45999 (part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

<sup>2</sup> Group 2 students (those who gained admission other than through the HSC) enrol in the subject 59325 Science Technology and Human Values instead of Engineering Practice and Engineering Discovery.

## COURSES IN MECHANICAL AND MANUFACTURING SYSTEMS ENGINEERING

Mechanical engineers are responsible for the design, manufacture, development, installation, testing, control and maintenance of machinery. They provide technical input and management for a wide range of industrial projects, processes and systems, including power generation and transport. In collaboration with other professionals they have an important responsibility for protecting the environment and for the efficient use of energy and natural resources. Mechanical engineers cooperate with production workers to create safe, efficient and pleasant working conditions.

Manufacturing Systems Engineering includes the design, development and optimisation of product, process and system technologies in manufacturing industries. The course prepares students for careers in a wide range of industries, including those producing leisure products and processing food and drugs. Manufacturing systems engineers interact with a variety of other professionals, including market researchers and industrial designers.

The courses in Mechanical and Manufacturing Systems Engineering provide a thorough grounding in the physical sciences, especially mathematics and physics. Accompanying this is a strong emphasis on the development of creativity and problem-solving skills. Analysis, design and experimentation are central aspects of professional activity in these branches of engineering. Oral, written, graphic and mathematical communication and documentation skills are also essential. The importance of sensitivity to the social, economic and environmental context of engineering is emphasised in subjects throughout the courses.

The quality and effectiveness of design support to Australian manufacturing is central to industry success. There is a demand for professional engineers who understand how industrial designers work and can cooperate effectively with them in design teams to produce innovative and attractive products for both Australian and international markets. The combined Bachelor of Engineering (in Mechanical or Manufacturing Systems Engineering) and Master of Design degree program has been introduced to meet this need.

All students in the Mechanical Engineering and Manufacturing Systems Engineering

degrees at UTS are required to complete approved industrial experience as they progress through their course. The Professional Orientation stream of subjects integrates this experience with the academic program. The sandwich program normally takes six years to complete and the part-time program seven years. With optimum work-experience patterns, however, it is possible to complete the Mechanical Engineering degree in five-and-a-half years, and the Manufacturing Systems Engineering degree in five years, including the full 90 weeks of work experience.

### Bachelor of Engineering in Mechanical Engineering

**Course code: EM03**

**Sandwich attendance pattern**

**Academic requirements<sup>1</sup>**

		CP	HPW
<b>Stage 1</b>			
33120	Engineering Mathematics 1	6	6
46310	Introduction to Engineering	4	3
46311	Engineering Graphics	4	3
46810	Introduction to Computing	4	3
65023	Engineering Chemistry	6	6
<b>Stage 2</b>			
33220	Engineering Mathematics 2	6	6
46110	Mechanics 1	6	4.5
46710	Materials Processing	4	3
46811	Computing 2	4	3
68011	Engineering Physics (Mechanical)	4	4
<b>Stage 3</b>			
46122	Mechanics 2	6	4.5
46321	Computer-aided Drafting	4	3
46420	Fluid Mechanics	6	4.5
46620	Engineering Communication	4	3
67021	Materials Engineering 1	4	4
<b>Stage 4</b>			
46121	Mechanics of Machines	6	4.5
46220	Solid Mechanics 1	6	4.5
46421	Thermodynamics	6	4.5
46821	Computing 3	6	4.5

**Stage 5**

46130	Dynamics of Mechanical Systems	4	3
46331	Design 1	6	4.5
46430	Thermofluids	6	4.5
67061	Materials Engineering 2	4	4
68012	Electrical Engineering 1 (Mechanical)	4	4

**Stage 6**

45931	Electrical Engineering 2 (Mechanical)	4	4
46230	Solid Mechanics 2	6	4.5
46431	Heat Transfer	4	3
46530	Measurement and Instrumentation	6	4.5
46630	Engineering and Society	4	3

**Stage 7**

46033	Project A	4	3
46334	Design 2	4	3
46531	Control Engineering 1	6	4.5
46632	Engineering Management Elective 1 <sup>2</sup>	6	4.5
		4	3

**Stage 8**

46034	Project B	6	4.5
46992	Professional Practice Elective 2	6	4.5
	Elective 3	4	3
	Elective 4	4	3

<sup>1</sup> Industrial Experience, 46997 (sandwich) and 46999 (part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

<sup>2</sup> One of the four electives may be taken outside the Mechanical Engineering program with the written approval of the Program Director. Electives are offered on demand and not all electives are offered every year. Some electives are offered in an intensive mode between semesters.

**Part-time attendance pattern****Academic requirements<sup>1</sup>**

CP HPW

**Stage 1****Autumn semester**

33121	Engineering Mathematics 1A	3	3
46310	Introduction to Engineering	4	3
46311	Engineering Graphics	4	3
46810	Introduction to Computing	4	3

**Spring semester**

33122	Engineering Mathematics 1B	3	3
65023	Engineering Chemistry	6	6
68011	Engineering Physics (Mechanical)	4	4

**Stage 2****Autumn semester**

33220	Engineering Mathematics 2	6	6
46110	Mechanics 1	6	4.5
46620	Engineering Communication	4	3

**Spring semester**

46710	Materials Processing	4	3
46811	Computing 2	4	3
67021	Materials Engineering 1	4	4

**Stage 3****Autumn semester**

46122	Mechanics 2	6	4.5
46321	Computer-aided Drafting	4	3
68012	Electrical Engineering 1 (Mechanical)	4	4

**Spring semester**

46420	Fluid Mechanics	6	4.5
46821	Computing 3	6	4.5

**Stage 4****Autumn semester**

46220	Solid Mechanics 1	6	4.5
46421	Thermodynamics	6	4.5

**Spring semester**

46121	Mechanics of Machines	6	4.5
46430	Thermofluids	6	4.5

**Stage 5****Autumn semester**

46130	Dynamics of Mechanical Systems	4	3
46331	Design 1	6	4.5
67061	Materials Engineering 2	4	4

**Spring semester**

46230	Solid Mechanics 2	6	4.5
46431	Heat Transfer	4	3
46630	Engineering and Society	4	3

**Stage 6****Autumn semester**

45931	Electrical Engineering 2 (Mechanical)	4	4
46334	Design 2	4	3
46530	Measurement and Instrumentation	6	4.5

**Spring semester**

46531	Control Engineering 1	6	4.5
46632	Engineering Management	6	4.5

Stage 7

**Autumn semester**

46033	Project A	4	3
46992	Professional Practice	6	4.5
	Elective 1 <sup>2</sup>	4	3

**Spring semester**

46034	Project B	6	4.5
	Elective 2	4	3
	Elective 3	4	3
	Elective 4	4	3

<sup>1</sup> Industrial Experience, 46997 (sandwich) and 46999 (part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

<sup>2</sup> One of the four electives may be taken outside the Mechanical Engineering program with the written approval of the Program Director. Electives are offered on demand and not all electives are offered every year. Some electives are offered in an intensive mode between semesters.

**Electives**

All of the following electives have a value of four credit points and involve three contact hours per week.

**Manufacturing and Management**

- 46040 Ergonomics
- 46640 Terotechnology
- 46642 Engineering Economics
- 46740 Quality and Reliability
- 46741 Flexible Manufacturing
- 46742 Production and Cost Control
- 46744 Computer-aided Manufacturing

**Applied Mechanics and Design**

- 46140 Kinematics and Dynamics of Machines
- 46141 Applied Dynamics
- 46142 Robotics
- 46143 Einstein's Universe
- 46240 Solid Mechanics 3
- 46241 Finite Element Applications
- 46340 Structures
- 46341 Machine Design
- 46343 Appropriate Technology
- 46344 Engineering Speculation
- 46345 Industrial Design

**Energy**

- 46441 Combustion and Air Pollution
- 46442 Advanced Fluid Dynamics
- 46443 Refrigeration and Airconditioning
- 46444 Power Cycles
- 46445 Fluid Machines

**Control and Computing**

- 46540 Programmable Controllers and Applications
- 46541 Control Engineering 2
- 46840 Advanced Engineering Computing
- 46841 Operations Research

**Other approved electives**

- 65071 Corrosion Technology for Engineers
- 91379 Environmental Science for Engineers

**Postgraduate subjects which may be available as electives in 1997**

The following subjects may be offered as electives in accordance with the Faculty's regulations for the availability of graduate subjects to undergraduate students (see p.32 of this handbook). These subjects all have a value of six credit points.

- 49033 Combined and Cogeneration Power Plants
- 49010 Engineering Ethics
- 49011 International Engineering
- 49044 Engineering Communication and Documentation
- 49047 Finite Element Applications in Engineering
- 49377 Process Control Studies
- 49311 Advanced Heat Transfer
- 49312 Computational Fluid Dynamics
- 49316 Bulk Materials Handling
- 49308 Rapid Response Engineering
- 49317 Design and Manufacture with Adhesives
- 49309 Quality Planning and Auditing
- 49381 Applications of Optimisation in Engineering

Descriptions of these subjects appear in the postgraduate section of this handbook.

## Bachelor of Engineering in Manufacturing Systems Engineering

**Course code: EM07**

**Sandwich attendance pattern<sup>1</sup>**

**Academic requirements<sup>1</sup>**

		CP	HPW
<b>Stage 1</b>			
33120	Engineering Mathematics 1	6	6
46312	Introduction to Manufacturing Systems	4	3
46311	Engineering Graphics	4	3
46810	Introduction to Computing	4	3
65023	Engineering Chemistry	6	6
<b>Stage 2</b>			
46110	Mechanics 1	6	4.5
46715	Manufacturing Processes	6	4.5
46811	Computing 2	4	3
67021	Materials Engineering 1	4	4
68011	Engineering Physics (Mechanical)	4	4
<b>Stage 3</b>			
33221	Engineering Mathematics 2A	3	3
46125	Mechanics for Manufacturing	6	4.5
46321	Computer-aided Drafting	4	3
46620	Engineering Communication	4	3
46725	Manufacturing Systems	6	4.5
<b>Stage 4</b>			
46220	Solid Mechanics 1	6	4.5
46630	Engineering and Society	4	3
46726	Manufacturing Systems Planning	4	3
46821	Computing 3	6	4.5
68012	Electrical Engineering 1 (Mechanical)	4	4
<b>Stage 5</b>			
45931	Electrical Engineering 2 (Mechanical)	4	4
46435	Fluid Mechanics for Manufacturing	4	3
46535	Metrology and Instrumentation	6	4.5
46632	Engineering Management	6	4.5
67061	Materials Engineering 2	4	4

### Stage 6

46335	Design for Manufacturing	6	4.5
46336	Computer-aided Manufacturing	4	3
46436	Thermodynamics for Manufacturing	4	3
46531	Control Engineering 1	6	4.5
46540	Programmable Controllers and Applications	4	3

### Stage 7

46033	Project A	4	3
46437	Thermofluids for Manufacturing	4	3
46735	Manufacturing Systems: Quality	6	4.5
46835	Operations Research Elective 1 <sup>3</sup>	6	4.5
		4	3

### Stage 8

46034	Project B	6	4.5
46337	Manufacturing Systems Design	4	3
46992	Professional Practice Elective 2 <sup>3</sup>	6	4.5
	Elective 3 <sup>3</sup>	4	3
		5	3

<sup>1</sup> While provision will be made for students to take this program in a part-time mode, the preferred pattern for the Bachelor of Engineering in Manufacturing Systems Engineering is for the program to be undertaken in sandwich mode, except for Stage 7 which is preferably undertaken part time over a year. The first 30-week period of professional experience is preferably undertaken in Stage 3. This pattern allows the student to complete the degree in five years, including the required 90 weeks of professional experience.

<sup>2</sup> Industrial Experience, 46997 (sandwich) and 46999 (part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

<sup>3</sup> Electives are normally to be taken within the Mechanical Engineering program, except with written approval of the Program Director. Electives are offered on demand and not all electives are offered every year. One elective must be of at least 5 credit points.

Please refer to the section Bachelor of Engineering in Mechanical Engineering – Electives.

## Bachelor of Engineering/ Bachelor of Arts in International Studies

---

### Course code: E003

The Faculty of Engineering offers a combined degree program leading to the award of a Bachelor of Engineering (BE) degree in one of the Faculty's fields of specialisation and a Bachelor of Arts (BA) degree in International Studies. The program is offered in collaboration with the Institute for International Studies.

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

The program links traditional engineering studies with the study of a language and culture, other than English, and the practice of engineering in a foreign country or countries. It is available in association with the Bachelor of Engineering course in any of the fields already offered:

- Civil Engineering
- Civil and Environmental Engineering
- Computer Systems Engineering
- Electrical Engineering
- Manufacturing Systems Engineering
- Mechanical Engineering
- Telecommunications Engineering

### Exemptions

Under normal circumstances, no exemptions are allowed in the combined degree program. The aim will be to develop each student's capabilities to the fullest possible extent.

### Admission

Students normally enter the program directly from high school and are admitted on the basis of their academic performance, a demonstrated proficiency in one of the target languages, commitment to a career in engineering and their prospects of leadership in the profession.

The proficiency in language may have been developed at high school, through private

study or through the student's family background.

Entry requirements of the relevant Bachelor of Engineering course, including its minimum TER cut-off, must be met. The minimum TER for the BE BA program has been set at 80. Selection is made through the Universities Admissions Centre (UAC) and a UTS interview.

Quotas will be set for each engineering and culture specialisation based on the expected support of industry.

### Attendance

The program is offered only on a sandwich attendance basis, although students will be able to transfer to part-time attendance for periods during the course if their circumstances make this desirable.

The overall duration of the program is a minimum of six years. The program requires satisfactory completion of eight semesters of academic work, plus at least 60 weeks of appropriate industrial experience in Australia (refer to the industrial experience requirements in this handbook) and a year of academic study and work experience overseas. The overseas year will normally count as one semester of academic work and 30 weeks of industrial experience. For the purpose of calculating HECS, the course is deemed to be the equivalent of five years of full-time study.

### Course structure

Students will be required to complete a total of 240 credit points, comprising 144 credit points of BE studies, 48 credit points of International Studies and 48 credit points of the International Practice of Engineering. Engineering and International Studies are integrated throughout the program and the combined degree is awarded on completion. It is not possible to complete either degree separately at an intermediate point.

The program requires each student to spend a full year overseas, normally in the fourth year of enrolment. This will be preceded by preparatory courses in the language and culture of the country to be visited, undertaken during the second and third years concurrently with the engineering curriculum at UTS. The overseas year includes further intensive exposure to language and culture, the study of academic subjects at a host university, and the study of the practice of engineering in the country concerned, preferably in conjunction



with a period of employment in industry. UTS is developing a network of partner universities and industry contacts in several countries, and will extend the network as circumstances permit.

Overseas travel and living costs are the responsibility of each student. However, UTS aims to establish industry sponsorship schemes to cover all or part of these costs.

Students who fail to complete either Engineering or Arts subjects at an overseas location to a satisfactory standard will be required to complete alternative studies at UTS.

Within the integrated program, subjects principally associated with the Bachelor of Arts in International Studies component are planned as follows:

		CP	HPW
<b>Stages 1, 2</b>			
—	Group meetings	0	
<b>Stage 3</b>			
971xxx	Language and Culture 1	8	6
48997	Industrial Experience		
<b>Stage 4</b>			
972xxx	Language and Culture 2	8	6
<b>Stage 5</b>			
973xxx	Language and Culture 3	8	6
59341	Modernisation and Globalisation	8	4
<b>Stage 6</b>			
974xxx	Language and Culture 4	8	6
<b>Stage 7</b>			
48501	International Practice of Engineering 1 (overseas university/industry)	8	
<b>Stage 8</b>			
48502	International Practice of Engineering 2 (overseas university)	24	
<b>Stage 9</b>			
48503	Review of Overseas Experience	3	2
<b>Stage 10</b>			
976xxx	Contemporary Society	8	4
<b>Stage 11</b>			
—	—	—	—
<b>Stage 12</b>			
48504	Australian Engineering on the International Scene	3	2
48505	Project	10	

The program will focus principally, but not exclusively, on Pacific rim countries. The languages that have been approved for students to study are Chinese (Mandarin), French, German, Indonesian, Japanese, Korean, Spanish and Thai. Others may be added to these in future years.

The program is expected to gain full accreditation by the Institution of Engineers, Australia.

## Bachelor of Engineering/ Master of Design

### Course code: EM06

This combined degree is offered as a Bachelor of Engineering in Mechanical or Manufacturing Systems Engineering and a Master of Design (BE MDes). The course is designed to meet the demand for professional engineers who understand how industrial designers work, and can cooperate effectively with them in design teams to produce innovative and attractive products for the Australian and international markets.

The course brings together two existing degrees, the Bachelor of Engineering in Mechanical or Manufacturing Systems Engineering and the Master of Design which is offered by the Faculty of Design, Architecture and Building at UTS.

In addition to the engineering content, a student must achieve 72 credit points in the Master of Design program. This total is made up of 28 credit points of core coursework subjects, 20 credit points of elective subjects and 24 credit points for an approved design project, taken over two semesters.

The central concern of the Industrial Design program is the design of products for manufacturing industry. Industrial designers have responsibility not only for the visual and tactile qualities of products but also to a large extent for their safety, efficiency and cost effectiveness. Through a combination of coursework and project work, the Master of Design degree deals with the management of design and its social, technological and environmental implications. It includes material on design decision making, design research methods, computer-aided design and the history of design.

## Admission

Students must enrol initially in the BE program. Acceptance for the combined program is competitive, based on performance at a high level in both the first half of the BE and the introductory Industrial Design (ID) subject. While students will be **accepted** for entry to the combined course after completing the first half of the BE and the qualifying Industrial Design subject at a satisfactory level, they will not actually be **admitted** to the course until they are about to start the first subjects of the Master of Design program.

Students will not qualify for either the BE or the MDes until they have completed the requirements for both. This is because the major BE project is deferred and incorporated into the larger and more advanced project in the MDes. This capstone project, which allows students to consolidate and apply all the coursework material, is jointly supervised by staff from the two faculties. Where the project is work-based there will also be an industrial supervisor.

If, after admission to the combined course, students decide not to proceed but to revert to the BE degree, they will need to complete the normal BE requirements, including the major project.

## Attendance patterns

Students can complete the combined degree program in a minimum of six-and-a-half years. This requires the BE component being undertaken on the sandwich pattern, and the MDes being completed on a full-time basis. The coursework in the MDes program is offered in the evenings and may be taken on a part-time basis. To undertake the degrees separately and consecutively would normally require a total of eight years.

Students must meet the Faculty's industrial experience requirements of relevant work experience in industry totalling at least 90 weeks.

Inquiries can be made by telephone during office hours on (+ 61 2) 9514 2666.

## Course structure

### Mechanical Engineering subjects in the combined degree

#### Academic requirements<sup>1</sup>

		CP	HPW
<b>Stage 1</b>			
33120	Engineering Mathematics 1	6	6
46310	Introduction to Engineering	4	3
46311	Engineering Graphics	4	3
46810	Introduction to Computing	4	3
65023	Engineering Chemistry	6	6
<b>Stage 2</b>			
33220	Engineering Mathematics 2	6	6
46110	Mechanics 1	6	4.5
46710	Materials Processing	4	3
46811	Computing 2	4	3
68011	Engineering Physics (Mechanical)	4	4
<b>Stage 3</b>			
46122	Mechanics 2	6	4.5
46321	Computer-aided Drafting	4	3
46420	Fluid Mechanics	6	4.5
46620	Engineering Communication	4	3
67021	Materials Engineering 1	4	4
<b>Stage 4</b>			
46121	Mechanics of Machines	6	4.5
46220	Solid Mechanics 1	6	4.5
46421	Thermodynamics	6	4.5
46821	Computing 3	6	4.5
84220	Design Project ID 2 (from the ID course)	24	0
<b>Stage 5</b>			
46130	Dynamics of Mechanical Systems	4	3
46331	Design 1	6	4.5
46430	Thermofluids	6	4.5
68012	Electrical Engineering 1 (Mechanical)	4	4
82009	Human Factors and Design	4	4
<i>and</i>			
84330	Design Project ID 3 (from the ID course)	14	0
<b>Stage 6</b>			
45931	Electrical Engineering 2 (Mechanical)	4	4
46230	Solid Mechanics 2	6	4.5
46530	Measurement and Instrumentation	6	4.5
46630	Engineering and Society	4	3
67061	Materials Engineering 2	4	4
84550	Design Project ID 5 (from the ID course)	14	0

**Stage 7**

46334	Design 2	4	3
46431	Heat Transfer	4	3
46531	Control Engineering 1	6	4.5
46632	Engineering Management	6	4.5
	Elective 1 <sup>2</sup>	4	3

**Stage 8**

46992	Professional Practice	6	4.5
	Elective 2 <sup>2</sup>	4	3

<sup>1</sup> Industrial Experience, 46997 (sandwich) and 46999 (part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

<sup>2</sup> Electives are normally to be taken within the Mechanical Engineering program, except with written approval of the Program Director. Electives are offered on demand and not all electives are offered every year. One elective must be of at least 5 credit points.

### **Manufacturing Systems Engineering subjects in the combined degree**

#### **Academic requirements<sup>1</sup>**

		CP	HPW
<b>Stage 1</b>			
33120	Engineering Mathematics 1	6	6
46312	Introduction to Manufacturing Systems	4	3
46311	Engineering Graphics	4	3
46810	Introduction to Computing	4	3
65023	Engineering Chemistry	6	6
<b>Stage 2</b>			
46110	Mechanics 1	6	4.5
46715	Manufacturing Processes	6	4.5
46811	Computing 2	4	3
67021	Materials Engineering 1	4	4
68011	Engineering Physics (Mechanical)	4	4
<b>Stage 3</b>			
33221	Engineering Mathematics 2A	3	3
46125	Mechanics for Manufacturing	6	4.5
46321	Computer-aided Drafting	4	3
46620	Engineering Communication	4	3
46725	Manufacturing Systems	6	4.5
<b>Stage 4</b>			
46220	Solid Mechanics 1	6	4.5
46630	Engineering and Society	4	3
46726	Manufacturing Systems Planning	4	3
46821	Computing 3	6	4.5
68012	Electrical Engineering 1 (Mechanical)	4	4
84220	Design Project ID 2 (from the ID course)	4	3

**Stage 5**

45931	Electrical Engineering 2 (Mechanical)	4	4
46435	Fluid Mechanics for Manufacturing	4	3
46535	Metrology and Instrumentation	6	4.5
46632	Engineering Management	6	4.5
82009	Human Factors and Design	4	4
	<i>and</i>		
84330	Design Project ID 3 (from the ID course)	14	0

**Stage 6**

46335	Design for Manufacturing	6	4.5
46336	Computer-aided Manufacturing	4	3
46436	Thermodynamics for Manufacturing	4	3
46531	Control Engineering 1	6	4.5
67061	Materials Engineering 2	4	4
84550	Design Project ID 5 (from the ID course)	14	0

**Stage 7**

46437	Thermofluids for Manufacturing	4	3
46540	Programmable Controllers and Applications	4	3
46735	Manufacturing Systems: Quality	6	4.5
46835	Operations Research	6	4.5
	Elective 1 <sup>2</sup>	4	3

**Stage 8**

46337	Manufacturing Systems Design	4	3
46992	Professional Practice	6	4.5
	Elective 2 <sup>2</sup>	4	3

<sup>1</sup> Industrial Experience, 46997 (sandwich) and 46999 (part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

<sup>2</sup> Electives are normally to be taken within the Mechanical Engineering program, except with written approval of the Program Director. Electives are offered on demand and not all electives are offered every year. One elective must be of at least 5 credit points.

### **Master of Design subjects in the combined degree**

#### **Stages 8 to 10**

Students take seven core Master of Design coursework subjects and five elective subjects. The design project is common to both degrees and draws on both engineering and industrial design knowledge and skills. The project is taken over two semesters.

**Master of Design core subjects:**

- 82004 Design Decision Making
- 82905 Research Methods
- 82912 Design Seminar
- 82013 Research Seminar
- 82901 Psychology of Design
- 82903 Technological Change
- 81020 Management Techniques and Design
- 81920 Marketing and Design

**Master of Design elective subjects chosen from the following academic study fields:**

- User Studies
- Technology Studies
- Design Management Studies
- Methodology Studies
- General Studies
- Design Computing Studies

**Subjects common to Bachelor of Engineering and Master of Design:**

Stages 9 and 10

89917 Design Project

## **Bachelor of Applied Science (Physics)/ Bachelor of Engineering (Electrical)**

**Course code: NP03**

The Faculty of Engineering offers a combined degree program leading to the award of a Bachelor of Applied Science (Physics) (B App Sc) and a Bachelor of Engineering (Electrical) (BE) degree. The program is offered in collaboration with the Faculty of Science.

Applied Physics focuses on the application of modern scientific techniques and strategic use of physics, and has the aim of advancing technology, increasing our understanding and control of the environment, improving quality in production, and providing solutions to industrial and medical problems. Electrical Engineering is a professionally oriented discipline which prepares students for careers in electrical power, electronic instrumentation and control, and optical and electrical communication. The two disciplines are thus interdependent and have many common elements.

The double degree will enable graduates to pursue careers as scientists or engineers. As engineers they will benefit from the emphasis on basic understanding and innovation, and from the 'hands-on' experience with advanced scientific instrumentation and modelling skills that they experience and develop in the applied physics component. As scientists their experience in engineering studies will enable them to appreciate the importance of – and have skills in – good design, the evaluation and testing of designs from performance, economic, social and environmental viewpoints, and their implementation into products and systems. Graduates will be particularly suited to the modern workplace with its need for multidisciplinary-team-oriented projects and for clear communication of ideas through all levels from process worker to senior management.

Key industries and research areas open to graduates include biomedical technology, energy and power, applied optics, communications, space and satellite technology, instrumentation and control, computer modelling and design, imaging, electromagnetic systems and materials, physical and industrial mathematics, technology and environmental management, and management consulting.

**Attendance**

The program is offered only on a sandwich attendance basis, although students may be able to transfer to part-time attendance for periods during the course if their circumstances make this desirable.

The program requires satisfactory completion of nine semesters of academic work, plus at least 90 weeks of appropriate industrial experience (refer to the industrial experience requirements in this handbook).

**Course structure**

It is important to note that, because the applied physics and electrical engineering components are integrated from the earliest stages of the double degree course, the structure of the course is not identical to that of the existing Bachelor of Applied Science (Physics) or Bachelor of Engineering (Electrical) degrees. Hence, much of the material normally presented under a particular subject name in one or other of the existing degrees may be presented under a different subject name in the double degree.

**Sandwich attendance pattern****Academic requirements**

		CP	HPW
<b>Stage 1</b>			
68031	Engineering Physics 1	6	6
65011	Chemistry 1	6	6
35101	Mathematics 1	6	6
35100	Discrete Mathematics	3	3
45116	Engineering Practice	3	3

**Stage 2**

68201	Physics 2	6	6
65021	Chemistry 2	6	6
	<i>or</i>		
67201	Introduction to Materials	6	6
35102	Mathematics 2	6	6
45123	Software Development 1	6	3

**Stage 3**

68311	Physics 3	6	6
68312	Applied Physics 1	6	6
68304	Electronics 1	6	6
33221	Engineering Mathematics 3	6	6

**Stage 4**

68411	Physics 4	6	6
68412	Applied Physics 2	6	6
68404	Electronics 2	6	6
45133	Software Development 2	3	3
68033	Engineering Physics 3	6	6
45135	Engineering Communication	3	3

Two periods of Industrial Experience will normally be taken at this point.

**Stage 5**

68511	Physics 5	6	6
45141	Continuous and Discrete Systems	6	6
45154	Contextual Studies	3	3
45145	Engineering Statistics	3	3
45143	Computer Hardware	3	3
	Physics Elective	3	3

**Stage 6**

68611	Physics 6	6	6
68516	Techniques of Materials Analysis	6	6
	<i>or</i>		
68652	Device Physics	6	6
45163	Real-time Software and Interfacing	3	3
45153	Signal Theory 1	3	3
45155	Project A	3	3
45266	Mathematical Modelling	3	3

Students are eligible to take out the Applied Physics award after completion of the above program.

**Stage 7**

45152	Signal Theory 2	3	3
	EE strand subjects	18	

One period of Industrial Experience will normally be taken after this point.

**Stage 8**

	EE strand subjects	15	
	Social Science Elective	6	
45182	Thesis	3	

**Stage 9**

45183	Thesis 2	12	
	EE strand subjects	18	
	EE strand subjects	12	

**Electives**

The Social Science elective is chosen from subjects offered as an elective by the Faculty of Humanities and Social Sciences. The Faculty of Education offers a six-credit-point elective 015115 Introducing Aboriginal Cultures and Philosophies. Students enrolling in electives offered by other programs should first seek approval from the Program Director of Electrical Engineering.

Electrical Engineering offers 45267 Engineering Research: The Cutting Edge in Stages 7/8 for all strands. For more details please see the Electrical Engineering program entry.

**Postgraduate subjects which may be available as electives in 1997**

The following subjects may be offered as electives in accordance with the Faculty's regulations for the availability of graduate subjects to undergraduate students (see p.32 of this handbook).

49273	Random Signal Theory
49206	Advanced Studies in Electromagnetic Compatibility
49207	Wave Propagation for Microwave and Mobile Communications
49208	Telecommunications Management
49212	Object-oriented Software Development
49214	UNIX and C
49217	Software Verification and Validation
49225	Software Project Management
49241	Hypermedia Technologies
49242	Image Computing
49261	Biomedical Instrumentation
49271	Computer Architecture
49272	Adaptive and Multivariable Control
49274	Advanced Robotics
49275	Neural Networks and Fuzzy Logic
49377	Process Control Studies

Descriptions of these subjects appear in the Postgraduate courses section of this handbook.

## Bachelor of Technology program

---

### Course code: E012

Bachelor of Technology courses have been offered by the Engineering Faculty since 1993. Detailed course arrangements have recently been revised, and those described below will come 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 program is aimed at the skills development of engineering technologists and builds on work already completed in select NSW TAFE Associate Diploma courses.

A Bachelor of Technology degree is recognised as a three-year full-time qualification (post-HSC). In this program the Associate Diploma counts for half the total. The course offered at UTS occupies 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 Bachelor of Technology degree may be awarded with Distinction, Credit or Pass grades depending on performance during the course as a whole. Presently, there is a choice of three specialty areas: Manufacturing Engineering; Heating, Ventilation, Airconditioning and Refrigeration; Aerospace Operations.

### 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 will be given to students who are working in this sector at the time of their enrolment 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-year study.

### Selection

The entry requirement is an Associate Diploma or equivalent. Students will be selected on the strength 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 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 of which students select one. The core comprises 42 credit points of the total 72-credit-point program. All core subjects have a uniform weighting of six credit points. The specialist strands each comprise 30 credit points, made up of both three- and six-credit-point subjects.

#### Core

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

#### Specialist strands

Each specialist strand comprises 30 credit points. Presently, there is a choice of three different specialist areas namely: Manufacturing Engineering; Heating, Ventilation, Airconditioning and Refrigeration; or Aerospace Operations.

#### Manufacturing Engineering (1)

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

#### Heating, Ventilation, Airconditioning and Refrigeration (2)

- Mechanical Services
- Computer Aids for Airconditioning Design
- Service Control Systems
- Law and Contracts

Building Construction Technology  
Airconditioning Design

### **Aerospace Operations (3)**

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

### **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

Note: The above course arrangements come into operation in 1997, and apply to commencing students. For students who commenced a Bachelor of Technology degree course in 1996 or earlier, the arrangements existing at that time will remain in operation. Detailed information is available from the Course Director or the Faculty of Engineering Undergraduate Student Centre.

# ***Postgraduate courses***

## **THE 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 1996, approximately 100 research students and 450 coursework students were enrolled in the GSE.

Details of all GSE courses are provided in this booklet. 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.

Information in this booklet 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 e-mail 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.html>



	Building/Room	Ext
<i>Associate Dean Graduate Coursework Programs</i>		
Associate Professor J V Parkin	2/7078	2638
<i>Associate Dean Research</i>		
Associate Professor J A Reizes	2/511C	2742
<i>Director, Graduate Projects</i>		
Dr H W Chung	2/519	2637
<i>Graduate Studies Officer</i>		
Ms B Buckenmaier	2/7083	2606
<b><i>Directors, graduate coursework programs in:</i></b>		
<i>Control Engineering</i>		
Associate Professor H T Nguyen	1/2517	2451
<i>Energy Planning and Policy</i>		
Dr D Sharma	2/7088	2422
<i>Engineering Management</i>		
Associate Professor R M Spencer	2/606	2660
<i>Environmental Engineering</i>		
Dr P Hazelton	2/512	2661
<i>Groundwater Management</i>		
Professor M J Knight	1/1715	2692
<i>Information Systems Engineering</i>		
Associate Professor A Ginige	1/2224	2393
<i>Local Government Engineering</i>		
Mr K J Halstead	2/522	2640
<i>Local Government Management</i>		
Associate Professor K W Sproats	1/1714	2643
<i>Manufacturing Engineering and Management</i>		
Associate Professor R M Spencer	2/606	2660
<i>Professional Practice</i>		
Associate Professor R M Spencer	2/606	2660
<i>Software Engineering</i>		
Mr J R M Leaney	1/2221A	2389
<i>Structural Engineering</i>		
Associate Professor B Samali	2/513	2632
<i>Telecommunications Engineering</i>		
Associate Professor A Seneviratne	1/2431	2441
<i>Water Engineering</i>		
Associate Professor G G O'Loughlin	2/tba	2644

## Research areas and associated centres

The Faculty of Engineering at UTS offers a range of undergraduate courses in Civil and Environmental Engineering; Electrical Engineering; Computer Systems Engineering; Telecommunications Engineering; Mechanical Engineering; 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, 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 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 positioning 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 multivariable 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, 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 interdisciplinary 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 (among other things): 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 at least, programs are being directed at the experienced professional levels.

AGSEI builds specifically on the capability of engineers, and focuses on the organisation and application of engineering effort to innovation and business performance. Its programs cover topics central to the process of engineering such as product and process innovation, strategic planning, technology management, project management, systems and concurrent engineering, quality management, design, information engineering, computer-aided engineering, logistics engineering, human resources and change management, com-

munication, 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 programs are taken on a full-fee basis.<sup>1</sup> Most modules include a course component, presented at AGSEI premises, and an applications project conducted within each candidate's own workplace under AGSEI guidance.*

Inquiries may be made to:

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

<sup>1</sup> In 1997, UTS graduate students may be able to take subjects through AGSEI under other arrangements. Further information will be provided on inquiry to AGSEI or the GSE.

**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  
E-mail:  
[groundwater.management@uts.edu.au](mailto:groundwater.management@uts.edu.au)

**Centre for Local Government Education and Research** (UTS, NSW TAFE, 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  
E-mail: 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 electro-physiology 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  
E-mail: htn@eng.uts.edu.au

**Centre for Materials Technology** (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.

Inquiries may be made to:

Professor Tony Baker  
Centre Director  
Room 1210, Building 1, City campus  
Telephone: (+ 61 2) 9514 2213  
Fax: (+61 2) 9514 2219  
E-mail: Tony.Baker@uts.edu.au

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

**Centre for Aquaculture** (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:

Peter Montague  
Centre Director  
Room 1713, Building 1, City campus  
Telephone: (+ 61 2) 9514 1385

Fax: (+ 61 2) 9514 1491  
E-mail: P.Montague@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 interdisciplinary 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 7078, Building 2, City campus  
Telephone: (+ 61 2) 9514 2423  
Fax: (+ 61 2) 9514 2549  
E-mail: 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

**Note:** Completion of supplementary application forms is an essential part of application for admission.

## 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 (including GSE supplementary forms) may be requested (by telephone, 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 very competitive and applicants are advised to exercise care in completing the application forms. 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

### Closing dates

The closing dates for receipt of on-time applications in 1997 are as follows:

For Autumn semester (for all coursework degrees) the closing date is: **31 October 1996**

For Spring semester (selected coursework degrees only): **31 May 1997**

**Please lodge your application, including supporting documents, early.**

You may experience lengthy delays if lodging your application in the final week before the closing date.

### 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 1997. 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 per cent 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)  
PO Box 25, Belconnen, ACT 2616  
Telephone: (+ 61 6) 276 7644 or  
freecall 008 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 1997 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 1996/January 1997.

## Charges and fees

### Student service charges

All students are required to pay compulsory student charges at enrolment. In 1997, these charges are as follows:

Students' Association	\$A48.00
UTS Union (General Fee)	\$A186.00
UTS Union (Entrance Fee) (non-refundable)	\$A20.00
Student Accommodation Levy	\$A55.00
Student identification card charge (non-refundable)	\$A10.00
<b>Total</b>	<b>\$A319.00<sup>1</sup></b>

<sup>1</sup> 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.<sup>1</sup>

Students admitted to the Graduate School of Engineering in 1997 will be required to pay course fees, according to a schedule which will be available late in 1996. The schedule will be provided on inquiry to the Graduate School of Engineering, the Kuring-gai Student Centre or the UTS Information Service, Level 4, Building 1, Broadway. Full information on fees is included with application forms, 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 6cp, so full-time attendance typically involves four subjects per semester. The fee schedule shows, for each course, the fee per EFTSU, per credit point, and for the course overall. Fees for individual subjects are pro rata with their credit point ratings.

As a guide, typical semester fees in 1996 for both full-time and part-time attendance were calculated on a schedule fee of \$120 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.

<sup>1</sup> At the time of printing, new policies in relation to higher education have been foreshadowed by the Australian Government. The impact of any of these policies on course fees for graduate students commencing a course in 1997 will be determined and advised on inquiry as early as possible, and advised by the University with any offer of a place in 1997.

### 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 1997. 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.

If you wish to apply for exemption from course fees, you must do so in conjunction with your application for admission.

You must request the form entitled Application for Exemption from Postgraduate Fees, 1997, 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.

If your application for exemption from course fees does not meet the criteria for financial hardship or disadvantage, or if you do not succeed in gaining one of the available fee-exemption places, you will be asked whether you wish to sustain your application for admission on a fee-paying basis.

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 1997 will range from \$A12,000 to \$A16,500 per annum, depending on the course.

For further information on fee arrangements for overseas students, 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 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 (July–November). For 1997, some subjects may also be offered in a Summer semester (December 1996 – February 1997).

All courses have their major intake in February, at the beginning of the academic year. Some places may be available in the second semester beginning in July, and potential mid-year applicants should contact the Graduate Studies Officer 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 Office of the University Graduate School, Level 5, Building 1, Broadway at the City 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 three-hour session is the standard requirement. Where appropriate, graduate subjects are also offered on a block-release or intensive short-course basis.<sup>1</sup>

Subjects offered in a block-release mode require attendance at the University for a block of full-time study (usually two to three 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.

<sup>1</sup> In 1997, some subjects may also be available distance mode. For further information, please contact the GSE.

### Duration of courses

PhD degrees are normally a minimum of two years' duration on a full-time basis and three years' duration on a part-time basis if the candidate holds a Master's degree by research, or three years full time, and four years part time for candidates with a Bachelor's degree or a Master's degree by pure coursework.

Master's degrees by research and thesis are normally a minimum of four semesters' duration on a full-time basis, or six semesters on a part-time basis. In some cases, a student with appropriate advanced study and/or relevant work experience may be permitted to complete the degree in a shorter time.

Master's 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 in the UTS 1997 *Postgraduate Student Handbook* 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 12 months for a full-time student), will be required to show cause why registration should not be discontinued. The student must respond in writing, and the decision will be made by the relevant Committee of the 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.

### Articulation, transfer and advanced standing

In certain circumstances, exemption from particular subjects may be granted on the basis of prior studies, as set out below.

#### Definitions

**Advanced standing** – academic exemption or credit, in the course of current enrolment, granted under transfer or articulation policies for previously completed studies.

**Articulation** – enrolment with academic exemption or credit for completed studies in a course which has been completed.

**Completed studies** – requirements which have been satisfied as part of another course, typically by completing subjects.

**Transfer** – change of enrolment from another course which has been partially completed. Transfer may be approved with academic credit for previously completed studies.

#### Policies

**Advanced standing** is granted in accordance with University Rules described in the 1997 *UTS Calendar*.

**Advanced standing** in any course offered by the GSE can only be granted where previously completed studies were undertaken as part of a postgraduate program with requirements deemed to be: equivalent to those applying to the GSE course in question and relevant to an approved graduate studies program in that course.

**Articulation** is only permitted where previously completed studies were undertaken for a lower level award with requirements (in part or in whole) deemed to be equivalent to part of the requirements of the course of current enrolment.

Subjects completed at other institutions and approved for exemption or credit towards a UTS award are given a credit point value in accordance with the following formula:

Credit = 24 x credit value of subject at other institution (credit requirements of a single semester full-time equivalent enrolment at that institution).

**Transfer to a higher level award course** is only considered for approval where a student: has achieved a weighted average mark (WAM) of at least 70 per cent following completion of at least 20 credit points (or equivalent) and meets the requirements for admission to the higher level award course.

#### Applications for advanced standing

Applications for advanced standing can be made at any time on the standard UTS Subject Exemption form and submitted to the GSE Graduate Studies Officer, 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.

#### Credit by substitution

Credit by substitution is applicable only in certain courses, and allows students to replace required core subjects with alternative subjects of equal credit, when they already possess the knowledge and skills that these core subjects provide.

#### Policies

1. There will be no exemption or credit by substitution on the basis of prior studies at undergraduate level.
2. Where students have gained expertise in a subject by taking appropriate courses in the past, a subject in lieu may be granted.

#### Applications for credit by substitution

Applications for credit by substitution in courses with core requirements can be made at any time on the standard UTS Subject Exemption form, and submitted to the Graduate Studies Officer, together with supporting documentation including relevant subject syllabi (and examination papers if available).

The student will be required to gain agreement from both the relevant Subject Coordinator and the Program Director on the question of expertise, and to agree with the Program Director on a suitable subject in lieu.

## RESEARCH DEGREES

The degrees of Doctor of Philosophy (PhD) and Master of Engineering (ME) by thesis are offered in areas of current research 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 after one year of enrolment for full-time candidates and after 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 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 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<sup>1</sup>, 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.

<sup>1</sup> In these respects, 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 telephone numbers of two professional referees. The application and/or the letter must indicate (c) the proposed research topic and (d) the name of a member of academic staff with whom the topic has been discussed and who is willing to supervise the candidate's work, and should also include (e) any evidence of ability to conduct research and to complete a substantial project.

For part-time candidature, the application must also include (f) a statement from the applicant's employer, indicating the level of the employer's support for the application and 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 available from the following people:

	Building/Rm	Ext
<i>Associate Dean Research</i>		
Professor J A Reizes	2/511C	2742
<i>Coordinators, research students in:</i>		
<i>Civil, Structural and</i>		
<i>Environmental Engineering</i>		
Associate Professor B Samali	2/513	2632
<i>Electrical, Computer Systems</i>		
<i>and Telecommunications</i>		
<i>Engineering</i>		
Mr C A Scott	1/2545	2397
<i>Mechanical Engineering and</i>		
<i>Manufacturing</i>		
Dr G Hong	2/619	2677
<i>Groundwater Management</i>		
Professor M J Knight	1/1715	2692

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 1997 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.

### 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 of 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 a Master's degree (by thesis), applicants must hold a Bachelor of Engineering degree from UTS or the former NSWIT, or another qualification deemed to be equivalent. In special circumstances, engineers who do not possess a degree or equivalent may be admitted to the program if they can provide evidence of general and professional qualifications which will satisfy the 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 *Postgraduate Student Handbook 1997*.

### Applications, research areas

Please refer to the corresponding sections under Doctor of Philosophy, and Teaching Schools and Centres of the Faculty, which apply identically to ME (by thesis).

### 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 in 1997 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 Studies Officer. Academic inquiries, such as the selection of an appropriate research topic, should be directed to the relevant Coordinator (see details in corresponding section under Doctor of Philosophy).

## COURSEWORK AWARDS – GENERAL

### (All Engineering disciplines)

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 booklet.

### Master of Engineering (by coursework)

**Course code:** EP81

#### Aims of the course

The course provides an 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–February). Completion on a part-time basis requires two to three years.

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

#### Admission requirements

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

1. be a graduate in Engineering of the University of Technology, Sydney or the former NSWIT; or

2. hold a degree or equivalent from another higher education institution, deemed to be equivalent to the Bachelor of Engineering degree of UTS.

Experience in the practice of engineering comparable with that required for a first degree in Engineering from UTS is essential.<sup>1</sup>

In selection for places, preference will be given to applicants holding an Honours degree 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 20 credit points at a level of performance approved by the Faculty Board in Engineering as evidence of ability to undertake Master's candidature.

<sup>1</sup> The Faculty of Engineering requires all students to complete 90 weeks of approved industrial experience integrated with their academic studies as part of the Bachelor of Engineering degree requirements.

#### 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,<sup>1</sup> 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 concentrations that require students to complete a number of prescribed subjects with or without opportunity for electives. In these cases, the area of program concentration will be recognised on the candidate's academic record.

Subjects selected shall be drawn from those offered by the Faculty of Engineering of UTS, other faculties of UTS, other faculties of engineering (including the University of Sydney, the University of New South Wales and the University of Western Sydney), and other institutions approved by the Academic Board. Not less than 50 per cent of total credit points must be completed through subjects offered and/or a 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.

<sup>1</sup> In special circumstances, to be approved by the Faculty Board in Engineering, a candidate may be allowed to complete the degree by undertaking a group project.

## Credit

Subjects taken through any faculty of UTS shall be credited towards the degree at the credit point values established for them by the University.

The credit point weighting for the 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 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 concentrations 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 three 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 concentrations in any year may be obtained initially on inquiry to the Faculty of Engineering, through the Graduate Studies Officer.

Subjects offered by the Faculty of Engineering and available to ME candidates, and illustrative examples of program concentrations, 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 Studies Officer in the Faculty of Engineering.

Individual subjects are offered on a demand basis. Generally, graduate classes are limited to a minimum of 10 and a maximum of 30 students.

## 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 upon 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 of Studies for the ME.

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 Studies Officer.

### Fees

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

### Inquiries

Inquiries should be made to:  
Graduate Studies Officer  
Ms B Buckenmaier  
Room 7083, Level 7, Building 2  
Telephone: (+ 61 2) 9514 2606  
Fax: (+ 61 2) 9514 2549  
E-mail: beate.buckenmaier@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 an 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–February). Completion on a part-time basis requires two to three years.

### Admission requirements

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

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

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

Applicants who have completed a first degree requiring less than four years' full-time study are required to undertake a period of academic preparation, equivalent to the requirements applying to the award of a Graduate Diploma. Prior learning from continuing professional education, professional experience and professional achievement is taken into account. In selection for places, preference will be given to applicants who can show that their chosen program of study will assist them in furthering a demonstrable employment responsibility or career objective.

Applications for admission by internal transfer of candidature from a Graduate Certificate or Graduate Diploma in Engineering may be considered, following completion of subjects totalling at least 20 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, week-end 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,<sup>1</sup> 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.

---

<sup>1</sup> In special circumstances, to be approved by the Faculty Board in Engineering, a candidate may be allowed to complete the degree by undertaking a group project.

### **Credit**

Subjects taken through any faculty of UTS shall be credited towards the degree at the credit point values established for them by the University.

The credit point weighting for the 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 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 concentrations in specialised fields. These may change from time to time in number or available areas of study. Program selection is not confined to these concentrations.

Programs are available in fields relating to each of the Faculty's three 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 concentrations, 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 Studies Officer in the Faculty of Engineering.

Individual subjects are offered on a demand basis. Generally, graduate classes are limited to a minimum of 10 and a maximum of 30 students.

### **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 upon 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 of Studies for the MTech.

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 Studies Officer.

### **Fees**

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

### **Inquiries**

Inquiries should be made to:  
 Graduate Studies Officer  
 Ms B Buckenmaier  
 Room 7083, Level 7, Building 2  
 Telephone: (+ 61 2) 9514 2606  
 Fax: (+ 61 2) 9514 2549  
 E-mail: beate.buckenmaier@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 three years part time or one-and-a-half years full time.

## Admission requirements

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

1. be a graduate in Engineering of the University of Technology, Sydney or the former NSWIT; 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. Under-

graduate 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 1997); 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 Studies Officer 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 the 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 interface 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 upon 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 teamwork 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 project

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 Master of Engineering Practice.

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 on inquiry to the Graduate Studies Officer, 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 Studies Officer  
 Ms B Buckenmaier  
 Room 7083, Level 7, Building 2  
 Telephone: (+ 61 2) 9514 2606  
 Fax: (+ 61 2) 9514 2549  
 E-mail: [beate.buckenmaier@uts.edu.au](mailto:beate.buckenmaier@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

Applicants must possess either a recognised engineering degree or an equivalent qualification. In special cases, applications may be considered from non-engineering graduates whose careers bring them into close contact with professional engineering practice.

Applicants should have a minimum of two years' experience in employment related to the course. Applicants are required to submit two letters with their application: one indicating why they wish to undertake the course, and the other a statement indicating the level of their employer's support for the application. They are also required to submit a detailed curriculum vitae and a description of their work experience.

In certain circumstances, consideration may be given to applicants not possessing formal academic qualifications, who are deemed to have suitable professional qualifications and experience to enable them to pursue graduate studies.

These courses do not guarantee admission to membership of the Institution of Engineers, Australia.

### 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. Students have the 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 concentrations 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.

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, in terms of subject coverage and project weighting. For example, a candidate who had completed 45 credit points under Graduate Diploma enrolment and wished to credit this towards a 60-credit-point Master's degree, would still have to undertake a full 18–24-credit-point project even if all 45 credit points of subjects were valid under the Master's requirements.

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 70 per cent (i.e. Credit grade).

### Fees

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

### Inquiries

Initial inquiries should be made to the Graduate Studies Officer. Academic inquiries should be directed to discipline coordinators, as follows:

#### Civil Engineering

Dr H W Chung  
Room 519, Level 5, Building 2  
Telephone: (+ 61 2) 9514 2637  
Fax: (+ 61 2) 9514 2633  
E-mail: hung.chung@uts.edu.au

#### Electrical Engineering

Dr V Ramaswamy  
Room 2417A, Level 24, Building 1  
Telephone: (+ 61 2) 9514 2418  
Fax: (+ 61 2) 9514 2435  
E-mail: venkat@eng.uts.edu.au

#### Mechanical Engineering

Associate Professor R M Spencer  
Room 606, Level 6, Building 2  
Telephone: (+ 61 2) 9514 2660  
Fax: (+ 61 2) 9514 2655  
E-mail: r.spencer@uts.edu.au

## GRADUATE PROGRAM CONCENTRATIONS

The Graduate School of 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 1997 program concentrations are described below. Information on other specialist research areas can be obtained from individual members of academic staff (see Academic staff groups – areas of professional interest on p.23).

Program concentrations 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 concentrations are differentiated by their focus, structure, presentation, attendance flexibility, assessment practices and multiple entry/completion options.

GSE program concentrations reflect current research strengths and interests in the Faculty of Engineering, and change with time. It is expected that all of the program concentrations listed below will be offered in 1997. 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 1997 program concentrations have been designated as foundation subjects, and are listed below. Further information can be found by referring to the Subject descriptions section, 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 (CTL)

Modern control theory addresses the issue of achieving and sustaining desired outcomes from dynamic systems, and provides concepts applicable beyond the technological context of engineering – for example, in the quest for productivity, competitiveness, quality and confidence in the management of industry, business and information.

The Control Engineering program at UTS spans current research and industrial collaboration in adaptive control, multivariable processes, biomedical systems modelling and real-time computing requirements. It includes major studies supporting the University's Cooperative Research Centre in Cardiac Technology, and the development of intelligent controllers, based on fuzzy logic and neural network models, for socio-technological systems.

#### Faculty

The teaching and research staff are drawn from academics in Electrical Engineering and Mechanical Engineering, specialists from industry and overseas visitors.

#### Award options

All general courses.

#### 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

Suitable additional subjects:

Other suitable graduate subjects are offered by the Faculty of Engineering. The Postgraduate subject selection table indicates some of these.

**Academic inquiries**

Mr K Stillman  
 Co-Director  
 Control Engineering program  
 Room 612C, Level 6, Building 2  
 Telephone: (+ 61 2) 9514 2451  
 Fax: (+ 61 2) 9514 2655  
 E-mail: kel.stillman@uts.edu.au

Associate Professor H Nguyen  
 Co-Director  
 Control Engineering program  
 Room 2517, Level 25, Building 1  
 Telephone: (+ 61 2) 9514 2667  
 Fax: (+ 61 2) 9514 2435  
 E-mail: htn@eng.uts.edu.au

**Energy Planning and Policy (EPP)**

With the escalating demand for energy and evident environmental and resource challenges on a global scale, effective planning and policy initiatives are needed to identify energy systems that are economically, environmentally and socially feasible and responsible.

Designed after extensive consultation with the energy industry in Australia and overseas, the energy planning and policy concentration develops interdisciplinary understanding and capabilities required by energy utilities, energy companies, environmental organisations, government departments, consulting groups and other national/international groups. The program concentration has a strong international dimension, providing an opportunity to develop links with national and international energy professionals and organisations.

Current research activity focuses on contemporary energy issues in regional, national and international contexts.

**Faculty**

The teaching and research staff are drawn from academics in UTS, other universities in Australia, the USA and Asia, and energy and environmental experts from Australian and international organisations.

**Award options**

Award options include Doctoral and Master's degrees by research, or coursework awards in this program concentration.

**Program structure**

Suitable foundation (undergraduate) subjects:  
 45145 Engineering Statistics 3cp  
 and first degree subjects from economics and econometrics courses, available through other faculties.

Core subjects (Master's program concentration) include:

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

Recommended subjects:

49025	Methods for Energy Analysis	6cp
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

Suitable additional subjects:

Other suitable graduate subjects are offered by the Faculty of Engineering. The Postgraduate subject selection table indicates some of these.

**Academic inquiries**

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

**Engineering Management (MGT)**

Engineering is practised at senior levels by managers able to make responsible decisions integrating technological, organisational, economic, human resource and business considerations.

The broad professional capabilities required for consistent success in such settings are developed by the UTS program concentration in engineering management. Study options include elective research and/or coursework programs assuring maximum flexibility or a 'lock step' program offering strong group

support networks in a specialist course. All program options address the interaction between technological, managerial and business considerations in engineering enterprises. Research areas include innovation studies, engineering process and organisational factors, professional issues and organisational behaviour.

### Faculty

The teaching and research staff are drawn from academics in the Faculty, adjunct professors, AGSEL, leading practitioners and international visitors.

### Award options

All general courses, together with the specialist Master of Engineering Management course.

### Program structure

Suitable foundation (undergraduate) subjects:

No undergraduate subjects are specifically recommended as foundation subjects. However, appropriate professional practice in engineering or a closely related field is a prerequisite.

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
49044	Engineering Communication and Documentation	6cp
49309	Quality Planning and Analysis	6cp
49381	Applications of Optimisation in Engineering	6cp

Suitable additional subjects:

Other suitable graduate subjects are offered by the Faculty of Engineering. The Postgraduate subject selection table indicates some of these.

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

### Academic inquiries

Associate Professor J Parkin  
Director  
Engineering Management program  
Room 7087, Level 7, Building 2  
Telephone: (+ 61 2) 9514 2638  
Fax: (+ 61 2) 9514 2549  
E-mail: jim.parkin@uts.edu.au

## Environmental Engineering and Management (ENV)

While political action over environmental issues continues to influence understanding of duty of care within many organisations, including professional bodies, expertise reflecting contemporary community values and trans-disciplinary responsibilities is required to protect and restore environments affected by engineering and other activities. The Environmental Engineering and Management Graduate program equips engineers and other professionals with understanding of ecological processes, global environmental problems, need for change and sustainable development. It develops the capability to assess environmental consequences, assure environmentally sustainable engineering outcomes and integrate cross-disciplinary expertise. The program is underpinned by current engineering research including emerging technologies for wastewater treatment, water quality monitoring, direct filtration of drinking water, membrane processes in water treatment and subsurface pollutant migration.

### Faculty

Staff are drawn from a number of faculties at UTS, including Engineering, Science, and Design, Architecture and Building, and from leading practitioners in several professions.

### Award options

All general courses, together with the specialist Graduate Certificate in Environmental Engineering and Management course.

### 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 subjects (Master's program):

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



Suitable additional subjects:

Other suitable graduate subjects are offered by the Faculty of Engineering. The Postgraduate subject selection table indicates some of these.

**Academic inquiries**

Professor S Vigneswaran  
 Director  
 Environmental Engineering and  
 Management Program  
 Room 523, Level 5, Building 2  
 Telephone: (+ 61 2) 9514 2641  
 Fax: (+ 61 2) 9514 2633  
 E-mail: s.vigneswaran@uts.edu.au

**Groundwater Management (GWM)**

Groundwater management is a national priority encompassing issues of contaminated land evaluation and rehabilitation, mine waste-pile behaviour and rehabilitation, containment transport modelling and waste disposal practice improvement, and water resource management.

The National Centre for Groundwater Management at UTS undertakes international projects and major Australian contracts in these areas of research capability.

**Faculty**

The teaching and research staff are drawn from the National Centre for Groundwater Management, from the Faculty of Engineering and the Faculty of Science.

**Award options**

All general courses, together with the specialist Graduate Diploma in Engineering in Groundwater Management and the Master of Engineering in Groundwater Management courses.

**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:

- 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 Faculty of Engineering and the Faculty of

Science. The Postgraduate subject selection table indicates some of these. Other subjects are listed under Subjects taught in the Faculty of Science on p.191.

**Academic inquiries**

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

**Information Systems Engineering (INF)**

With recent advances in computer and telecommunications technologies, information consisting of text, images, animations and sound can be converted to bit streams for high density storage, high capacity network transmission and reception, efficient retrieval through random access strategies, and enhanced multimedia transfer between people and machines.

Using state-of-the-art technologies, large information systems meeting these requirements can now be developed. These technologies are important for engineers as they create information, use information and develop infrastructure for large information systems.

Research is focusing on the development and application of hypermedia technologies for these next-generation systems.

**Faculty**

Associate Professor Athula Ginige heads a team of teaching and research staff drawn from leading researchers and academics in UTS, and other Australian and international organisations.

**Award options**

All general courses.

**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 Design of Hypermedia Information Systems 6cp

Suitable additional subjects:

Other suitable graduate subjects are offered by the Faculty of Engineering. Refer to the Postgraduate subject selection table.

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

### **Academic inquiries**

Associate Professor A Ginige  
Director

Information Systems Engineering program  
Room 2224, Level 22, Building 1  
Telephone: (+ 61 2) 9514 2393  
Fax: (+ 61 2) 9514 2435  
E-mail: athula@eng.uts.edu.au

## **Local Government Engineering (LGE)**

The provision of community services and facilities underpinned by engineering is central to the responsibilities of local government in Australia and elsewhere.

UTS Engineering enjoys a special and long-standing relationship with local government in NSW. Its programs reflect, in both presentation and development, an ongoing collaboration with engineers and allied professionals working in or for the local government sector, and a commitment to professional practice underpinned by cooperative education.

Research spans the program in civil engineering with application to local government and cross-disciplinary programs.

### **Faculty**

The teaching and research staff include practising engineers, local government professionals, consultants and academics with extensive local government engineering, planning and management experience specialising in key areas addressed by the program.

### **Award options**

All general courses, together with the specialist Graduate Diploma in Local Government Engineering course.

### **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:

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

Suitable additional subjects:

Other suitable graduate subjects are offered by the Faculty of Engineering. The Postgraduate subject selection table indicates some of these.

**Note:** Selected subjects from the Local Government Management or Environmental Engineering and Management concentrations can frequently be combined with studies in this program concentration.

### **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  
E-mail: ken.halstead@uts.edu.au

## **Local Government Management (LGM)**

Effective management is fundamental to the processes of local government. The challenge of providing high quality and responsible service to the community has required the development of new skills and knowledge among local government managers and professionals.

The Local Government Management program is designed to provide the knowledge and skills to meet the requirements of today's local government manager – i.e. someone who can: recognise economic, technological, environmental, organisational, social and political factors and the way these should guide management decisions and practices; work effectively in a multidisciplinary team that encourages diversity and change; utilise high-level skills in managing financial, organisational, technological and human resource systems; and provide educated and informed advice to the community, the Council and their staff.

The program is designed specifically and purposefully to meet local government needs. It is regularly reviewed to ensure coverage of issues affecting local government today, with input from a wide range of industry bodies.

**Faculty**

The LGM program is provided jointly by the Faculties of Engineering and Business at UTS, and coordinated by the Centre for Local Government Education and Research at UTS. Teaching staff are drawn from academics at UTS, with supplementary presentations by leading authorities from local government, and public and private sector organisations.

**Award options**

All general courses, together with the specialist Graduate Diploma in Local Government Engineering and the Master of Local Government Management courses.

**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 include:

49451	Environment of Professions in Local Government	6cp
49452	Environmental Management	6cp
49453	Infrastructure Management	6cp
49454	Managing Local Enterprise	6cp
49126	Land Resource and Environmental Management	6cp

Suitable additional subjects:

Other suitable graduate subjects are offered by the Faculty of Engineering. The Postgraduate subject selection table indicates some of these.

**Academic inquiries**

Associate Professor K Sproats  
 Director  
 UTS Centre for Local Government Education and Research  
 Room 1714, Level 17, Building 1  
 Telephone: (+ 61 2) 9514 2643  
 Fax: (+ 61 2) 9514 2274  
 E-mail: kevin.sproats@uts.edu.au

**Manufacturing Engineering and Management (MFG)**

With manufacturing exports now exceeding rural exports by value, Australia is well placed to benefit by and contribute to the dynamic changes currently occurring in international manufacturing.

The Manufacturing Engineering program at UTS emphasises rapid response to changing market demands and the synthesis of new products and processes while working in flat management structures, communicating clearly and maintaining appropriate documentation. It is supported by significant international links through industry and overseas universities, and underpinned by strong research work.

The program is supported by an endowed Chair in Manufacturing Engineering. Research spans development and application of advanced manufacturing techniques.

**Faculty**

The teaching and research staff are drawn from staff in the Faculty, leading Australian practitioners and overseas academics, and include specialists in key areas of manufacturing and international best practice.

**Award options**

All general courses.

**Program structure**

Suitable foundation (undergraduate) subjects:

46321	Computer-aided Drafting	4cp
46312	Introduction to Manufacturing Systems	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	Product Design for Marketing	6cp
49381	Applications of Optimisation in Engineering	6cp

Suitable additional subjects:

Other suitable graduate subjects are offered by the Faculty of Engineering. The Postgraduate subject selection table indicates some of these.

**Academic inquiries**

Associate Professor R M Spencer  
 Director  
 Manufacturing Engineering and  
 Management program  
 Room 606, Level 6, Building 2  
 Telephone: (+ 61 2) 9514 2660  
 Fax: (+ 61 2) 9514 2655  
 E-mail: r.spencer@uts.edu.au

**Professional Practice (PRP)**

Professional work is becoming increasingly complex, carried out in a global context by multidisciplinary teams incorporating members with a range of specific skills and competencies and the ability to work together effectively. Success in this environment requires the development of specific practice skills. The Professional Practice subjects have been designed to develop these skills in engineering graduates and extend general awareness of the broad social, political, economic and environmental context in which they work.

This program assists students seeking to meet the Stage 2 Professional Engineer Competency Standards of the Institution of Engineers, Australia (now required for admission to the grade of Member). These Standards include requirements on engineering ethics and engineering communication. Students whose initial education and experience were obtained outside Australia will find these subjects particularly helpful in relating their experience to the Australian professional context and developing their awareness of local issues and practices.

These subjects will be of interest to non-engineering graduates who work with engineers or are interested in exploring the local and international context and practice of engineering.

**Faculty**

Teaching and research staff are drawn from academics in UTS, other universities in Australia and overseas, and leading practitioners from Australian and international industry.

**Award options**

All general courses.

**Program structure**

Suitable foundation (undergraduate) subjects:

No undergraduate subjects are specifically recommended as foundation subjects. How-

ever, 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

Suitable additional subjects:

Other suitable graduate subjects are offered by the Faculty of Engineering. The Postgraduate subject selection table indicates some of these.

**Academic inquiries**

Associate Professor S Johnston  
 Director  
 Professional Practice program  
 Room 612B, Level 6, Building 2  
 Telephone: (+ 61 2) 9514 2668  
 Fax: (+ 61 2) 9514 2655  
 E-mail: stephen.johnston@uts.edu.au

**Software Engineering (SFT)**

Effective software development pervades all of engineering, being the major implementation medium in the disciplines of control, telecommunications, multimedia and other large industrial systems. It is also the major cost component of many engineered systems, accounting on average for more than 70 per cent of manufacturing costs. This dependency on software, and the need for more effective software process control within companies, have led to a strong demand for real-time software engineers.

The real-time software engineering community worldwide has recognised that engineers must be able: to interpret and adapt international standards and techniques (including methodologies, tools and languages); to understand, and work within, a defined process; and to participate effectively within a highly disciplined team.

The Software Engineering program (SEP) concentration provides an opportunity to master real-time software development for industrial applications. To meet this need in an emerging discipline, the SEP depends heavily on its industry partners, especially Thomson-CSF. Approximately 50 per cent of the SEP is taught by leading industry practitioners, using industry tools and standards. All Master's degree candidates must complete an industrially sponsored application project.

The Software Engineering program concentration includes research in computer systems engineering, including requirements analysis, systems architecture, system/software measurements, object-oriented techniques, and real-time operating systems.

### Faculty

Teaching and research staff are drawn from academics at UTS, other universities in Australia, Europe and the USA, and leading practitioners from Australian and international industry.

### Award options

All general courses, together with the UTS–Thomson Software Engineering program (SEP) Graduate Certificate, SEP Graduate Diploma and Master's degree.

### Program structure

Suitable foundation, and prerequisite (undergraduate) subjects for general courses:

45123	Software Development 1	6cp
45133	Software Development 2	3cp
45163	Real-time Software and Interfacing	3cp

Core subjects (UTS–Thomson SEP 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

Core subjects (UTS–Thomson 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 SEP Graduate Certificate will not be available in either the SEP Graduate Diploma or the SEP Master's degree, as there is no overlap of material between subjects.
- Subjects offered in either the SEP Graduate Certificate, or the SEP Master's may be taken as part of a general course, subject to prerequisites.

Suitable additional subjects:

Other suitable graduate subjects are offered by the Faculty of Engineering. The Postgraduate

subject selection table indicates some of these subjects.

### Academic inquiries

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

### Structural Engineering (STR)

The increasing demand for infrastructure developments in both developed and developing countries continues to provide structural engineers with opportunities to practise their profession internationally.

The Structural Engineering program at UTS spans current research and industrial collaboration in: structural mechanics, stability and large deformations, structural reliability, and finite element analysis; structural dynamics, earthquake engineering, active and passive damping of tall buildings; bridges and off-shore structures; prestressed concrete, steel and composite structures; timber engineering; construction materials; construction, protection and rehabilitation of structures.

### Faculty

The teaching and research staff are drawn from Civil Engineering, leading structural engineering practitioners, and academics from other Australian and international organisations.

### Award options

All general courses.

### 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:

Subjects are supported by well-equipped structures and materials laboratories, a major structural dynamics test facility featuring a modern shaker table, and advanced computing infrastructure.

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

Suitable additional subjects:

Other suitable graduate subjects are offered by the Faculty of Engineering. The Postgraduate subject selection table indicates some of these.

### Academic inquiries

Professor S Bakoss  
Director

Structural Engineering Graduate program  
Room 528, Level 5, Building 2  
Telephone: (+ 61 2) 9514 2629  
Fax: (+ 61 2) 9514 2633  
E-mail: steve.bakoss@uts.edu.au

Associate Professor B Samali  
Co-Director

Structural Engineering Graduate program  
Room 7079, Level 7, Building 2  
Telephone: (+ 61 2) 9514 2623  
Fax: (+ 61 2) 9514 2633  
E-mail: bijan.samali@uts.edu.au

## Telecommunications Engineering (TEL)

Unprecedented demand, both nationally and internationally, for engineers with knowledge and skills in telecommunications has been created by deregulation of services, proliferation of technologies and prospects of high-speed networks for multimedia services.

The Telecommunications Engineering program at UTS offers opportunities to master and extend these technologies through practice-oriented, 'hands-on' study. The program is distinguished by strong industrial and institutional collaboration, international linkages, and research in the fields of: antennas and propagation, multiple access, modulation and coding, computer networks and operating systems, telecommunications switching systems and teletraffic engineering.

### Faculty

The teaching and research staff are drawn from Electrical Engineering, the CRC for Distributed Systems Technology, and leading industrial research and development establishments.

### Award options

All general courses, together with the specialist Master of Engineering in Telecommunications Engineering course.

### 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

Suitable additional subjects:

Other suitable graduate subjects are offered by the Faculty of Engineering. The Postgraduate subject selection table indicates some of these.

### Academic inquiries

Associate Professor S Reisenfeld  
Director

Telecommunications Engineering Graduate program  
Room 2512B, Level 25, Building 1  
Telephone: (+ 61 2) 9514 2447  
Fax: (+ 61 2) 9514 2435  
E-mail: samr@eng.uts.edu.au

## Water Engineering (WTR)

Many large government bodies have a water engineering focus, and several private consultancies and manufacturers specialise in serving the water industry. There are employment opportunities for water engineering

professionals with these organisations, and in broad fields such as local government.

The graduate Water Engineering program enables engineers and suitably qualified professionals to gain advanced skills and knowledge in water engineering by research or coursework. It has particular relevance to Australian practice, and focuses on the engineering challenges of water quantity and quality management.

### **Faculty**

Subjects are taught by practising experts in appropriate fields, together with members of UTS staff who specialise in water engineering. The Program Director, Associate Professor Geoff O'Loughlin, has specialised in urban stormwater management for nearly 20 years.

Industry participation assures appropriate course material and best practice perspectives, and is reinforced through joint supervision of approved student projects.

### **Award options**

All general courses.

### **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

Suitable additional subjects:

Other suitable graduate subjects are offered by the Faculty of Engineering. The Postgraduate subject selection table indicates some of these.

### **Academic inquiries**

Associate Professor G O'Loughlin  
 Director  
 Water Engineering program  
 Room tba, Level 5, Building 2  
 Telephone: (+ 61 2) 9514 2644  
 Fax: (+ 61 2) 9514 2633  
 E-mail: geoff.o'loughlin@uts.edu.au

## **SUBJECT SELECTION GUIDE**

### **For graduate program concentrations in coursework awards**

This subject selection guide is intended for use by students in all programs leading to the following awards:

- Master of Engineering (by coursework)
- Master of Engineering Practice
- Master of Technology
- Graduate Diploma in Engineering
- Graduate Certificate in Engineering

### **Subject availability**

The Faculty of Engineering aims to offer an array of graduate subjects which allow flexibility in the development of programs matched to the professional objectives of its students.

The list of subjects in the Postgraduate subject selection table (following) indicates capability within the Faculty. The number of subjects which can be offered in any year is necessarily limited. Subjects scheduled for offer in any year will be determined by evidence of demand for places; the availability of academic staff; arrangements with visiting contributors from industry and overseas; and commitments to currently enrolled students. The 1997 timetable, to be available in December 1996, will provide details of subjects to be offered, modes of delivery (i.e. standard one-semester pattern, block release, short course etc.) and times.

However, students are strongly advised to check their timetables with the Graduate Studies Officer at the GSE on a regular basis to obtain the most recent information on subject availabilities.

Provision also exists for candidates in the above courses to undertake foundation (undergraduate) subjects, as well as subjects offered by other faculties at UTS, other universities (through their faculties of engineering), and other approved providers, including the Australian Graduate School of Engineering Innovation Ltd (AGSEI).

Enrolment in foundation (undergraduate) subjects is strongly recommended for candidates who undertook their first degree at another university, or who completed previous studies some years ago.

### 1997 programs

The Faculty of Engineering has identified the following program concentrations for graduate studies in engineering in 1997:

Local Government Engineering	LGE
Local Government Management	LGM
Water Engineering	WTR
Environmental Engineering	ENV
Groundwater Management	GWM
Structural Engineering	STR
Telecommunications Engineering	TEL
Software Engineering	SFT
Information Systems Engineering	INF
Control Engineering	CTL
Manufacturing Engineering and Management	MFG
Engineering Management	MGT
Professional Practice	PRP
Energy Planning and Policy	EPP

Further program concentrations may also be offered. The Faculty is constantly alert to the need to develop new subjects in areas of strong demand, particularly where this is accompanied by the possibility of industry involvement.

Note that some of these program concentrations (LGE, LGM, ENV, GWM, TEL, MGT) may be taken by students enrolling in a UTS course leading to one of the following specialist awards:

- Graduate Diploma in Local Government Engineering
- Master of Local Government Management
- Graduate Certificate in Environmental Engineering and Management
- Master of Engineering in Groundwater Management
- Graduate Diploma in Engineering in Groundwater Management
- Master of Engineering in Telecommunications Engineering
- Master of Engineering Management

### Approved subjects

The list of currently approved subjects available through the Graduate School of Engineering and which can be taken for credit as part of the courses listed above is given in the Postgraduate subject selection table on the following pages.

This list may be amended prior to enrolment in January/February 1997; subjects to be offered in 1997 will be advised to applicants in December 1996.

Any additional subjects to be presented in 1997 which are not listed will be separately advertised. These will typically be offered as short courses or in block-release mode.

### Approval of programs

Individual programs are approved at enrolment.

The selection of subjects should ensure a coherent study program. Students may combine subjects from two or more program concentrations.

Individual subjects which are core to specialist (or specific award) courses may be taken as electives in a general program, class sizes permitting. However, prerequisite requirements must be satisfied before requested places in such classes can be approved.

Normally students enrolled in general courses will not be allowed to take more than two subjects in either the UTS-Thomson Software Engineering program or the Energy Planning and Policy program concentration.



## Guide to postgraduate subject selection table

The following table shows how subjects might be combined to form coursework programs in each of the illustrative program concentrations, LGE to EPP, as part of a general course candidature. For each program concentration, subjects are classified in the table as follows:

C = A designated core subject

R = A strongly recommended subject

E = A suitable elective

As noted above, this classification is offered as a guide only, with the exception of subjects classified as core requirements.

Candidates are encouraged to select subject combinations appropriate to their career needs, academic background, engineering experience and prior learning, in consultation with their nominated Academic Adviser.

Candidates intending to include subjects from the table for credit towards the Master of Engineering Practice degree should consult the Head of the Graduate School of Engineering for details of supplementary assessment requirements and credit weightings.

Details of subjects offered by other faculties at UTS, by AGSEI and by other metropolitan universities, and which may be recognised for credit, are given in the relevant handbooks.

### Advice

Guidance on the suitability and selection of undergraduate and/or graduate subjects and choice of programs can be provided through consultation with an Academic Adviser, or by contacting the Graduate School of Engineering.



### Postgraduate subject selection table (cont.)

No.	Subject name	LGE	LGM	WTR	ENV	GWM	STR	TEL	SFT	INF	CTL	MFG	SYS	MGT	PRP	EPP
49131	Medium Span Bridges	E		E			R									
49132	Stability of Structures						R				E					
49133	Steel and Composite Design						R									
49134	Structural Dynamics						R				E					
49135	Wind Engineering				E		R									
49318	Product Design for Marketing										E	R	E			
49136	Application of Timber in Engineered Structures	E					R									
49141	Advanced Geomechanics	E				E	R									
49142	Advanced Ground Modification	E		E	E	E	R									
49151	Advanced Concrete Technology						R									
49152	Damage and Repair of Concrete Structures	E					R									
49273	Random Signal Theory							R	E	E	R					
49201	Integrated Services Networks							R	E	E						
49202	Communication Protocols							R	E	E						
49203	Telecommunications Signal Processing							R	E	E						
49204	Advanced Teletraffic Engineering							R	E							
49205	Transmission Systems							R	E							
49206	Advanced Studies in Electromagnetic Compatibility							R	E							
49207	Wave Propagation for Microwave and Mobile Communications							R	E							
49208	Telecommunications Management							R					E			
49211	Software Engineering Principles	E		E	E	E	E	E	R	E	E	E				
49212	Object-oriented Software Development							E	R	E	E	E				
49214	UNIX and C	E		E	E	E	E	E	R	E	E	E				
49217	Software Verification and Validation							E	R	E	E	E				
49225	Software Project Management	E		E	E	E	E	E	R	E	E	E				
49233	Software Requirements Specification <sup>1</sup>								R							
49234	Real-time Object-oriented Software Development <sup>1</sup>								R							
49235	Real-time Operating Systems <sup>1</sup>								R							
49236	Software Development Project <sup>1</sup>								R							



**Postgraduate subject selection table (cont.)**

No.	Subject name	LGE	LGM	WTR	ENV	GWM	STR	TEL	SFT	INF	CTL	MFG	SYS	MGT	PRP	EPP
49026	Electricity Sector Planning															R
49027	Energy Demand Analysis and Forecasting															R
49028	Policy and Planning of Energy Conservation				E							E				R
49029	Environmental Policy for Energy Systems				E											C
49032	Sustainable Technological Development	E	E													R
49033	Combined and Cogeneration Power Plants	E														R
49009	Engineering in Australian Society	E	E	E	E	E	E	E	E	E	E	E	E	E	R	E
49010	Engineering Ethics	E	E	E	E	E	E	E	E	E	E	E	E	E	R	E
49011	International Engineering	E	E	E	E	E	E	E	E	E	E	E	E	E	R	E
49044	Engineering Communication and Documentation	E	E	E	E	E	E	E	E	E	E	E	E	R	R	E
49040	Graduate Seminar	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
49041	Engineering Research Methodology	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
49052 to 49076	Graduate Project (Master's courses only)	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
49082 to 49096	Special Course	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
49045	Engineering for Law <sup>2</sup>															
49047	Finite Element Applications in Structure Mechanics						R					E				
66014	Hydrogeology					C										
66015	Hydrogeochemistry					C										
66016	Geophysics and Remote Sensing of Groundwater Resources					E										
66017	Geopollution Management					C										
66018	Groundwater Geophysics					E										
66025	Contaminated Site Management					R										

<sup>1</sup> Core subjects offered in UTS-Thomson Software Engineering Program.

<sup>2</sup> Law graduates only.

## 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. While the MEM program is formally administered by the Faculty of Engineering, there is close collaboration with the Faculty of Business in its presentation and development.

The MEM program provides an 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 specialties.

### Duration

The course requires 72 credit points of study.<sup>1</sup> The program is structured for part-time evening attendance. Extra intensive classes may be held in the University breaks. Most students taking two subjects per semester require three years to complete the degree.

<sup>1</sup> This requirement may change to 60 credit points in 1997. This is subject to University approval and cannot be guaranteed.

## Overseas students

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

## Admission requirements

An undergraduate degree in engineering or other technological/applied science field is required for entry to the course. Applicants should have a minimum of two years' experience in employment related to the course.

Applicants are required to submit a covering letter indicating why they wish to undertake the course, a detailed curriculum vitae including the names, telephone numbers and addresses of two professional referees and a statement indicating the level of their employer's support for the application.

## Course structure

### Core

The following subjects must be completed (48 credit points):

21718	Organisation Analysis and Design	6cp
49003	Economic Evaluation	6cp
21813	Managing People	6cp
49005	Technological Change	6cp
22747	Accounting for Management Decisions	6cp
49001	Judgment and Decision Making	6cp
49002	Project Management	6cp
49004	Systems Engineering for Managers	6cp

Most students take subjects in the order shown above but this is not compulsory. Subjects may be available once or twice per year, depending on demand, and class sizes are normally restricted to 35.

### Electives

A total of 24 credit points of electives must be completed. Subjects may be chosen, by agreement, from the Faculties of Business or Engineering or, by special arrangement, from other faculties or universities. Students are encouraged to take at least 12 credit points from the following list of subjects:

21720	Employment Relations	6cp
21728	Public Sector Management	6cp
21741	Operations Management	6cp
21779	Management Skills	6cp
24734	Managerial Marketing	6cp
25742	Financial Marketing	6cp
49052-49076	Graduate Project	18-24cp
79708	Contemporary Business Law	6cp

Students should note that the demand for places in Faculty of Business subjects is high and Business students have precedence. For this reason, students cannot be guaranteed admission to any particular subject and acceptance will only be known in the week prior to commencement.

### Fees

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

### Inquiries

Inquiries should be made to:

Associate Professor J V Parkin  
Room 7087, Level 7, Building 2  
Telephone: (+ 61 2) 9514 2638  
Fax: (+ 61 2) 9514 2549  
E-mail: jim.parkin@uts.edu.au

## Master of Engineering in Telecommunications Engineering

### Course code: EP84

The course is designed to enable graduates in electrical or computer engineering to develop an in-depth specialisation in one of the telecommunications technologies currently emerging. Experienced graduates will also find the course attractive as a means of keeping current with the technologies that are having such a profound influence on their industry. Special features include the opportunity to undertake a substantial Telecommunications Research Project and to participate in the industrially relevant research programs in place in the University.

### Duration

The minimum time for completion of the degree is three semesters for full-time candidates and five semesters for part-time candidates.

### Admission requirements

Engineers wishing to enter the program must possess a First or Second Class Honours degree in Electrical or Computer Systems Engineering from an Australian university, or an equivalent four-year full-time degree. Applicants should

have a minimum of two years' experience in employment related to the course.

Applicants are required to submit a covering letter indicating why they wish to undertake the course, as well as the names, telephone numbers and addresses of two professional referees and, for part-time study, a statement indicating the level of their employer's support for the application. They also need to submit a detailed curriculum vitae with a clear indication of the projects or work in the telecommunications or related industries that they have been involved in.

Prospective students who do not meet the entrance requirements may be invited to undertake qualifying study before commencing the Master's program. A qualifying program may comprise subjects totalling up to 45 credit points, and may specify a level of attainment.

Qualifying students who complete a total of 24 credit points in an approved program, with an average grade of Credit or better, may be accepted into the Master's program.

Students who do not attain a sufficient level of performance for admission to the Master's program, but who have completed subjects totalling the requisite numbers of credit points, may be awarded a Graduate Certificate or Graduate Diploma in Engineering.

Graduate Diploma students who complete all Master of Telecommunications coursework subjects, with an average grade of Credit or better, may be accepted into the Master's program. However, such acceptance cannot be guaranteed and should not be the motivation for initial enrolment in the Graduate Diploma course.

### Course structure

A candidate for the degree shall complete coursework and a graduate project, totalling 72 credit points.<sup>1</sup> This includes 30 credit points of core material, together with a graduate project with a weighting of 36 credit points. The remaining credit requirements are met through the completion of one or more approved elective(s).

The following coursework subjects are presently offered at the rate of two per semester; but since the actual program may vary, the current program should be requested from the Graduate Studies Officer.

49201	Integrated Services Networks	6cp
49202	Communication Protocols	6cp

49203	Telecommunications Signal Processing	6cp
49204	Teletraffic Engineering	6cp
49205	Transmission Systems	6cp
	Elective	6cp

The elective may be chosen from any approved subject offered through the Graduate School of Engineering or graduate level subjects offered by the Faculties of Mathematical and Computing Sciences or Business.

<sup>1</sup> The credit point requirements for the research project may be adjusted in 1997, to allow completion of the degree with 60 credit points.

## Attendance

Some lectures will be held in the evening, for three hours, and some will be offered in three, two-day modules, with students to undertake independently computer assignments and reading programs between modules. Formal examination will be conducted at the end of each semester. Students will also undertake a research project. Excellent facilities for computer-aided design, hardware development and system simulation are available at the University.

Each of the subjects may be undertaken independently as a short course and later credited towards a Master's degree.

For information on short courses, applicants should contact the Graduate Studies Officer on (+ 61 2) 9514 2606.

## Fees

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

## Inquiries

Inquiries should be made to:

Associate Professor S Reisenfeld  
 Room 2512B, Level 25, Building 1  
 Telephone: (+ 61 2) 9514 2448  
 Fax: (+ 61 2) 9514 2435  
 E-mail: samr@uts.edu.au

# 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.

The course is designed to enable students to develop specialist skills in the area of groundwater management including aspects of geology, hydrology, hydraulics and resource management. This provides a multi-disciplinary perspective to issues of groundwater management.

## Duration

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

## 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, telephone numbers and addresses of two professional referees.

## Course structure

### Autumn semester

49550	Computing for Groundwater Specialists <sup>1</sup>	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
-------	---------------------------------	------

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



### 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:

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

## Master of Local Government Management

### Course code: EB52

This course is designed for individuals employed in local government in a range of occupational groups (e.g. administrators, community workers, engineers, health and building inspectors, librarians etc.) who aspire to senior executive positions in local government.

The course builds upon the experience and expertise of the Faculties of Business and Engineering at UTS, both of which have offered educational programs for many years for individuals in local government. The course is administered jointly by the two Faculties, and draws also upon the resources of other faculties of the University.

### Admission requirements

Applicants are required to submit with their application a curriculum vitae and two letters: one indicating why they wish to undertake the course, and the other a statement indicating the level of their employer's support for the application.

A Bachelor's degree in a discipline appropriate to the activities of local government is a normal minimum requirement for admission.

It will be assumed that successful applicants will have a sound knowledge of the environment and operations of local government and

will have demonstrated competence in a relevant functional and/or professional field. Successful applicants would normally be expected to have a minimum of five years' relevant experience in a professional and/or administrative position following attainment of the minimum required educational qualifications for that position.

### Provisional admission

Students who do not possess a degree or equivalent may be considered for provisional admission if they can demonstrate:

1. possession of other relevant post-secondary qualifications;
2. a minimum of five years' work experience at a senior level in local government; and
3. adequate preparation and capacity to pursue successfully postgraduate studies.

### Course structure

The course is offered by block-release attendance mode, normally completed over three years (six semesters). All students will enrol in the Master's course. However, those who successfully complete the foundation of six subjects plus two elective subjects (or one elective and one project subject) will be permitted to withdraw from the course and graduate with a Graduate Diploma in Local Government.

#### Semester 1

21728	Public Sector Management	6cp
49451	Environment of Professions in Local Government	6cp

#### Semester 2

21731	Resource Management	6cp
49452	Environmental Management	6cp

#### Semester 3

49453	Infrastructure Management	6cp
	Project or elective (1 subject)	6cp
	<i>or</i>	
	Research Stream (1 subject)	6cp

#### Semester 4

21729	Human Resource Management (Public)	6cp
	Project or Elective (1 subject)	6cp
	<i>or</i>	
	Research Stream (1 subject)	6cp

**Semester 5**

Project or Elective (2 subjects)	12cp
<i>or</i>	
Research Stream (2 subjects)	12cp

**Semester 6**

21758 Strategic Management (Public)	6cp
49454 Managing Local Enterprise	6cp

**Electives**

Students may submit for approval a portfolio of up to four elective subjects prior to enrolment in those subjects. Students will be counselled in selecting a balanced portfolio.

**Applied research stream**

Students who demonstrate aptitude for research and who have gained a minimum average Credit assessment in the first four subjects of the course may be permitted to undertake a research stream (equivalent to four subjects). Students who have attained results of high quality may view this as preparation for a PhD.

**Work projects (action learning)**

Students will have the option of undertaking an action learning project, equivalent to one subject. It will normally combine investigation and action in a real work situation in which both the employer and the University have an interest in the outcome.

**Short courses**

It is possible to accumulate limited credit for completion of approved short courses. This is limited to the equivalent of two subjects, termed Vocational Competencies 1 and 2. This is conditional upon:

1. approval of the student's portfolio of short courses;
2. completion of the short courses during the period of enrolment in the Master of Local Government Management course. No credit will be allowed for short courses completed prior to enrolment.

**Advanced standing**

Subject places being available, individuals who have completed the University's Graduate Diploma in Local Government Engineering at a minimum Credit level average may gain entry to this Master's course with advanced standing. Such students will be required to complete a further six subjects, normally over three semesters.

**Fees**

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

**Inquiries**

Inquiries should be made to:

Associate Professor K Sproats  
Room 1714, Level 14, Building 1  
Telephone: (+ 61 2) 9514 2643  
Fax: (+ 61 2) 9514 2274  
E-mail: kevin.sproats@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 that of the Master of Engineering in Groundwater Management course. However, the project work of the Spring semester is shorter and must be completed by the end of the teaching semester.

**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 Specialists <sup>1</sup>	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

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

**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:

Professor M Knight  
Room 1715, Level 17, Building 1  
Telephone: (+ 61 2) 9514 2692  
Fax: (+ 61 2) 9514 1985  
E-mail:  
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 on a block-release pattern of study to accommodate the special needs of students living in country areas of the State. 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 of a similar nature.

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 local government or are employed 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 an interview. It may be necessary in some cases, to pursue an area of study to prepare for admission to the course.

**Course structure**

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 and 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 Local Government Management or Environmental Engineering and Management program areas.

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 while 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 on inquiry to the Graduate Studies Officer, on (+ 61 2) 9514 2606.

### Inquiries

Inquiries should be made to:

Associate Professor K Sproats  
Room 1714, Level 17, Building 1  
Telephone: (+ 61 2) 9514 2643  
Fax: (+ 61 2) 9514 2274  
E-mail: kevin.sproats@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 work-

ing 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 ecological processes; a sensitivity to the possible impacts of planned actions on the environment; an understanding of the issues related to monitoring and to reducing the impacts of those actions; and the professional skills necessary 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 acceptance for 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 on inquiry to the Graduate Studies Officer, on (+ 61 2) 9514 2606.

## Inquiries

Initial inquiries should be made to the Graduate Studies Officer on (+ 61 2) 9514 2606. Academic inquiries should be directed to responsible coordinators as follows:

### Civil Engineering

Professor S Vigneswaran  
Room 523, Level 5, Building 2  
Telephone: (+ 61 2) 9514 2641  
Fax: (+ 61 2) 9514 2633  
E-mail: s.vigneswaran@uts.edu.au

Associate Professor G O'Loughlin  
Room tba, Level 5, Building 2  
Telephone: (+ 61 2) 9514 2630  
Fax: (+ 61 2) 9514 2633  
E-mail: geoff.O'Loughlin@uts.edu.au

### Faculty of Science

Dr M Dawson  
Room 208, Level 2, Building 4  
Telephone: (+ 61 2) 9514 1717  
Fax: (+ 61 2) 9514 1460  
E-mail: michael.dawson@uts.edu.au

### Faculty of Design, Architecture and Building

Dr J Broadbent  
Room 610, Level 6, Building 6  
Telephone: (+ 61 2) 9514 8986  
Fax: (+ 61 2) 9514 8787  
E-mail: john.broadbent@uts.edu.au

### Faculty of Science

Associate Professor K Brown  
Room 2.3B, Level 2, Dunbar Building, Gore Hill  
Telephone: (+ 61 2) 9514 4042  
Fax: (+ 61 2) 9514 4079  
E-mail: ken.brown@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 Studies Officer at any time.

# Subject descriptions

## UNDERGRADUATE COURSES

### Key to subject numbers

Subject descriptions appear in numerical order. Subject numbers are made up of five digits.

The first digit indicates the faculty which teaches the subject.

- 2 = Faculty of Business
- 3 = Faculty of Mathematical and Computing Sciences
- 4 = Faculty of Engineering
- 5 = Faculty of Humanities and Social Sciences
- 6 = Faculty of Science (Physical Sciences)
- 7 = Faculty of Law
- 91 = Faculty of Science (Life Sciences)
- 97 = Institute for International Studies

### Key to abbreviated course names used in subject synopses

Where the subjects shown form a prescribed or recommended part of a course, the abbreviation for that course is indicated as follows:

- CE Bachelor of Engineering in Civil Engineering
- CEE Bachelor of Engineering in Civil and Environmental Engineering
- SE Bachelor of Engineering in Structural Engineering
- EE Bachelor of Engineering in Electrical Engineering
- ET Bachelor of Engineering in Telecommunications Engineering
- CSE Bachelor of Engineering in Computer Systems Engineering
- MEE Bachelor of Engineering in Mechanical Engineering
- MSE Bachelor of Engineering in Manufacturing Systems Engineering
- BEBA Bachelor of Engineering/Bachelor of Arts in International Studies
- BT Bachelor of Technology in Manufacturing Engineering

### Guide to subject descriptions

The subject descriptions shown below indicate the subject code and name, the number of credit points for the subject (e.g. 3cp), the duration of the subject, indicated as semester weeks, if applicable, and the number of formal contact hours each week (e.g. 4hpw). Also shown are the prerequisites or corequisites if any, the method of assessment, the name of the Subject Coordinator and a brief outline of the content.

Prerequisites are subjects which must be completed before taking the subject to which they refer. Corequisites may be completed before or be taken concurrently with the subject to which they refer.

**Note:** Methods of assessment given in the following descriptions are subject to change.

### 015115

#### Introducing Aboriginal Cultures and Philosophies

*6cp; 3hpw  
School of Adult Education*

This subject is offered as an elective for students in all faculties. The subject will introduce students to Aboriginal culture and social organisation as expressions of Aboriginal cosmology. Contemporary Aboriginal culture will be presented as an evolving response to colonialism and as a reassertion of cultural empowerment.

### 27001

#### Commercial Issues in Telecommunications

*ET  
6cp; prerequisite: 33310 Engineering Mathematics 3  
Faculty of Business*

This subject provides background on the commercial context in which telecommunications technologies are applied. Students are introduced to two major components of economic theory in microeconomics (which deals with the behaviour of individuals, firms and industries) and macroeconomics (which deals with the behaviour of national and international economies). Topics covered include demand and supply, theory of the firm, the market

system, market failure, macroeconomic theory output, employment and inflation and macroeconomic policies.

### 31141

#### Database Structures and Management

CSE/ET

3cp; 3hpw; prerequisite: 45133 Software Development 2

The nature of common data structures and their use was introduced in 45133 Software Development 2. This subject covers operations on data structures, basic file systems, common database architectures and their relative merits, data entry to database and data retrieval. The student will, on completion, have the knowledge to be able to select and configure suitable databases to meet a specification and be able to write handlers to supply and extract data from the database. Key features of the subject are the illustration of concepts by commercial systems such as pick, unify, dbase IV or lotus 123, plus a major assignment using an asynchronous communications port for data input and ad hoc report generation from the stored data.

Topics include review of strings, arrays, lists, trees, linking, and structures of structures; operations including sort, search, merge; basic file systems on mass storage, distributed databases, data input (forms, handlers) and data retrieval (ad hoc queries, report generator, alarms), database administration.

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

### 31926

#### Paradigms of Intelligence

CSE

4cp; 3hpw; coordinator: Dr S Prabhakar  
School of Computing Sciences

Introduces the basic issues in modelling intelligent behaviour. The issues are addressed by introducing the underlying assumptions behind various paradigms and analysis of experiences with these paradigms in research. Topics include intelligent systems as problem solvers and learning systems; modelling the external world and the user environment; and the psychological, philosophical, computational and scientific issues in modelling intelligence.

Assessment: seminar 20 per cent, two assignments 40 per cent, project 40 per cent.

### 33120

#### Engineering Mathematics I

MEE/MSE

6cp; 6hpw

School of Mathematical Sciences

Presents basic aspects of calculus to engineering students. On completion of the subject, students should have a knowledge of the following topics: matrices and determinants; vectors; limits, continuity and differentiation; applications of differentiation; integration and applications; elementary functions; methods of integration; sequences, series and complex numbers.

### 33121

#### Engineering Mathematics IA

CE/SE/CEE

3cp; 3hpw

School of Mathematical Sciences

Presents basic aspects of calculus to engineering students. On completion of the subject, students should have a knowledge of the following topics: matrices and determinants; vectors; limits, continuity and differentiation; applications of differentiation.

### 33122

#### Engineering Mathematics IB

CE/SE/CEE

3cp; 3hpw; prerequisite: 33121 Engineering Mathematics IA

School of Mathematical Sciences

Presents basic aspects of calculus to engineering students. On completion of the subject, students should have a knowledge of the following topics: integration and applications; elementary functions; methods of integration; sequences, series and complex numbers.

### 33220

#### Engineering Mathematics 2

MEE

6cp; 6hpw; prerequisite: 33120 Engineering Mathematics I

School of Mathematical Sciences

Builds on the elementary aspects of calculus covered in Engineering Mathematics 1. On completion of the subject, students should have a knowledge of partial derivatives, multiple integrals and differential equations. Topics covered include partial derivatives; double integrals and applications; triple

integrals and applications; differential equations; solution of ordinary differential equations by Laplace transforms; convolution theorem; step functions; series solutions of ordinary differential equations; regular singular points; Bessel functions; boundary value problems; Fourier series; vibrating membrane and Bessel functions; vector fields; divergence and curl; line and surface integrals; and theorems of Gauss and Stokes.

Assessment: class test 25 per cent, final examination 75 per cent.

### 33221

#### Engineering Mathematics 2A

CE/SE/CEE AND MSE

3cp; 3hpw; prerequisite: 33122 Engineering Mathematics 1B

School of Mathematical Sciences

Builds on the elementary aspects of calculus covered in Engineering Mathematics 1A and 1B. On completion of the subject, students should have a knowledge of partial derivatives, multiple integrals and differential equations. Topics covered include partial derivatives; double integrals and applications; triple integrals and applications; differential equations.

Assessment: class test 25 per cent, final examination 75 per cent.

### 33310

#### Engineering Mathematics 3 (Electrical)

EE/CSE/ET

6cp; 6hpw; prerequisite: 35102 Mathematics 2

School of Mathematical Sciences

The series solution of differential equations and the conceptualisation of simple problems requiring multidimensional thinking, for example, boundary value problems, vector calculus and complex variable theory.

The subject content is as follows: series solution of linear differential equations; ordinary and regular singular points; Bessel functions; boundary value problems for one-dimensional heat and wave equations; Laplace equation in a circle; circular drum; double and triple integrals; polar, cylindrical and spherical coordinates; line and surface integrals; Green's theorem; divergence theorem and Stokes' theorem; analytic functions; Cauchy-Riemann equations; conformal mapping; Cauchy's integral theorem; Taylor and Laurent series; the residue theorem; inverse Laplace transforms.

There will be emphasis on deriving proofs of the fundamental concepts.

Assessment: class tests 25 per cent, final examination 75 per cent.

### 35101

#### Mathematics 1

CE/CSE/ET

6cp; 6hpw; prerequisite: HSC 3-unit Mathematics is assumed

School of Mathematical Sciences

The objective is for students to master the fundamental mathematical operations used in most branches of electrical engineering. Topics include matrices and determinants; solution of linear equations; Gaussian reduction. Eigenvalues and eigen vectors. Vectors; products of vectors; equations of lines and planes. Complex numbers: polar form, De Moivre's theorem. Limits, continuity and differentiation. Mean value theorem. Curve sketching; related rates; maxima and minima; integration. Riemann sums; fundamental theorem of calculus; application to areas and volumes and to lengths of curves; logarithm and exponential functions. Trigonometric and hyperbolic functions. L'Hopital's rule.

Assessment: two examinations 40 per cent each, class tests and assignments 20 per cent.

### 35102

#### Mathematics 2

CE/CSE/ET

6cp; 6hpw; prerequisite: 35101 Mathematics 1

School of Mathematical Sciences

The objective is for students to master the fundamental mathematical operations used in most branches of electrical engineering. Topics include methods of integration; improper integrals; ordinary differential equations; first order linear and variable separate equations; higher order linear equations; under-determined coefficients. Sequences and series; tests for convergence; power series; radius of convergence; Taylor series. Application of matrix exponentials to systems of linear equations. Series solution of linear differential equations; ordinary and regular singular points; Bessel functions. Partial derivatives, directional derivative and gradient; maxima and minima; Lagrange multipliers.

Assessment: two examinations 40 per cent each, class tests and assignments 20 per cent.



**35111****Discrete Mathematics***EE/CSE/ET**6cp; 6hpw**School of Mathematical Sciences*

This is a foundation subject which contributes basic techniques to later mathematics and computing subjects. Topics include graphs, paths, trees; set operations; indexing and recurrence relations; propositional and predicate calculus; groups and monoids; automata; and permutations, combinations, partitions, counting and allocation problems.

Assessment: class tests and assignments 40 per cent, final examination 60 per cent.

**45113****Digital Techniques***EE/CSE/ET**3cp; 3hpw; subject coordinator: A/Prof C E Peterson*

The first part of this subject will introduce number systems and Boolean algebra. Techniques of manipulating and minimising Boolean functions, and implementing these functions using logic gates will then be presented. The concepts introduced will be demonstrated by designing and building a combinatorial circuit in the laboratory.

The introduction to sequential circuit design will be by examining the operation of D, and JK flip flops. Methods of formally describing the operation of sequential circuits using state tables and state diagrams will then be introduced. Finally techniques of implementing the circuits represented in the form of state tables and diagrams will be presented. These concepts will again be demonstrated by designing and building a sequential circuit in the laboratory.

Assessment: class tests 20 per cent, laboratory work 20 per cent, final examination 60 per cent.

**45115****Engineering Practice***EE/CSE/ET**3cp; 3hpw; subject coordinators: Ms V McKain, Ms E A Taylor*

This subject is undertaken only by students who gained admission on the basis of a TER score i.e. their performance in high school.

The aim is to help students: develop their understanding of the practice of electrical and computer systems engineering, the role(s) of

practitioners, and the academic disciplines which support these professions; develop an appreciation of their communication capabilities and provide support for those needing to remedy weaknesses; develop an understanding of how their course is designed to contribute to their professional development; assume responsibility for their own learning. Students are encouraged to see their progression through the course as an engineering project that is to be delivered on time and to a specified standard; and take action to equip themselves with skills that will be required in future studies and work.

**45116****Electrical Engineering I***EE/CSE/ET**3cp; 3hpw; corequisite: 35101 Mathematics I; subject coordinator: A/Prof C E Peterson*

This is a first course in dc and ac circuit theory and introduces electric and magnetic fields. Circuits containing resistors and capacitors are analysed. Circuit measurements use ac and dc meters and the oscilloscope.

Assessment: laboratory work 10 per cent, mid-semester examination 30 per cent, final examination 50 per cent, tutorials 10 per cent.

**45123****Software Development I***EE/CSE/ET**6cp; 6hpw; prerequisites: 45115 Engineering Practice; 35111 Discrete Mathematics; subject coordinator: Dr D Lowe*

Introduces students to the fundamental aspects of computer usage and computer programming. They should be able to engineer software based on the object-oriented paradigm. They should understand the need for software engineering principles and be willing to use them in the development of correct, efficient, appropriate, maintainable, cost-effective, re-usable software.

The students should be able to develop small to medium software systems (up to 5,000 lines of code), working in teams, using the language Eiffel. They should be able to identify the appropriate tools and techniques to use, and use them in a correct engineering methodology. They should be able to use the relevant tools on both a PC and a UNIX system.

Assessment: assignments 35 per cent, tutorials and reviews 20 per cent, quizzes 15 per cent, final examination 30 per cent.

**45124****Electrical Engineering 2***EE/ET**6cp; 6hpw; prerequisite: 45116 Electrical Engineering 1; corequisite: 35102 Mathematics 2; subject coordinator: Dr D Webster*

Covers the essential theory needed by students in their first industrial semester. It deals with electromagnetic theory, measurements, basic electronic rectifier and amplifier circuits and electromechanical devices. It consists of lectures, tutorials, laboratory and computing work.

Assessment: laboratory reports 10 per cent, problems 24 per cent, experiments 2 per cent, mid-semester test 14 per cent, final examination 50 per cent.

**45125****Engineering Discovery***EE/CSE/ET**3cp; 3hpw; prerequisite: 45115 Engineering Practice; subject coordinator: Ms E Taylor*

This subject is undertaken by students who gained admission with a TER score i.e. on the basis of their performance in high school.

The objectives of this subject are to continue and extend the exposure of students to team-based approaches to tackling open-ended problems, which the team members initially have neither the skills nor the knowledge to solve. It aims to develop in students the confidence and enthusiasm that allow a positive response to the challenge of working with problems where step-by-step procedures are unknown and to provide a setting in which students have the freedom to explore and discover methods of fostering their own creativity and ingenuity. It aims to develop advocacy, written and verbal reporting skills and the ability to use communications technology.

The problem-based learning approach introduced in Engineering Practice is continued in this subject. The students, grouped into syndicates, will be presented with challenges generally contained within scenarios which attempt to simulate realistic but simplified situations with which junior engineers might be confronted. Resource sessions are provided where necessary at which students have the opportunity to acquire the necessary knowledge and skills.

**45133****Software Development 2***EE/CSE**3cp; 3hpw; prerequisite: 45123 Software Development 1; subject coordinator: Dr D Lowe*

Extends the knowledge and skills of the students obtained in Software Development 1. This will cover both software development and specific programming skills.

The students' objectives are to be able to understand and use basic structured analysis and design methods, and to be able to develop small- to medium-sized programs (up to 5,000 lines of code) in C, working as members of a group. They should be able to apply structured coding techniques to the fundamental data types. The students should be able to produce object-oriented software using a procedural language (specifically, C). They should be able to read C++ software.

Assessment: assignments 35 per cent, tutorials and reviews 20 per cent, quizzes 15 per cent, final examination 30 per cent.

**45134****Network Theory***EE/CSE/ET**6cp; 6hpw; prerequisites: 45124 Electrical Engineering 2; 35102 Mathematics 2; subject coordinators: Dr J Nicol, Prof W Yates*

Outlines the general techniques of network analysis. The emphasis is on the time response and frequency response of I- and II-order networks. Discussion on response of networks will be preceded by description of typical signals, such as singularity functions, sinusoidal and non-sinusoidal signals, and nodal and mesh analysis. Obtaining the response of networks containing active elements will be explained, with the equivalent circuit of an active element being given to the students. The topic of three-phase networks will be covered briefly.

Assessment: laboratory and assignments 10 per cent, mid-semester examination 40 per cent, final examination 50 per cent.

**45135****Engineering Communication***EE/CSE/ET**3cp; 3hpw; prerequisite: 45125 Engineering Discovery; subject coordinators: Ms E Taylor, Ms V McKain*

The practice of engineering relies on effective technical communication, and utilises various standard documents and procedures to achieve precision and clarity. The subject develops an understanding of the requirements for effective technical communication in engineering and provides experience in the development, presentation, interpretation and maintenance of engineering information, with respect to established and developing practice.

Assessment: drawing exercises 33 per cent, report and essays 33 per cent, final examination 34 per cent.

**45141****Continuous and Discrete Systems***EE/CSE/ET**6cp; 6hpw; prerequisites: 33310 Engineering Mathematics 3 (Electrical); 45134 Network Theory; subject coordinator: Dr J G Nicol*

Gives a comprehensive coverage of the theory of linear systems with and without feedback. Continuous and discrete systems are presented in parallel. State-space methods are introduced and compared with frequency domain techniques. There are six two-hour laboratory sessions. Topics include physical system modelling, linearisation, block diagrams, signal flow graphs, Laplace and transforms, state equations, time and frequency domain response, root locus, stability criteria (Routh, Hurwitz, Jury, Nyquist).

Assessment: laboratory work 20 per cent, mid-semester examination 30 per cent, final examination 50 per cent.

**45143****Computer Hardware***EE/ET**3cp; 3hpw; prerequisites: 45116 Electrical Engineering 1; 45113 Digital Techniques; subject coordinator: Mr K K Kung*

Introduces microprocessor and micro-computer hardware, as well as assembly language programming. Topics include architectures of common microprocessors, assembly language programming, memory subsystem, interrupts, I/O subsystem and I/O controllers.

Assessment: assignments 30 per cent, final examination 70 per cent.

**45144****Electronic Devices and Circuits***EE/CSE/ET**6cp; 6hpw; prerequisite: 45134 Network Theory; subject coordinator: Dr V Ramaswamy*

Semiconductor physics, p-n junction, ideal vs real semiconductor diode, JFET, properties of the MOS system, MOSFET, BJT. Device modelling. Basic applications of semiconductor devices. Other solid-state devices (thyristors, photoelectronic devices, microwave devices). Introduction to integrated circuits. Each topic introduced in a lecture will be reinforced in a tutorial session. In addition, there will be four laboratory sessions dealing with diodes and their applications, field-effect transistors and simple FET amplifiers, BJT characteristics and model parameter extraction and BJT amplifier configurations. Students will also be required to complete three to four assignments.

Assessment: assignments 12 per cent, laboratory 8 per cent, mid-semester examination 30 per cent, final examination 50 per cent.

**45145****Engineering Statistics***EE/CSE/ET**3cp; 3hpw; prerequisites: 33310 Engineering Mathematics 3 (Electrical); 45123 Software Development 1; 45124 Electrical Engineering 2; subject coordinator: Dr KYasukawa*

Presents an introduction to statistical theory with applications in engineering. Topics are illustrated with engineering examples and case studies. Topics include probability theory, random variables, density and distribution functions including Gaussian, Binomial, Poisson and Raleigh, transformation and generation of random variables, moments and expected value calculations, summation of random variables, central limit theorem, sampling from a normal population, estimates of means and variances, confidence limits, correlation, linear regression, multiple regression, analysis of variance, the design of experiments, reliability theory, MTBF calculations, Markov chains.

The subject is taught in three modules: Probability Theory, Characterisation of Random Variables and Sampling Statistics.

Assessment: assignments 40 per cent, mid-semester quiz 30 per cent, final examination 30 per cent.

### 45151

#### Signal Theory 1

EE/CSE

3cp; 3hpw; prerequisites: 45141 *Continuous and Discrete Systems*; subject coordinator: Dr M Eckert

An introductory course in communication systems. It presents the theoretical basis for communication system analysis and gives students skills in using the techniques to design components of communication systems. The treatment is continued in the subject Signal Theory 2.

The subject's objectives are to bring students to the point where they can design active and passive lumped element filters which conform to a given mark with specified component tolerances, and to equip students with the analytical tools used to characterise deterministic and random signals in both time and frequency domains.

The subject is taught in three modules: Filter Design, the Fourier Transform and Signal Theory and Correlation and Power Spectral Density.

Assessment: assignments 10 per cent, mid-semester quiz 40 per cent, final examination 50 per cent.

### 45152

#### Signal Theory 2

EE/CSE/ET

3cp; 3hpw; prerequisites: 45151 *Signal Theory 1*; 45145 *Engineering Statistics*; subject coordinator: Mr A Kadi

Applies the analytical techniques developed in Signal Theory 1 to the analysis and design of practical baseband and bandpass point-to-point communications systems. Students are also familiarised with the design choices that are embodied in many current communication systems standards in broadcasting and telephony.

The subject is taught in three modules: Baseband Communication Systems, Bandpass Communication Systems, Communication System Performance in Noise.

Assessment: assignment 10 per cent, mid-semester quiz 40 per cent, final examination 50 per cent.

### 45153

#### Analogue Electronics

EE

6cp; 6hpw; prerequisites: 45144 *Electronic Devices and Circuits*; 45141 *Continuous and Discrete Systems*; subject coordinator: Dr B S Rodanski

Aims to develop skills in the analysis, design, practical implementation and testing of the main analogue electronic circuits of interest to an electrical or computer systems engineer. Students should be able to understand the characteristics and limitations of devices and ICs used in analogue systems; master the analysis and design methods of linear and nonlinear electronic analogue circuits and systems, test and measure the parameters of analogue circuits and systems using standard laboratory equipment.

Assessment: assignments 20 per cent, two examinations 80 per cent.

### 45154

#### Contextual Studies

EE/CSE

3cp; 3hpw; prerequisites: at least 22 weeks of approved *Industrial Experience* and 45135 *Engineering Communication*; subject coordinator: Ms E A Taylor

Aims to develop an appreciation of the contexts within which engineers practise; including their professional roles and responsibilities within society. It provides an overview and basic framework of knowledge from other disciplines and an appreciation of their interfaces with engineering practice. It also aims to contribute to the development of personal skills, self-knowledge and understanding of society.

Assessment: presentation 20 per cent, participation 20 per cent, journal 30 per cent, final examination 30 per cent.

### 45155

#### Project A

EE/CSE/ET

3cp; 3hpw; prerequisite: 45143 *Computer Hardware*; corequisites: 45151 *Signal Theory 1*; 45153 *Analogue Electronics*; subject coordinator: A/Prof P Bryce

Project A is laboratory based, and provides students with an individual experience on an analogue design project. It builds on theoretical knowledge gained from prior or concurrent core subjects. Tasks are presented in the form

of a request for tender, including a system specification and the requirement of an individually engineered prototype solution. Students are required to design, construct, demonstrate, cost, report on and defend a tender submission for their project. Project topics are allocated from a list intended to cover a range of technical interests.

### 45163

#### Real-time Software and Interfacing

EE/CSE/ET

3cp; 3hpw; prerequisites: 45133 Software Development 2; 45143 Computer Hardware; subject coordinator: Mr S Murray

Introduces students to the methods used to develop solutions for real-time computer-controlled applications. The optimal design of both the software and hardware required to interface to the 'outside world' is the objective of this course. It will emphasise the real-time and complex interface issues through case studies and laboratory work. The single chip microcomputer and supporting devices will be used to develop a stand-alone real-time application.

Assessment: laboratory 50 per cent, final examination 50 per cent.

### 45166

#### Project Management

EE/CSE/ET

3cp; 3hpw; prerequisite: 45145 Engineering Statistics; subject coordinator: Mr P Lewis

Provides students with knowledge and skills essential to the management of engineering projects. The engineering disciplines required to achieve project objectives within time, budget and resource constraints feature prominently. The subject builds on topics introduced in the prerequisite subject, and forms the contextual background to Systems Engineering.

Assessment: continuous assessment 50 per cent, quizzes and final examination 50 per cent.

### 45176

#### Systems Engineering

EE/CSE/ET

3cp; 3hpw; prerequisites: 45166 Project Management; Industrial Experience 60 weeks minimum; subject coordinator: Dr R Meegoda

Seeks to develop in students a combination of the knowledge, skills and attitudes required

to solve complex problems in engineering, with particular reference to the design of electrical, electronic and computer systems. The subject draws strongly on insights gained from industrial experience, and prepares students for contemporary professional practice.

Assessment: assignments 30 per cent, quizzes 30 per cent, final examination 40 per cent.

### 45182

#### Thesis 1

EE/CSE/ET

3cp; 3hpw; prerequisites: 45155 Project A; 45176 Systems Engineering (recommended); subject coordinator: Dr R Meegoda

The primary objective of the subjects Thesis 1 and 2 is to give the student individual responsibility for the completion of a significant engineering task, requiring the application at professional level of knowledge gained during the degree course.

The details covering the conduct and nature of the thesis subjects are covered in a separate document available from the Projects Coordinator. Students should obtain this document at least six months before intending to do the project. In brief, the arrangements are as follows: students may choose a project topic proposed by a member of academic staff or may undertake a topic that has been mutually agreed between themselves and a member of academic staff. All topics will need to have scope for the student to demonstrate his or her ability to successfully complete an engineering project of professional standard.

Thesis 1 provides for the definition, analysis and specification of a task, culminating in a documented program for completion of the task within Thesis 2.

### 45183

#### Thesis 2

EE/CSE/ET

12cp; 6hpw; prerequisite: 45182 Thesis 1; subject coordinator: Dr R Meegoda

A significant engineering task, researched within Thesis 1, is completed in this subject with the presentation of a seminar and production of a thesis document.

**45242****Electromagnetics***EE/ET**3cp; 3hpw; prerequisites: 33310 Engineering Mathematics 3 (Electrical); 45134 Network Theory; subject coordinator: A/Prof P Bryce*

Develops the topics of static electric and magnetic fields that lead to, and include, time-varying applications. The magnetic field is seen as a spatial 'distortion' of the electrostatic field, and Maxwell's equations developed from this basis. The fundamental laws of Poisson, Laplace, Faraday, Gauss, Ampere and Kirchoff are derived and placed in context with Maxwell's equations. Examples enable the simultaneous development of advanced mathematical tools for the analysis of two-dimensional boundary value problems.

Assessment: assignment 40 per cent, examination 60 per cent.

**45252****Power Apparatus and Systems***EE**6cp; 6hpw; prerequisite: 45242 Electromagnetics; subject coordinator: Dr J Zhu*

Covers transformer equivalent circuits from geometry and material properties, e.m.f. induced in a moving circuit with a non-uniform time-varying field, winding m.m.f. and air gap flux density, force and torque calculations in a doubly excited electromagnetic system, principles of dc and ac machines (including stepping motors), steady-state calculations, speed control, two-machine power flow, control of real reactive power.

Assessment: laboratory 20 per cent, mid-semester examination 30 per cent, final examination 50 per cent.

**45264****Fields and Waves***EE/ET**3cp; 3hpw; prerequisite: 45242 Electromagnetics; subject coordinator: Dr A M Sanagavarapu*

Builds on material introduced in the subjects 45242 Electromagnetics and 45134 Network Theory to consider the theoretical aspects of transmission technology based on electromagnetic field theory. An early introduction

to distributed parameter systems, boundary value problems and delayed field vectors enables consideration of steady-state transmission lines, waveguides, dielectric waveguides, optical fibres and simple antennas.

Assessment: mid-semester examination 30 per cent, final examination 70 per cent.

**45265****Numerical Methods***EE/CSE**3cp; 3hpw; prerequisites: 45144 Electronic Devices and Circuits; 45145 Engineering Statistics; 45141 Continuous and Discrete Systems; 45242 Electromagnetics; subject coordinator: Dr B Rodanski*

Deals with standard numerical techniques, covering the solution of systems of equations, root finding, differentiation and integration, curve fitting, solution of systems of differential equations, the evaluation of eigenvalues, and optimisation techniques. In all cases questions of problem conditioning, numerical accuracy, memory requirements and speed are considered. On completion of the subject students will have built up their own integrated set of tested and documented Pascal or C numerical analysis tools.

Assessment: four exercises 60 per cent, eight problems 40 per cent.

**45266****Mathematical Modelling***EE/CSE/ET**3cp; 3hpw; prerequisites: 33310 Engineering Mathematics 3; 45141 Continuous and Discrete Systems; 45145 Engineering Statistics; subject coordinator: Dr K Yasukawa*

An exploration of the process of mathematical modelling and its relevance in engineering. An engineering-related theme will be explored, problems will be identified and defined, and mathematical models, such as numerical algorithms, will be developed as needed. Students will develop an awareness of different interpretations of the nature of mathematics and their implications in the context of engineering.

Assessment will be based on three learning contracts.

**45267****Engineering Research: The Cutting Edge**

EE/ET/CSE

3cp, 3hpw; prerequisite: 45166 Project Management; corequisite: 45176 Systems Engineering; subject coordinator: Dr D B Lowe

This subject has three primary objectives. Firstly it is intended to give the students an appreciation of the way in which the engineering field is growing and expanding, and how this growth is achieved. They should realise the importance of continuing to develop their understanding, knowledge and skills, once they have completed the course.

Secondly, it aims to illustrate the breadth of the engineering field. The students are encouraged to step out of their own narrow focus, and investigate other aspects of engineering, and to see how this can provide insights into their own specialisation.

Finally, it aims to provide the students with an appreciation of research, what it involves, what the goals are, how these are achieved, and what constitutes good research methodology. The students should be able to see the relevance of research to normal engineering tasks.

**45274****Physical Design and Production**

EE

3cp, 3hpw; prerequisites: 68033 Engineering Physics 3 (Electrical); 67023 Materials Technology; subject coordinator: Dr D Webster

Introduces students to the methods and requirements of designing an electrical/electronic physical system and to translating this design into a producible and reliable item of equipment. The course consists of two modules:

PDP1: Heat transfer and thermal design of electrical and electronic equipment (7 weeks), including the following topics: Introduction to heat transfer by conduction, convection and radiation. One and two-dimensional, steady-state and transient heat transfer. Effectiveness of various configurations. Models for natural and forced convection heat transfer. Introduction to the concepts of thermal control.

PDP2: Assembly technologies and good design practice (6 weeks) including the topics: Basic

processes and design constraints of electronic assembly technologies: monolithic, hybrid thick and thin film, SMA technologies. Good design practice: product definition, product development, designing for manufacture. Concurrent engineering and modern CAD tools for electrical and electronic product design.

Assessment: assignments 20 per cent, mid-semester examination 40 per cent, final examination 40 per cent.

**45342****Electromechanical Systems**

EE

3cp, 3hpw; prerequisite: 45124 Electrical Engineering 2; subject coordinator: Prof V S Ramsden

Concerned with the operating principles, characteristics and modelling of electromechanical devices used in computer-controlled systems. Through problem-based learning with access to laboratory computer-aided data acquisition and control facilities, students will develop an understanding of one or more devices. Such devices may be singly or doubly excited, linear or rotary, including vibratory feeders, solenoids, stepping motors, brushless dc motors, linear voice coil actuators, dc motors, 1ph and 3ph induction motors. Electronic speed control may be included. Models developed will cover steady-state and dynamic behaviour, linking electrical and mechanical systems.

Assessment: laboratory 20 per cent, project 30 per cent, final examination 50 per cent.

**45353****Operating Systems**

CSE/ET

6cp, 6hpw; prerequisites: 45163 Real-time Software and Interfacing; 45363 Software Engineering; subject coordinator: Mr N J Carmody

Introduction to concurrency, methods of process synchronisation, proof of correctness, concurrency modelling using Petri nets, design of an operating system, distributed operating systems, multiprocessor systems, design of a real-time Kernel. Methods of implementing real-time systems, design of I/O, device handlers. One-third of the subject is taught by the School of Computing Sciences.

**45363****Software Engineering**

CSE/ET

3cp; 3hpw; prerequisite: 45163 *Real-time Software and Interfacing*; subject coordinator: Mr J R M Leaney

Aims to bring students to the point where they: are fluent in the issues and objectives of software engineering; are competent in structured analysis techniques; are able to apply mathematical techniques to the programming process; are able to coordinate rigorous software analysis, design, coding and testing procedures; and are able to understand and use object-oriented analysis, design, coding and testing techniques.

On completion of the subject students will be competent, as team members, in the engineering of moderately complex, but not large, engineering software systems.

Assessment: assignments 50 per cent, two examinations 50 per cent.

**45364****Digital Systems**

CSE/ET

3cp; 3hpw; prerequisite: 45163 *Real-time Software and Interfacing*; subject coordinator: A/Prof A Ginige

Introduces methodologies, techniques, tools and architectures for specification, design, verification using simulation, and implementation of medium- to large-scale digital systems.

Assessment: laboratory 5 per cent, assignments 45 per cent, final examination 50 per cent.

**45372****Computer Systems Analysis**

CSE

3cp; 4hpw; prerequisites: 45145 *Engineering Statistics*; 45363 *Software Engineering*; corequisites: 31141 *Database Structures and Management*; 45661 *Communication Networks*; subject coordinator: A/Prof C Peterson

The aim is to draw together information from a range of earlier subjects so the performance and design alternatives of a large technical computer system can be analysed. The student should gain an understanding of the interaction of the various hardware and software components in the system and the effects on systems specification (response time,

data access issues, reliability, resilience etc.). The overall method of the course will be problem based. Students will work in teams to develop a detailed manufacturing system specification. During the course, the students can request lectures on architectural analysis, SCADA systems, queuing theory models, discrete event simulation, and other topics.

Assessment: four assignments 100 per cent.

**45383****Computer Systems Design**

CSE

6cp; prerequisite: 45372 *Computer Systems Analysis*; subject coordinator: A/Prof C Peterson

The aim of the subject is to teach the student to design and implement complex technical computer systems. The student should be able to identify several solutions and then assess these solutions on the basis of functional, performance, cost and other criteria. The student should be able to demonstrate the use of analysis techniques learnt earlier in the course and be able to write clear, concise design documents.

Assessment: assignments 1–3 (various documents) 75 per cent, final assessment by oral exam 25 per cent.

**45388****Project B (Instrumentation and Control)**

EE

6cp; 3hpw; prerequisites: 45153 *Analogue Electronics*; 45163 *Real-time Software and Interfacing*; corequisites: 45581 *Analogue and Digital Control*; 45562 *Data Acquisition and Distribution Systems*

Develops skills in the specification, engineering design, project planning and economic evaluation, practical implementation and testing of a typical instrumentation and control hardware and/or software system or subsystem. Aims to develop the ability of the students to cooperate with other designers within a small project team and to complete a project assignment in time and in compliance with given specifications.

Assessment: specification and project planning 10 per cent, design review 20 per cent, project seminar and test results 30 per cent, project report 30 per cent, team cooperation 10 per cent.



### 45463

#### Power Electronics

EE

6cp; 6hpw; prerequisites: 45252 Power Apparatus and Systems; 45265 Numerical Methods

This course will develop a clear understanding of modern power electronic devices, conversion, design principles, applications, and the role of microprocessor control.

Assessment: laboratory 20 per cent, assignments 40 per cent, examination 40 per cent.

### 45464

#### Power Systems

EE

6cp; 6hpw; prerequisites: 45252 Power Apparatus and Systems; 45265 Numerical Methods

This subject provides students with the basic knowledge of modern power system theory and practice. Emphasis is placed on the derivation of mathematical models and equivalent circuits of devices, and on methods of analysis and parameter measurement. Students are also exposed to applications of microprocessors in power system protection and control.

Assessment: assignments 80 per cent, examination 20 per cent.

### 45473

#### Project B (Power and Machines)

EE

6cp; 6hpw; prerequisites: at least one of 45464 Power Systems, 45463 Power Electronics, 45482 Power Equipment Design

Develops skills in the specification, engineering design, project planning and economic evaluation, practical implementation and testing of a typical power systems hardware and/or software system or subsystem. Aims to develop the ability of the students to cooperate with other designers within a small project team and to complete a project assignment in time and in compliance with given specifications.

Assessment: specification and planning documentation 10 per cent, project review 20 per cent, project presentation 70 per cent.

### 45482

#### Power Equipment Design

EE

3cp; 3hpw; prerequisite: 45252 Power Apparatus and Systems; corequisite: 45274 Physical Design and Production; subject coordinator: Prof V S Ramsden

Considers the thermal, electric, magnetic and mechanical constraints on the design of electric power equipment and is taught through group work on the design of practical equipment examples. Topics include thermal rating; electric and magnetic rating – insulation, magnetic materials; mechanical rating – forces, noise, vibration; design optimisation – minimum cost, weight etc. Equipment examples – power transformers, resistors, reactors, capacitors.

Assessment: assignments 65 per cent, field trip 5 per cent, laboratory 5 per cent, final examination 25 per cent.

### 45562

#### Data Acquisition and Distribution Systems

EE/CSE

6cp; 6hpw; prerequisites: 45153 Analogue Electronics; 45163 Real-time Software and Interfacing; subject coordinator: Dr D Webster

Aims to develop skills in the analysis, design and practical implementation of electronic measurement systems and data acquisition and distribution systems (DADS) interfacing computers to plant and installations. Topics include applications and architectures of DADS; general performance characteristics of DADS components; physical principles and design fundamentals of transducers; mechanical, temperature, pressure, flow-rate transducers; opto-electronic transducers and applications; transducer analogue interfacing; low-level signal conditioning; data conversion devices and systems; DADS design; time and error budget of DADS. DADS and control interfacing to computers. Computer structures for DADS; data integrity.

Students will gain design experience in the art of DADS by participating in a team project involving the design, assembly and testing of a DADS and/or control system in 45577 Project B.

Assessment: laboratory 10 per cent, mid-semester examination 40 per cent, final examination 50 per cent.

**45581****Analogue and Digital Control**

EE/CSE

6cp; 6hpw; prerequisite: 45141 *Continuous and Discrete Systems*; subject coordinator: A/Prof HT Nguyen

Introduces the use of classical and state variable techniques as applied to the analysis and design of continuous and discrete feedback control systems. Topics include sampling theory, data holds, cascade and feedback compensation employing lead/lag and three-term controllers, deadbeat control, discretisation, digital filters, Lagrangian dynamics, Bond graphs, state estimation and state variable feedback control, phase plane, describing functions, Popov and circle criteria, identification, specifications.

**45582****Computer-aided Design of Electronic Circuits**

EE

3cp; 3hpw; prerequisites: 45153 *Analogue Electronics*; 45265 *Numerical Methods*; subject coordinator: Dr B S Rodanski

This subject is designed to give the students the knowledge and understanding of basic concepts and techniques of computer-aided analysis and design of electronic circuits and systems and to provide the essential skills in using modern design tools in engineering practice.

Assessment: assignments 55 per cent, project 45 per cent.

**45584****Principles of VLSI Design**

EE/CSE

3cp; 3hpw; prerequisites: 45561 *Digital Systems Design*; 45144 *Electronic Devices and Circuits*; subject coordinator: Mr N J Carmody

Introduces students to the technologies and methods in designing full- and semi-custom very large scale integrated (VLSI) circuits. A further objective is to introduce students to the methods of determining suitable architectures for supporting complex applications implemented in VLSI technologies.

Assessment: assignments 10 per cent, laboratory 40 per cent, final examination 50 per cent.

**45585****Introduction to Neuro Fuzzy Systems**

EE

3cp; 3hpw; prerequisite: 45141 *Continuous and Discrete Systems*; subject coordinator: A/Prof HT Nguyen

This subject covers the fundamental concepts of artificial neural systems. Learning rules. Error function minimisation using steepest descent extended to multilayer feedforward neural networks. Feedforward recall and error back propagation training. The second component of the subject covers fuzzy logic theory. It includes fuzzy sets, linguistic variables and approximate reasoning. The basic construction of a fuzzy controller is introduced covering the fuzzification interface, the knowledge base, the decision-making logic and the defuzzification interface. The subject has extensive laboratory work.

Assessment: four assignments 25 per cent, final examination 25 per cent, projects 50 per cent.

**45663****Digital Transmission**

EE/ET

3cp; 3hpw; prerequisite: 45152 *Signal Theory 2*; subject coordinator: A/Prof S Reisenfeld

Provides essential knowledge in digital detection theory, digital communication techniques, and digital communication system design. The students gain essential skills required for the design and development of digital communication systems. The course covers digital detection theory, digital modulation, error rate analysis, synchronisation, link design, multiplexing and multiple access, and error correction coding.

Assessment: assignment 20 per cent, laboratory 20 per cent, mid-semester examination 20 per cent, final examination 40 per cent.

**45666****Signal Processing**

EE/ET

6cp; 6hpw; prerequisite: 45152 *Signal Theory 2*

This course will provide an introduction to signal processing which is both theoretical and practical. Concepts will be presented in the classroom, the theory will be implemented in the laboratory. The students will be expected to prototype DSP algorithms in MATLAB and then will be asked to implement the algorithm on a Texas Instruments C30 or C50 DSP board.

Assessment: projects 70 per cent, final examination 30 per cent.

### 45667

#### Broadband Telecommunications Networks

ET

3cp; 3hpw; prerequisite: 45145 Engineering Statistics; subject coordinator: A/Prof A Seneviratne

This subject introduces the underlying technology and user-visible architecture of integrated services digital networks (ISDN) and broadband ISDN. The subject first explores the development of digital transmission and switching technologies, packet switching and common channel signalling. Then architecture of ISDN and B-ISDN is explored. Finally, standards that govern the development of these networks, and the services that will be supported by these networks, are introduced.

Assessment: assignments 25 per cent, laboratory project 25 per cent, final examination 50 per cent.

### 45668

#### Teletraffic Engineering

ET

3cp; 3hpw; prerequisite: 45145 Engineering Statistics; subject coordinator: Dr J Daba

Introduces the concepts associated with the design of common-usage telecommunication links and switching equipment. The subject will present busy hour engineering terms and service criteria for switching systems and techniques used to determine the trunk capacity. Trunk network configurations with numerous routing algorithms will also be examined.

Assessment: assignments 40 per cent, final examination 60 per cent.

### 45669

#### Communications Channels

EE

6cp; 6hpw; prerequisites: 45152 Signal Theory 2; 45264 Fields and Waves

This course will develop in students an appreciation of the diversity of channels used for communication and the techniques for characterisation of these channels and the specification and design of terminal equipment for implementing reliable communication over the channels. Channels based on both guided and unguided electromagnetic waves at RF and microwave frequencies are considered

along with optical channels. To achieve these objectives students will be introduced to methods of modelling noise, modelling propagation loss and using these to determine the performance of point-to-point links and the statistical representation of coverage in broadcasting and mobile radio applications.

Assessment: laboratory and design projects 40 per cent, final examination 60 per cent.

### 45681

#### Communications Systems

EE/ET

6cp; 6hpw; prerequisites: 45663 Digital Transmission; 45661 Communications Networks; subject coordinator: A/Prof A P Seneviratne

The subject involves two modules of which students must undertake one. Each module involves a major case study for which students are required to evolve a working solution. In each module students will be given lectures covering background information on existing technologies, regulatory considerations and international standards, and an appreciation of the cost performance trade-offs that must be made. The case study in each module will be changed each semester.

### 45901

#### Telecommunications for Managers

6cp; 3hpw

This subject is aimed at students who have no background in telecommunications other than that which is gained in the course of daily living. Some knowledge of information systems is assumed but no more than would be expected of any undergraduate student.

The subject takes an outside-in approach to unravelling the complexities of a technology that may appear to have the characteristic that you need to know everything before you can learn anything. Material is presented in a logical, building-block fashion. Words and terms are defined and explained when they are first used. Examples are used as a foundation and then expanded with more detail.

Students will learn why corporations feel that telecommunications is vitally important as well as how the regulatory environment affects the industry. Telecommunications technology is explained in an easy-to-understand yet thorough manner using the ISO model as a framework. Students will gain an in-depth understanding of how telecommunications work, and how networks are designed, constructed and managed.

The subject concludes with an overview of emerging technologies that will underpin the evolution of telecommunications towards full mobility and universal Internet access.

### 45931

#### Electrical Engineering 2 (Mechanical)

MEE/MSE

4cp; 4hpw; prerequisite: 68012 Electrical Engineering 1 (Mechanical)

Introduces fundamental electronic/electrical devices and circuits to undergraduate students in mechanical engineering.

There are two strands within the course. The Linear strand examines fundamental semiconductor devices and demonstrates their linear application, particularly in the power control area. The Digital strand similarly introduces the fundamental devices along with Boolean algebra and demonstrates their application in simple industrially oriented digital control systems.

### 45997

#### Industrial Experience (Sandwich)

EE/CSE/ET

### 45999

#### Industrial Experience (Part-time)

EE/CSE/ET

Students enrol in this subject while they are gaining industrial experience, which is a requirement of the course. Ninety weeks of approved industrial experience must be gained prior to graduation. The student must experience typical environments in which professional engineering is practised, including the range of situations and requirements peculiar to the workplace and the successful operation of enterprises – in order to develop an understanding of the role, responsibilities and interfaces of engineering in technologically dependent enterprises and the community, having regard for other professions and disciplines; to reinforce and extend the knowledge of principles, techniques and technologies gained from the academic program; to enrich learning through the integration of work and study experiences; and to facilitate professional development.

Students must become familiar with the Faculty's industrial experience requirements and rules which are set out on p.33 of this handbook.

### 46033

#### Project A

MEE/MSE

Part-time and sandwich; 4cp; 3hpw; corequisite: 46632 Engineering Management; subject coordinator: Mr G M Marks

This is the first of two related project subjects in which students are responsible for the complete execution of a project, from specification to final report. Projects may be initiated by staff, students or employers, and students may work individually or in groups. A project may include any aspects of design, building, testing, analysis or software. The key feature should be a professional approach to a problem of relevance to industry, commerce or the community. Student effort for these two related subjects is expected to be equivalent to at least 400 hours of professional effort.

In Project A the students should complete to the satisfaction of the Academic Project Supervisor, 50 per cent of the activities that follow the preliminary planning phase of an engineering project. Typically, this will include complete write-up of a literature survey chapter which summarises and reviews the prior knowledge available on the student's own selected project topic together with, at least, a draft table of contents listing all the proposed chapters and appendices in the final report. For software projects, program flow charts will have been developed and some software modules written and debugged. For experimental projects, the design of any equipment to be built for conducting the experiments will be completed and initial experimental designs developed. For design, build and commission projects, the design will be completed and construction commenced. For design only projects, layout or assembly drawings will be completed with detail drawings to follow in Project B.

Assessment: project report 100 per cent (oral presentation if required).

### 46034

#### Project B

MEE/MSE

Part-time and sandwich; 6cp; 4.5hpw; corequisite: 46033 Project A; subject coordinator: Mr G M Marks

This is the second of two related project subjects in which students are responsible for the complete execution of a project, from specification to final report. Projects may be

initiated by staff, students or employers, and students may work individually or in groups. A project may include any aspects of design, building, testing, analysis or software. The key feature should be a professional approach to a problem of relevance to industry, commerce or the community. Student effort for these two related subjects is expected to be equivalent to at least 400 hours of professional effort. In the subject Project B, the student completes the design, building, test, analysis or software development as specified, and writes up and submits a formal report on the work.

Assessment: project report 100 per cent (oral presentation if required).

**46040**

**Ergonomics**

*MEE/MSE*

*4cp; 3hpw; prerequisite: 46632 Engineering Management*

Covers the basic concepts of ergonomics, and illustrates the relationship between improved health and safety and improved productivity by relating human capabilities to engineering design and task design factors in the workplace.

The subject consists of approximately equal parts of health science topics and engineering topics. The health science topics include basic physiology, anatomy, biomechanics, perception etc. to provide a background for the understanding of the relationship between people and their workplace and work tasks. The engineering topics deal with basic design approaches which incorporate the abilities and limitations of people, and the analysis and synthesis of work tasks and work organisations. Practical demonstrations and exercises using actual work situations are included.

Assessment: assignments, essays and seminars 30 per cent, final examination 70 per cent.

**46110**

**Mechanics I**

*MEE/MSE*

*6cp; 4.5hpw; subject coordinator: Mr G M Marks*

An introduction to the principles of Newtonian mechanics, applied to planar motion. The behaviour of non-rotating bodies is analysed through an explicit investigation of Newton's three laws of motion, extending to energy and momentum methods. This subject lays the foundation for more advanced work in mechanics in succeeding subjects. Through

both discussion and selected exercises, students are also introduced to professional methods of dealing with engineering problems.

Assessment: assignments 20 per cent, and two examinations 30 per cent and 50 per cent.

**46121**

**Mechanics of Machines**

*MEE*

*6cp; 4.5hpw; prerequisite: 46122 Mechanics 2; subject coordinator: Dr F C O Sticher*

This subject presents four broad fields; forces in mechanisms including band, shoe and disc brakes, engine balancing and harmonic analysis, geometry and cams with fixed axes of rotation, and elementary gear theory. A main aim of the subject is to encourage individual thought and discussion of possible solutions which need not always follow conventional patterns.

Assessment: assignments 30 per cent, examinations 70 per cent.

**46122**

**Mechanics 2**

*MEE*

*6cp; 4.5hpw; prerequisites: 46110 Mechanics 1; 33120 Engineering Mathematics 1; subject coordinator: Dr N Zhang*

This subject presents kinematics and dynamics in a more general way than in Mechanics 1. The spatial two- and three-body velocity and acceleration equations are derived and applied to spatial and planar mechanisms. The topic planar dynamics is then developed for general planar motion, including the use of energy methods, impulse, virtual work and virtual power. Second moment of mass is included.

Assessment: assignments 15 per cent, examination 85 per cent.

**46125**

**Mechanics for Manufacturing**

*MSE*

*4cp; 3hpw; prerequisites: 46110 Mechanics 1; 33120 Engineering Mathematics 1; subject coordinator: Mr G M Marks*

Aims to apply the principles learnt in Mechanics 1 to various fields of engineering practice in machine component design. The subject will be based on explorations of real problems and case studies such as those related to operation of robotics and machine tools and general materials handling.

Assessment: assignments 30 per cent, examinations 70 per cent.

### 46130

#### Dynamics of Mechanical Systems

MEE

4cp; 3hpw; prerequisite: 46122 Mechanics 2; subject coordinator: Dr N Zhang

Aims to develop insight into the causes and effects of vibration in machinery and structures; to introduce the techniques of condition monitoring and the foundations of control theory. The subject deals mainly with linear vibration theory. Topics covered include multidegree of freedom systems, elementary modal analysis, frequency response, transients, simple modelling of vehicle suspension, and electrical analogues. Computer packages are used where appropriate, and some experiments and demonstrations of vibration monitoring instrumentation are introduced.

Assessment: assignments 10 per cent, examinations 90 per cent.

### 46140

#### Kinematics and Dynamics of Machines

MEE

4cp; 3hpw; prerequisites: 46121 Mechanics of Machines; 46130 Dynamics of Mechanical Systems; subject coordinator: Dr F C O Sticher

Introduces the student to the field of kinematic synthesis for the first time, and to the power of spatial (projective) geometry, through the five assignments which form the assessment of the course to encourage and require the student to exercise individual judgment and design initiative. The subject deals with freedom and constraint in spatial mechanisms, elementary screw-systems theory, four and five positions planar synthesis of mechanisms, function generation, open loop spatial mechanisms (robotics), gyroscopic effects on whirling speeds, dynamic equivalence, polydyne cam design and general three-dimensional dynamics including spin stability as applied to space vehicles. An integral part of the process of discovery learning, essential to this subject, is the building of working mechanism models.

Assessment: five assignments 100 per cent.

### 46141

#### Applied Dynamics

MEE

4cp; 3hpw; prerequisite: 46130 Dynamics of Mechanical Systems; subject coordinator: Dr F C O Sticher

Introduces the application of the theories of rigid body dynamics and mechanical vibrations to machine and structural analysis. Topics include spatial dynamics and Euler's equations of motion, the vibration of continuous systems, modal analysis and parametric excitation. These topics are applied to the study of vehicle dynamics, inertial guidance systems and the vibration of beam and plate structures. Both analytical and computer-based solution techniques are covered and laboratory work is an integral part of the course.

Assessment: six assignments 67 per cent, projects 33 per cent.

### 46142

#### Robotics

MEE

4cp; 3hpw; prerequisite: 46121 Mechanics of Machines; subject coordinator: A/Prof R M Spencer

Aims to develop confidence and competence in the application of kinematic control and programming principles relevant to robots.

Topics include coordinate classification of joints, spatial kinematics, configurations, geometric duality, envelopes, trajectories, safety; joint interpolation between positions, homogeneous coordinate transformations, kinematic equations, differential relationships, velocity and acceleration, singularity positions, joint/end effector/world coordinate systems; kinetics, force and motion reciprocity, assembly problems, compliance, design of parts for assembly.

Assessment: reports and assignments 60 per cent, examination 40 per cent.

### 46143

#### Einstein's Universe

MEE/MSE

4cp; 3hpw; prerequisite: 46122 Mechanics 2 (for MEE students); subject coordinator: Dr F C O Sticher

Aims to give perspective to the Newtonian model of the universe (i.e. conventional mechanics) in the light of the philosophical and experimental difficulties of this model which

were addressed by Einstein, and to explain, in a simple but rigorous way, the logic and results of Einstein's Theory of Relativity.

Topics include the special Theory of Relativity explained via the Michelson-Morley results and the Doppler effect. Consequences for the concepts of time, velocity and distance. The General Theory of Relativity from the point of view of the time paradox and the principle of equivalence. The similarities and divergences of the thought processes necessary to embrace the Newtonian synthesis, the Einstein synthesis and modern quantum mechanics.

Assessment: two essays 50 per cent, quantitative solution of assignment problems 50 per cent.

## 46220

### Solid Mechanics I

MEE/MSE

6cp; 4.5hpw; prerequisite: 46122 Mechanics 2; subject coordinator: Mr R M Wiltshire

Deals with the basics of solid and structural mechanics. The concepts of stress and strain, material properties (both linear and nonlinear) and structural analysis are introduced in terms of axial, torsional, bending and shear stresses and the deflection of beams. Further work includes the transformation of stress and strain, combined stresses in beams and yield and failure analysis. Laboratory work is a significant component of the course.

Assessment: assignments 15 per cent, laboratory 15 per cent, examinations 70 per cent.

## 46230

### Solid Mechanics 2

MEE

6cp; 4.5hpw; prerequisite: 46220 Solid Mechanics I; subject coordinator: Mr R M Wiltshire

Aims to develop an understanding of the basic principles of solid mechanics and the use of these principles in the design of simple structures and machine elements; and to establish the background for further study in the areas of structural, experimental and solid mechanics with special reference to mechanical design. This subject builds on the material treated in Solid Mechanics 1 and deals with the basis of solid and structural mechanics. The topics include the analysis of beams using moment area, superposition and energy methods, torsion and shear in thin walled sections, shells of revolution, thick walled

cylinders, composite beams, limit analysis and elastic stability. An overview is given of experimental stress analysis and computer-based numerical methods. Laboratory work is an integral part of the course.

Assessment: laboratory and assignments 20 per cent, class quiz 20 per cent, final examination 60 per cent.

## 46240

### Solid Mechanics 3

MEE

4cp; 3hpw; prerequisite: 46230 Solid Mechanics 2; subject coordinator: Mr R M Wiltshire

Aims to facilitate an understanding of the fundamental and classical principles of solid mechanics and the use of these principles in mechanical engineering design; and to establish the background for more advanced study in the area of solid mechanics and the use of finite element stress analysis. Introduces the theories of elasticity and plasticity, matrix structural analysis and the theory of plates and shells. It includes material and geometric nonlinearity, structural stability and limit analysis. In addition to topics relating to mechanical design, students are introduced to the use of Australian standards for the practical design of structures.

Assessment: assignments 60 per cent, project 20 per cent, class quiz 20 per cent.

## 46241

### Finite Element Applications

MEE

4cp; 3hpw; prerequisites: 46240 Solid Mechanics 3; 46130 Dynamics of Mechanical Systems; 46321 Computer-aided Drafting; subject coordinator: Mr R M Wiltshire

Aims to facilitate an understanding of the practical application of solid mechanics to the design of structures and machines using the finite element method; and to develop an awareness of the capabilities and limitations of the finite element method in solid and structural analysis.

This subject is a practical introduction to the finite element method and is intended for potential users of finite element computer programs. As a consequence the subject is in two parts, the first of which is an introduction to the basic theories of the finite element method. This includes a review of matrix structural analysis, the use of structural and variational methods to formulate element

stiffnesses, geometric and material non-linearity, dynamic analysis and optimisation. The second part consists of the modelling process and the analysis of finite element solutions. This includes problem formulation, the preparation of data for finite element computer programs, element selection, convergence and the analysis of errors. Particular attention is paid to the use of behaviour of isoparametric and frame and plate bending elements. General purpose structural analysis programs, MSC/NASTRAN and MSC/Pal 2, are used to obtain finite element solutions.

Assessment: assignments 60 per cent, project 20 per cent, class quiz 20 per cent.

### 46310

#### Introduction to Engineering

MEE

4cp; 3hpw; subject coordinator: Mrs H McGregor

This subject provides an overview of issues and concepts which are important to new engineering students. Major learning areas include:

##### Part I – Discovering Engineering

History of technology/manufacturing; learning at UTS and in this course; introduction to professional associations and professionalism/ethics; quality in learning and in performance; cooperative education; documentation.

##### Part II – Experiencing Engineering

Manufacturing systems engineering: proactive: importance of standards requirements; life cycles; design; management; mechanics: understanding mechanical systems; energy and productive power; environmental concerns.

The subject includes practical examples and exercises to assist students to explore issues for themselves. The concept of cooperative education and the role of professional experience in the course and the sorts of employment which are suitable are also discussed.

Assessment: continuous assessment by assignments and projects.

### 46311

#### Engineering Graphics

MEE/MSE

4cp; 3hpw; subject coordinator: Mr G M Marks

Aims to enhance fundamental visualisation and drawing skills and to develop knowledge of the formal and informal graphical communication requirements of the professional mechanical engineer. This subject commences with an overview of orthographic projection. It then covers engineering elements, basic engineering drawing, pictorial drawing, sketching and working drawings. The last topic includes tolerances and limits and fits, surface finish, detail and assembly drawings.

Assessment: continuous assessment via drawing exercises.

### 46312

#### Introduction to Manufacturing Systems

MSE

4cp; 3hpw; subject coordinator: Mrs H McGregor

Introduces the UTS Manufacturing Systems Engineering course and the profession of engineering. This subject will provide an overview of issues and concepts which are important to new engineering students. Major learning areas will include:

##### Part I – Discovering Engineering

History of technology/manufacturing; learning at UTS and in this course; introduction to professional associations and professionalism/ethics; quality in learning and in performance; cooperative education; documentation.

##### Part II – Experiencing Engineering

Manufacturing systems engineering: proactive – importance of standards requirements; life cycles: design; management; mechanics: understanding mechanical systems; energy and productive power; environmental concerns.

The subject will include practical examples and exercises to assist students to explore issues for themselves. The concept of cooperative education and the role of professional experience in the course and the sorts of employment which are suitable will also be discussed.

Assessment: continuous assessment by assignments and projects.



**46321****Computer-aided Drafting (CAD)**

MEE/MSE

*5cp; 4hpw; prerequisite: 46710 Materials Processing or 46715 Manufacturing Processes; subject coordinator: Prof F B Swinkels*

Students are introduced to the use of computers in two-dimensional drafting and three-dimensional wire frame, surface and solids modelling. These modelling techniques are then applied to determine two-dimensional sectional properties and three-dimensional mass properties.

Assessment: assignments 25 per cent, projects 50 per cent, examinations 25 per cent.

**46331****Design 1**

MEE

*6cp; 4.5hpw; prerequisites: 46122 Mechanics 2; 46220 Solid Mechanics 1; 46321 Computer-aided Drafting; subject coordinator: Mr G M Marks*

Design 1 and 2 introduce the student in a systematic way to the process of engineering design. They encourage students to integrate their technical and other knowledge and skills and apply them to the solution of realistic problems. Design 1 introduces students to design methodology. One emphasis of this subject is on machine elements, strength and endurance. The machine elements will include bolted and welded joints, springs, shafts, gears and bearings. Factors affecting materials selection, including the use of carbon fibre and other composites, will be discussed. Power transmission systems are then discussed, including selection criteria, couplings, clutches, chain and belt drives. The subject involves group participation in a creative design competition.

The philosophy underlying these two subjects is to introduce the student to the various tasks and decisions associated with engineering design projects, from problem formulation to final presentation. In both design subjects students will be required to address the applicable codes and regulations, safety and other requirements of the human operators, and the wider responsibilities of the engineer in preserving health, the environment and public safety.

Assessment: assignments 70 per cent, examinations 30 per cent.

**46332****Design 2**

MEE

*4cp; 3hpw; prerequisite: 46331 Design 1; subject coordinator: Mr G M Marks*

Further development of the skills needed for project design and management related to systems with many complex variables. Lectures will stress the synthesis of engineering and economic skills acquired in the course, and encourage students to build on that foundation by specific research applied to this project-based subject. Topics will typically be drawn from: pressure vessels; fluid power; materials handling and transport systems. Industrial visits will be arranged to provide state-of-the-art information. Students will undertake design projects, singly or in groups.

Assessment: projects 60 per cent, final examination 40 per cent.

**46335****Design for Manufacturing**

MSE

*6cp; 4.5hpw; prerequisites: 46726 Manufacturing Systems Planning; 46535 Metrology and Instrumentation; 45931 Electrical Engineering 2 (Mechanical); subject coordinator: Prof F B Swinkels*

Aims both to build on earlier material to develop a broad appreciation of the central issues in designing systems, processes and products for manufacturing, and to develop specific skills in one or more design areas. Students will be encouraged to formulate and investigate industrially relevant problems of their own selection. The emphasis will be on capitalising on the design possibilities offered by new techniques and organisational structures in manufacturing. Examples and case studies will be central to the presentation of the subject.

Approaches to design which may be considered in the subject include reducing time to market/time compression/simultaneous/concurrent engineering; value analysis/FMEA/QFD, functional dimensions; design by features; geometric dimensional tolerancing; material selection in mechanical design; process simulation; design for manufacture of castings, forgings, fabrications, plastics, ceramics and composites; design for assembly, design for recycling, design for manufacture (including forming processes).

Assessment: reports 30 per cent, assignment 15 per cent, examination 55 per cent.

### 46336

#### Computer-aided Manufacturing

MEE/MSE

4cp; 3hpw; prerequisite: 46321 Computer-aided Drafting; subject coordinator: Prof F B Swinkels

Aims to develop an understanding of computer-aided manufacturing technology in the areas of coordinate measurement, sheet metal applications, machine tool programming and data communication and control. Topics covered include coordinate measurement for CAD/CAM data analysis and verification; sheet metal manufacturing programming for flat pattern, nesting and punchlaser; NC programming for point-to-point machine, planar milling and surface milling; data communication and transfer for the various CAM processes.

Assessment: assignments 20 per cent, projects 30 per cent, examination 50 per cent.

### 46337

#### Manufacturing Systems Design

MSE

4cp; 3hpw; prerequisites: 46335 Design for Manufacturing; 46735 Manufacturing Systems: Quality; 46835 Operations Research; subject coordinator: Prof F B Swinkels

This subject is designed to assist students to integrate and apply all the material in the course to industrially relevant design problems, including problems of their own selection. The emphasis will be on capitalising on the design possibilities offered by new techniques and organisational structures in manufacturing. Examples and case studies will be central to the presentation of the subject.

Design issues which may be addressed in the subject include strategic planning, facilities design, design engineering, purchasing, MIS, legal issues, finance/accounting, business economics, human resources, marketing/sales, logistics, and manufacturing; internationalisation of trade and manufacture; continuous and at times rapid change; interaction with consultants, research and development organisations; development of 'off the shelf' systems for unique company fit; system upgradability; system life; software package

installation; patents and intellectual property; support for 'learning organisations'; information technology, including protocols like MAP; 'seamless' transfer between systems, telecommunications and software technologies; integrated manufacturing systems; flexible manufacturing systems; routing, factory flow analysis and layout, facility design.

Assessment: reports 50 per cent, assignments 15 per cent, examinations 35 per cent.

### 46340

#### Structures

MEE

4cp; 3hpw; prerequisite: 46230 Solid Mechanics 2; subject coordinator: Mr R M Wiltshire

This is a non-specialist subject aimed at preparing the mechanical engineer for practical structural steel and reinforced concrete design. It aims to develop competence in structural steel and reinforced concrete design to Australian standard requirements, based on broad understanding of the underlying theory.

Assessment: assignments 60 per cent, final examination 40 per cent.

### 46341

#### Machine Design

MEE

4cp; 3hpw; prerequisites: 46331 Design I; 46121 Mechanics of Machines; 46230 Solid Mechanics 2; 46130 Dynamics of Mechanical Systems; subject coordinator: Dr F C O Sticher

Particular emphasis will be placed in this subject on the detailed design of mechanisms and machines. Specific topics treated will be some of the following: the tribology of bearings, gears and cams including hydrodynamic and hydroelastic lubrication; variable speed drive and control elements including special purpose mechanisms and hydraulic drives and couplings and their characteristics and capabilities; machine logic and control. A project applying a number of these elements to the design of a mechanism or machine will be a major part of the subject assessment.

Assessment: assignments 60 per cent, project 40 per cent.

**46343****Appropriate Technology**

MEE/MSE

4cp; 3hpw; corequisite: 46632 Engineering Management; subject coordinator: A/Prof S F Johnston

Provides an effective vehicle for individual understanding of the term 'appropriate technology' and an appreciation of its relevance to engineering practice. This will be done by encouraging students to question the appropriateness of specific technologies, particularly in terms of their long-term sustainability, and by giving students experience of project work intended to address the perceived shortcomings of present approaches.

Assessment: reports 25 per cent, seminar 25 per cent, project 50 per cent.

**46344****Engineering Speculation**

MEE/MSE

4cp; 3hpw; prerequisite: 46630 Engineering and Society; corequisite: 46632 Engineering Management; subject coordinator: Dr R B Ward

Encourages students to consider and be aware of the opportunities, possibilities and probabilities in the results and side effects of their professional work on the world around them.

Assessment: continuous assessment, assignments.

**46345****Industrial Design**

MEE/MSE

4cp; 3hpw; corequisite: 46220 Solid Mechanics I; subject coordinator: A/Prof S F Johnston

The objective is primarily to broaden students' design skills and awareness and also to prepare them for working in interdisciplinary teams with industrial design professionals. This subject introduces the engineer to the discipline of industrial design. The emphasis is on innovation, human factors and visual semantics. The teaching is largely project based.

Assessment: projects 100 per cent.

**46420****Fluid Mechanics**

MEE

6cp; 4.5hpw; prerequisites: 33120 Engineering Mathematics I; 46110 Mechanics I; subject coordinator: Dr B P Huynh

Provides an introduction to the broad area of fluid mechanics, by giving a thorough grounding in fundamental principles and developing expertise in the solution of common problems. The subject introduces fluid statics and fluid dynamics. It covers fluid properties, manometry, forces on submerged surfaces, acceleration of fluid volumes, continuity, Bernoulli, impulse-momentum and flow measurement. The limitations implied by an ideal fluid are reviewed before the modifications required for a real fluid are presented.

Assessment: assignments 10 per cent, laboratory reports 10 per cent, examinations 80 per cent.

**46421****Thermodynamics**

MEE

6cp; 4.5hpw; prerequisites: 33120 Engineering Mathematics I; 46420 Fluid Mechanics; 68011 Engineering Physics (Mechanical); subject coordinator: Dr G Hong

This is an introductory subject with the emphasis on the basic principles of thermodynamics, including a thorough discussion of the First and Second Laws. The properties of a simple substance and the ideal gas concept are also considered and the principles briefly applied to power and refrigeration cycles. It aims to develop fundamental understanding of thermodynamics and the ability to apply knowledge to analysis of thermodynamic systems.

Assessment: tutorial questions 10 per cent, laboratory reports 15 per cent, examinations 75 per cent.

**46430****Thermofluids**

MEE

6cp; 4.5hpw; prerequisites: 46420 Fluid Mechanics; 46421 Thermodynamics; subject coordinator: Mr G Marks

The basic principles of fluid mechanics and thermodynamics are consolidated by application to fluid machines and engineering plant. The subject extends basic principles in

the following areas: standard and actual power cycles; dimensional analysis and similitude; principles and selection of pumps and fans; compressible flow.

Assessment: tutorial questions 10 per cent, laboratory tests and reports 15 per cent, examinations 75 per cent.

### 46431

#### Heat Transfer

MEE

4cp; 3hpw; prerequisite: 46430 Thermofluids; subject coordinator: Dr J Madadnia

Aims to provide students with sufficient understanding and knowledge of heat transmission to enable them to deal with common engineering systems. Covers the fundamentals of heat transmission in engineering systems. Topics include conduction, convection, radiation and heat exchangers. Laboratory experiments are an important part of the subject.

Assessment: assignments 10 per cent, laboratory reports 10 per cent, examinations 80 per cent.

### 46435

#### Fluid Mechanics for Manufacturing

MSE

4cp; 3hpw; prerequisites: 33120 Engineering Mathematics I; 46110 Mechanics I; subject coordinator: Dr B P Huynh

The subject provides an introduction to: basic fluid statics; the Bernoulli equation; fixed flow-rate problems; pipe head-loss problems; unsteady flow (including a descriptive or qualitative discussion of water hammer); flow measurement devices. It deals with pump selection and installation, but not pump design.

Assessment: assignments 10 per cent, laboratory reports 10 per cent, examinations 80 per cent.

### 46436

#### Thermodynamics for Manufacturing

MSE

4cp; 3hpw; prerequisite: 46435 Fluid Mechanics for Manufacturing; subject coordinator: Dr G Hong

Aims to develop an understanding of the First and Second Laws of Thermodynamics as they apply to plant used in manufacturing; process steam boilers, steam plants, compressed air systems and equipment. Students will learn basic thermodynamic principles so that they

know how to use the conservation of energy approach in plant analysis and design and appreciate the energy aspects of manufacturing plant equipment.

Assessment: tutorial questions 15 per cent, laboratory reports 20 per cent, examinations 65 per cent.

### 46437

#### Thermofluids for Manufacturing

MSE

4cp; 3hpw; prerequisite: 46436 Thermodynamics for Manufacturing; subject coordinator: Mr G Marks

Aims to develop an understanding of thermodynamics and fluid mechanics so that informed decisions can be made about the related aspects of manufacturing activity, particularly: (1) on effects of parameter changes on heat transfer; (2) thermofluid aspects of plant selection.

Topics include dimensional analysis; heat transfer; selection of plant equipment (pumps, hydraulics etc.).

Assessment: tutorial questions 15 per cent, laboratory tests and reports 20 per cent, examinations 65 per cent.

### 46441

#### Combustion and Air Pollution

MEE

4cp; 3hpw; prerequisite: 46421 Thermodynamics; subject coordinator: Dr G Hong

Aims to develop an understanding of the fundamentals of combustion science and apply the results to the control of pollutant formation. A treatment is given of the fundamentals of combustion as well as the consideration of fuels and their characteristics. Special attention will be given to the products of combustion and their relationship to current air pollution considerations.

Assessment: examination 40 per cent, essay 40 per cent, assignments 20 per cent.

### 46442

#### Advanced Fluid Dynamics

MEE

4cp; 3hpw; prerequisites: 46430 Thermofluids; 46821 Computing 3; subject coordinator: Dr A N F Mack

Builds on previous subjects in the thermofluids stream. Covers the Navier-Stokes equations and the difficulties with their solution followed

by an investigation of approximations to these equations and their validity. Topics here include the inviscid Euler equations, together with potential flows. The main limitation of these approximations is their failure to model the viscous boundary layer. This topic is therefore examined, along with the effects of turbulence. Finally, numerical methods are presented for the modelling of the entire flow region.

Assessment: reports 25 per cent, assignments 50 per cent, examination 25 per cent.

#### 46443

##### Refrigeration and Airconditioning

MEE

4cp; 3hpw; prerequisites: 46430 *Thermofluids*; 46431 *Heat Transfer*; subject coordinator: Dr J Madadnia

Gives students experience in applying the principles of thermodynamics, heat transfer and fluid mechanics to the airconditioning of buildings and to the design criteria and performance of commercial and industrial refrigeration equipment. Additionally, the student will be able to analyse various refrigeration cycles and be capable of undertaking an energy audit of a complete system. The student is introduced to the concepts of determining the cooling and heating loads of a building, designing the air handling and distribution system and selecting the appropriate plant to provide the cooling and heating requirements. Energy conservation and management as applicable to the various airconditioning and refrigeration systems are reviewed.

Assessment: projects 10 per cent, laboratory assignments 10 per cent, examination 80 per cent.

#### 46444

##### Power Cycles

MEE

4cp; 3hpw; prerequisite: 46430 *Thermofluids*; subject coordinator: Dr G Hong

Covers steam and gas power cycles in depth. Combustion chemistry and efficiency, equipment details, augmentation methods and cogeneration systems are presented. Aims to develop proficiency in the performance analysis of actual steam and gas turbine power plants.

Assessment: examinations 80 per cent, assignments 15 per cent, laboratory 5 per cent.

#### 46445

##### Fluid Machines

MEE

4cp; 3hpw; prerequisite: 46430 *Thermofluids*; subject coordinator: Prof J Reizes

The application of thermodynamics and fluid mechanics principles in turbomachinery analysis and design. The objective is to present a more thorough treatment of fluid machines than was possible in the core subjects. In particular, a theoretical design and development basis will be provided for axial flow compressors, pumps, fans and turbines and for centrifugal pumps, fans and compressors.

Assessment: tutorial questions 10 per cent, laboratory reports 20 per cent, examinations 70 per cent.

#### 46530

##### Measurement and Instrumentation

MEE

6cp; 4.5hpw; prerequisite: 46130 *Dynamics of Mechanical Systems*; corequisite: 45931 *Electrical Engineering 2 (Mechanical)*; subject coordinator: Dr F C O Sticher

Gives mechanical engineering students detailed exposure to using a wide range of modern measuring instruments. This subject introduces the student to a variety of measurement techniques. A large proportion of the time is spent in carrying out experiments. Topics covered will be drawn from the following: length, time, angular measurement, straightness, flatness, pressure, temperature, strain, force, frequency response, vibration and sound.

Assessment: laboratory reports 75 per cent, four small examinations 25 per cent.

#### 46531

##### Control Engineering I

MEE/MSE

6cp; 4.5hpw; prerequisites: 46130 *Dynamics of Mechanical Systems* or 46125 *Mechanics for Manufacturing*; 46530 *Measurement and Instrumentation* or 46535 *Metrology and Instrumentation*; subject coordinator: Mr K A Stillman

The methods and concepts required for classical control analysis are developed; mathematical models based on linear differential equations (and their Laplace transforms) are introduced. Transient analysis,

simulation, controller actions, frequency response analysis, and stability are treated. Several control systems are analysed with particular emphasis on servo systems and process control. Important hardware aspects (such as control valves and hydraulic actuators) are covered. A brief treatment is given of computer-based control (programmable controllers) and their advantages and limitations. A proportion of the course is devoted to laboratory studies of various real control systems.

Assessment: assignments 50 per cent, quiz (open book) 10 per cent, final examination (open book) 40 per cent.

### 46535

#### Metrology and Instrumentation

MSE

6cp; 4.5hpw; prerequisite: 46125 *Mechanics for Manufacturing*; corequisite: 45931 *Electrical Engineering 2 (Mechanical)*; subject coordinator: Dr F C O Stücher

This subject introduces the student to a variety of measurement techniques. A large proportion of the time is spent in carrying out experiments. Topics covered will be drawn from the following: instruments for linear measurement (e.g. comparators); calibration. Measurement of straightness, flatness, alignment, length, time, position, angle, velocity and acceleration. Measurement of temperature, force, pressure, strain, frequency, frequency response, vibrations and sound. Advanced inspection technologies such as coordinate measuring machines, LASERs. Attention is given to data collection and processing and to emerging technologies.

Assessment: laboratory reports 75 per cent, four small examinations 25 per cent.

### 46540

#### Programmable Controllers and Applications

MEE/MSE

4cp; 3hpw; prerequisite: 45931 *Electrical Engineering 2 (Mechanical)*; corequisite: 46531 *Control Engineering 1*; subject coordinator: Mr KA Stillman

Modern process and manufacturing control technology includes the application of discrete logic control as well as classical analogue control. The discrete logic analysis of processes is introduced and examined using binary logic and Boolean algebra, and other tools which are available to the control engineer. The pro-

grammable logic controller (PLC) is introduced as a specialised computing device which applies binary logic to control processes, and its various functions and capabilities are examined. Techniques are applied such as state and ladder diagram development and the application of high-level languages for programming. Communication facilities and protocol are discussed with the view to integration of complete control systems. The emphasis of the course is on design for applications requiring discrete input/output control, and programmable analogue input/output. Case studies are used extensively.

Assessment: assignments 20 per cent, laboratory reports 40 per cent, examinations 40 per cent.

### 46541

#### Control Engineering 2

MEE/MSE

4cp; 3hpw; prerequisite: 46531 *Control Engineering 1*; subject coordinator: Mr KA Stillman

Aims to develop an understanding of the methods of 'classical control' and their advantages and limitations, to introduce selected topics from 'modern control' and to prepare the student for postgraduate study in control engineering.

This subject follows on from Control Engineering 1, extending the control system analysis to include inverse Nyquist methods and root locus methods. Considerable time is devoted to comparing and assessing these classical techniques. Additional topics then covered are state variable feedback and control, with a brief introduction to multi-variable control. Where possible laboratory studies of various real control systems will be used.

Assessment: assignments 30 per cent, laboratory 40 per cent, final examination (open book) 30 per cent.

### 46620

#### Engineering Communication

MEE/MSE

4cp; 3hpw; subject coordinator: Mrs H McGregor

The aim is to develop students' written and oral communication skills to a professional level. Students develop confidence through workshop presentations and gain advanced knowledge through lecture sessions. Reports, letters, proposals, oral presentations, meeting

procedure, group dynamics and elective topics are covered.

The subject covers the various aspects of the communication process in an engineering context. Students participate in workshop sessions to develop written and oral skills to a professional level. Basic communication theory is used as a foundation for practical work in research techniques; writing letters, reports and discussion papers; and conducting conferences, seminars, interviews, meetings and small group discussions.

Assessment: assignments 100 per cent.

### 46630

#### Engineering and Society

MEE/MSE

4cp; 3hpw; prerequisite: 46620 Engineering Communication; subject coordinator: Mrs H McGregor

Encourages students to think about and be aware of the social and other contexts in which their profession functions. It is also intended to help students to integrate the different aspects and topic areas of the Engineering course as a whole.

The subject deals with the nature of the engineering profession and its various interactions with society. Attention is given to the historical development of mechanical engineering, the philosophical basis of the profession, and its relationship with the environment, industry and the community.

Assessment: essays 45 per cent, seminar 15 per cent, final examination 40 per cent.

### 46632

#### Engineering Management

MEE/MSE

6cp; 4.5hpw; prerequisite: 46630 Engineering and Society; subject coordinator: Dr R B Ward

The emphasis in this subject is on management decision making, which is illustrated by four basic quantitative methods and by discussion of the fundamental functions of management: planning, organising, leading and controlling. Management activities such as marketing and forecasting are covered, as are management of change and personnel management.

Following selected reading and tutorial discussion, students will review aspects of the structure and operation of their current or most recent employer and prepare written summaries of their conclusions. Topics will be chosen from matters such as: the organisation

of the firm; industrial relations policy and practices; social location and impact of the firm in the community; product and process range and development; roles of professional engineers in the firm.

Assessment: continuous assessment through reports and assignments.

### 46640

#### Terotechnology

MEE/MSE

4cp; 3hpw; prerequisite: 46821 Computing 3; corequisite: 46632 Engineering Management; subject coordinator: Dr R B Ward

Aims to provide students with basic knowledge of the management of maintenance, and to prepare them for the control of continued operation, value, depreciation and replacement of industrial assets and property, by introducing them to current philosophy, procedures, processes and equipment.

There is a brief review of 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. Subsequent topics, illustrated with appropriate examples, will include the effects 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; the organisation, operation and costing of a maintenance department.

Assessment: continuous assessment through reports and assignments,

### 46642

#### Engineering Economics

MEE/MSE

4cp; 3hpw; prerequisite: 46632 Engineering Management; subject coordinator: Dr R B Ward

Introduces students to the basic concept of economic analysis and its application to engineering projects, an economic evaluation of investment alternatives, and the application of economic analysis techniques in the comparison of engineering design alternatives.

Covers economic considerations in evaluating operational problems, revenue-cost relationship through break-even analysis, time-value analysis, cost-benefit analysis, depreciation, effects of income tax on economic evaluations,

replacement studies, risk uncertainty and sensitivity considerations, and introductory macroeconomics.

Assessment: assignments 30 per cent, examination 70 per cent.

## 46701

### Robotics and Flexible Manufacturing

CSE

3cp; 3hpw; prerequisites: 45342

*Electromechanical Systems; 67023 Materials Technology; subject coordinator: A/Prof R M Spencer*

The subject is subdivided into three sequential sections, each leading into the next: (1) traditional manufacturing and production processes, (2) fundamentals of robots and computer numerical control (CNC) and (3) flexible manufacturing in the computer-integrated manufacturing (CIM) environment. Each section is prefaced with lectures aimed at familiarisation with the fundamentals behind each topic, supplemented by videos, comprehensive laboratory work and factory visits where appropriate.

Assessment: assignments 50 per cent, examination 50 per cent.

## 46710

### Materials Processing

MEE

4cp; 3hpw; prerequisite: 46311 *Engineering Graphics; subject coordinator: Mr G Marks*

Begins to develop an appreciation and understanding of materials processing principles and their application in manufacturing.

This subject covers classification of processes; safety engineering; principles and processes of casting, permanent mould casting and hot working of metals; principles and processes of welding and metal cutting.

Assessment: reports 30 per cent, assignments 15 per cent, examinations 55 per cent.

## 46715

### Manufacturing Processes

MSE

6cp; 4.5hpw; corequisite: 67021 *Materials Engineering I; subject coordinator: Mr J Dartnell*

Begins to develop an appreciation and understanding of materials processing principles and their application in manufacturing.

This subject covers: classification of processes; safety engineering; principles and processes of

casting, permanent mould casting and hot working of metals; principles and processes of welding and metal cutting.

Assessment: reports 30 per cent, assignments 15 per cent, examinations 55 per cent.

## 46725

### Manufacturing Systems

MSE

6cp; 4.5hpw; prerequisites: 46312 *Introduction to Manufacturing Systems; 46715 Manufacturing Processes; subject coordinator: A/Prof R M Spencer*

Builds on earlier material to develop a more detailed understanding of manufacturing systems principles and applications. This subject will make major use of examples and case studies, illustrated by one or two appropriate industry visits.

Topics to be treated will include development and analysis of systems; history and characteristics of manufacturing in Australia; typical objectives for manufacturing systems; manufacturing models and strategies; manufacturing strategies. Importance of quality in manufacturing; quality standards (AS3900/ISO9000 Series): resources for manufacturing. The nature and importance of maintenance systems. Communication and information technology; electronic data interchange; documentation. Configuration management and product life cycles.

Assessment: reports 30 per cent, assignment 15 per cent, examination 55 per cent.

## 46726

### Manufacturing Systems Planning

MSE

4cp; 3hpw; prerequisite: 46725 *Manufacturing Systems; subject coordinator: A/Prof R M Spencer*

Builds on earlier material to develop a broad appreciation of manufacturing systems planning. The emphasis will be on developing an awareness of planning philosophies and techniques, using examples and case studies. Manufacturing systems planning material to be treated may include forecasting models; process planning and design; capacity planning; aggregate planning and master scheduling; resource requirement planning; just-in-time; cellular manufacturing; KANBAN systems; inventory control; standard costing system and work-centre costing; project planning and control; ratio analysis; reliability, maintainability, maintenance planning.

Assessment: reports 30 per cent, assignment 15 per cent, examination 55 per cent.



**46735****Manufacturing Systems: Quality**

MSE

6cp; 4.5hpw; prerequisite: 46335 Design for Manufacturing; subject coordinator: A/Prof R M Spencer

Builds on earlier material to develop a broad appreciation of manufacturing systems quality issues and methodologies. The emphasis will be on developing an awareness of quality systems, philosophies and techniques, using examples and case studies. Material to be treated may include planning, organisation and operation of a production enterprise for quality – ensuring process is capable and in control; inspection by control charts – attributes and variables; process capability studies; methods for quality improvement; inspection by sampling plans; TQM; quality circles; quality standards and quality certification; reliability, exponential model, series, parallel and standby systems; sudden death tests; design for maintainability – whole life analysis; ‘total customer responsiveness’ (soliciting and transforming raw customer comments and feedback into product and process modifications and innovations; manuals for installation/ operators/ maintenance); product certification (NATA).

Assessment: reports 30 per cent, assignment 15 per cent, examination 55 per cent.

**46740****Quality and Reliability**

MEE/MSE

4cp; 3hpw; prerequisite: 46821 Computing 3; subject coordinator: A/Prof R M Spencer

Provides basic knowledge of fundamentals of quality control and reliability. At completion of the course, the student will be able to interpret quality control data and records, and establish an appropriate QC system for any process.

Covers process capability, control chart techniques, cusum charts, techniques of acceptance control, standards of acceptance sampling, prediction of reliability for series, parallel and standby systems and reliability testing.

Assessment: assignments 35 per cent, examination 65 per cent.

**46742****Production and Cost Control**

MEE/MSE

4cp; 3hpw; prerequisite: 46632 Engineering Management; subject coordinator: A/Prof R M Spencer

Aims to familiarise the student with quantitative methods for the planning and control of materials and costs in manufacturing processes, and to introduce computer-aided planning and MRP2 approach.

Introduces an organised and systematic approach towards obtaining maximum utilisation of capacity resources in order to reduce excess inventory, controlling product quality, and ensuring timely product delivery at minimum cost. The subject will cover material management, forecasting of demand, capacity requirement planning (CRP), materials requirement planning (MRP), production scheduling, production control, network analysis, costing, distribution of overheads, ratio analysis, and annual reports. Computer-aided planning will also be introduced.

Assessment: reports and assignments 20 per cent, examination 80 per cent.

**46810****Introduction to Computing**

MEE/MSE

4cp; 3hpw; subject coordinator: Dr A N F Mack

Introduces the computer as a means of solving engineering problems and as an aid to communications. The main emphasis will be on personal computers, but some time will be devoted to more powerful computers and networks. The topics covered will include DOS, word processing, spreadsheets, databases, and programming at an elementary level. Operating systems including UNIX and networking will also be treated at an elementary level.

Assessment: assignments 50 per cent, examinations 50 per cent. Students are required to pass in each section.

**46811****Computing 2**

MEE/MSE

4cp; 3hpw; prerequisites: 46810 Introduction to Computing; 33120 Engineering Mathematics 1; subject coordinator: Mr KA Stillman

Expands the student’s ability to use the computer as an aid in the practice of engineer-

ing, further develops programming concepts, elementary numerical techniques, use of selected mathematical packages, databases and spreadsheets.

The subject includes: programming concepts and structure, numerical accuracy in computer arithmetic, binary arithmetic, simple integration, matrix manipulation and solution of linear simultaneous equations, solution of  $f(x)=0$ , use of spreadsheets for graphical display and presentation.

Assessment: assignments 45 per cent, quiz (open book) 15 per cent, final examination (open book) 40 per cent.

### 46821

#### Computing 3

*MEE/MSE*

*6cp; 4.5hpw; prerequisites: 46811 Computing 2; 33220 Engineering Mathematics 2; subject coordinator: Mr KA Stillman*

Introduces a selection of commonly used statistical and numerical tools and their underlying theory. Aims to develop an understanding of the usage and limitations of these tools in the practice of engineering. Topics include elementary probability, summarising data, the standard distributions (such as Binomial, Poisson, Normal, Weibull), inference and hypothesis testing, linear regression and curve fitting, introduction to ANOVA, solution of sets of equations, introduction to partial differential equations, singular value decomposition and eigen structures, discrete Fourier series.

Assessment: assignments 45 per cent, quiz (open book) 15 per cent, final examination (open book) 40 per cent.

### 46835

#### Operations Research

*MEE/MSE*

*6cp; 4.5hpw; prerequisites: all Stage 5 subjects; corequisite: for MEE, 46632 Engineering Management; subject coordinator: Mr KA Stillman*

Aims to apply the various techniques of operations research to the design and management of manufacturing systems.

This is an introduction to the philosophy and methodology of operations research, with a more detailed treatment of selected techniques including simulation, linear programming, dynamic programming, network analysis (CPM, PERT, least cost scheduling), and queuing theory.

### 46840

#### Advanced Engineering Computing

*MEE/MSE*

*4cp; 3hpw; prerequisite: 46821 Computing 3; subject coordinator: Mr KA Stillman*

Aims to: give an appreciation of selected important topics from computer science and develop understanding of program structure and data structure; and to develop skills in formulating and solving problems in optimisation.

The subject is broadly divided into programming and application. The programming section uses the Ratfor preprocessor as a bridge from Fortran to the more richly structured languages Pascal and C. The use of the UNIX dataprocessing tools awk and grep are introduced. The application section is an introduction to optimisation methods: linear programming, simulated annealing and calculus-based algorithms.

Assessment: assignments 70 per cent, final examination (open book) 30 per cent.

### 46992

#### Professional Practice

*MEE/MSE*

*6cp; 4.5hpw; prerequisite: 46632 Engineering Management; subject coordinator: Dr R B Ward*

The subject deals in more detail with issues raised in 46632 Engineering Management. It principally covers the structure of commercial entities (from sole trader through to public company), the detailed accounting procedures followed in business, the relevant legal system, marketing and personnel practices. From time to time other topics will be introduced, such as quality, management of innovative technology, business ethics, and risk management.

The different philosophies on cooperative education will also be discussed. Each student will present a report on their industrial experience, give a seminar to the class outlining this experience in the light of the course objectives, and develop his/her own learning contract for the five years after graduation.

Assessment: continuous assessment by reports and assignments.

**46997****Professional Experience (Sandwich)**

MEE/MSE

*and***46999****Professional Experience (Part-Time)**

MEE/MSE

These subjects are the Industrial Experience subjects for Mechanical and Manufacturing Systems Engineering degrees. Enrolment in them indicates that the student is currently obtaining industrial experience. Ninety weeks of approved industrial experience must be gained prior to graduation.

The objectives are: to help students understand the format, structure and conventions of technical, written and speech reporting; to apply these skills to the writing of professional papers; and to alert students to the principles of communication inherent in speech, writing, listening and reading situations.

**47002****Project**

CE

*2cp; 2hpw***47003****Project**

CE

*3cp; 3hpw***47004****Project**

CE

*4cp; 4hpw***47006****Project**

CE

*6cp; 6hpw***47009****Project**

CE

*9cp; 9hpw***47012****Project**

CE

*12cp; 12hpw***47015****Project**

CE

*15cp; 15hpw; subject coordinator: Dr G J Ring*

Subjects with varying credit points are provided to allow flexibility in undertaking projects over more than one semester. Project topics, guidelines for project registration and other information about projects may be obtained from Dr Ring.

In the project students are expected to carry out a major engineering task and to prepare a formal bound report on that task. The project has many objectives. It develops the need to formalise a rational approach to a significant, long-term piece of work. It requires effective time management to meet deadlines. It compels students to work individually under the guidance of a supervisor. It enhances their communication and engineering skills. Finally it gives students a feeling of professional pride and confidence in their ability, thus preparing for their future roles in the engineering workplace.

**47110****Introduction to Civil Engineering**

CE/SE/CEE

*3cp; 3hpw; subject coordinator: Mr K Halstead*

The objectives are: to improve staff/student interaction and understanding and to provide close contact with at least one member of the academic staff; to provide an insight into the breadth of civil engineering and the many skills and approaches required by the profession; and to develop written and verbal communication skills. Topics include the phases of engineering work; the design process; materials and behaviour; environmental engineering; water engineering; geotechnical engineering; project evaluation; management and professional aspects of engineering, including ethics, professional associations, contracting and consulting.

Assessment: written report 20 per cent, class assignments 20 per cent, seminar 20 per cent, tutorial participation 10 per cent, final examination 30 per cent.

**47112****Computer Applications**

CE/SE/CEE

*3cp; 3hpw; subject coordinator: Dr A Saleh*

Introduces students to computer utilisation and the practical use of a variety of software

tools relevant to civil engineering. Emphasis is given to hands-on work at the computer and the application of software to engineering problems. The subject covers introduction to computing environment; software applications; and electronic communications.

### 47113

#### Computer Programming

CE/SE/CEE

3cp; 3hpw; corequisite: 47112 Computer Applications; subject coordinator: Dr K L Lai

Aims to familiarise students with computing as a tool for solving engineering problems. Emphasis is on the process of formulating problems in a manner suitable for computer solution. At the conclusion of the subject, students should be able to recognise problems which lend themselves to computer solutions and have the confidence to use a computer whenever it is warranted.

Assessment: assignments 25 per cent, mid-term quiz 25 per cent, final examination 50 per cent.

### 47117

#### Statics

CE/SE/CEE

4cp; 3hpw

Provides students with the fundamental concepts of statics and the application of the basic principles of statics to solving engineering mechanics problems. Much emphasis in the course will be placed on the concepts of free body diagrams and equilibrium of the free body. At the end of the course students should be able to confidently apply these basic principles to solve statically determinate problems involving non-deformable bodies.

### 47118

#### Surveying IA

CE/SE/CEE

3cp; 3hpw; subject coordinator: Mr A Brady

Introduces students to fundamental surveying theory, techniques and instruments which are used in civil engineering. This will include levelling, distance measurement and use of the theodolite. At the completion of Surveying IA the student should have a practical understanding of the execution of the following surveys in the field and appreciation of the accuracy achievable by: (1) levelling, (2) distance measurement by tape or wire and (3)

traversing. The student should also gain a practical understanding of the execution of the following computations and appreciation of the accuracy required in computation: (1) level reduction, (2) distance reduction, (3) traverse closure for both misclose and bearing and distance of missing line.

This subject is essential to provide students with basic material which they can use during the initial industrial training components of the subject.

Assessment: practical reports and assignments 20 per cent, quizzes 20 per cent, final examination 60 per cent.

### 47120

#### Graphics

CE/SE/CEE

4cp; 3hpw; subject coordinator: Mr A Brady

In this subject the student will be exposed to a variety of ways in solving three-dimensional design problems, from the basic levels to complex practical problems using conventional and computer-aided design techniques.

Upon completion of this subject, students should be able to clearly identify and translate three-dimensional objects on to a two-dimensional frame.

### 47127

#### Mechanics of Solids I

CE/SE/CEE

4cp; 3hpw; prerequisite: 47117 Statics; subject coordinator: Dr R Karim

Aims to develop an understanding of the behaviour of deformable solids responding to loads, deformations and temperature changes, leading to analysis of structure and machine elements utilising established principles. The subject emphasises the use of fundamental techniques for formulating and solving problems in the mechanics of deformable solids based on equilibrium and compatibility relationships and material properties. The subject will provide the required knowledge necessary for understanding more advanced topics in 47137 Mechanics of Solids 2 and the underlying principles in structural analysis as well as design subjects.

Assessment: assignments 10 per cent, mid-semester quiz 20 per cent, final examination 70 per cent.

**47128****Surveying IB**

CE/SE/CEE

3cp; 3hpw; prerequisite: 47118 Surveying 1A;  
subject coordinator: Mr A Brady

Students are assisted in developing basic surveying skills and in reaching a significant level of competence in using basic surveying equipment such as levels, theodolites and distance measuring tapes. Students will be introduced to the engineering applications of surveying, including detail and contour surveying, setting out of roads and buildings and road design. Students will also be introduced to current surveying computer packages.

Assessment: quizzes 25 per cent, assignments and practical reports 15 per cent, practical test 25 per cent, final examination 35 per cent.

**47131****Structural Mechanics**

CE/SE/CEE

3cp; 3hpw; prerequisite: 47127 Mechanics of Solids 1; subject coordinator: Dr R Karim

Reinforces the basic concepts of statics and mechanics of deformable solids and enhances the student's understanding of structural behaviour of determinate frames by exploring the principles of energy, theories of failure and concepts of stability.

Assessment: assignments 10 per cent, quiz 30 per cent, final examination 60 per cent.

**47133****Numerical Methods in Engineering**

CE/SE/CEE

3cp; 3hpw; prerequisites: 47113 Computer Programming; 33121 Engineering Mathematics 1A; 33122 Engineering Mathematics 1B; corequisite: 33221 Engineering Mathematics 2A; subject coordinator: Dr A Saleh

Familiarises the student with a number of numerical methods which will be useful in the solution of a wide range of engineering problems. Emphasis will be given to application, rather than derivation, but some theory will be provided to assist in the understanding of the solution techniques.

Assessment: class tests and assignments 40 per cent, final examination 60 per cent.

**47134****Construction Materials**

CE/SE/CEE

3cp; 3hpw; prerequisite: 67022 Materials Science for Engineers; subject coordinator: Dr H Chung

Timber, steel, concrete and masonry are the major materials commonly used in civil engineering construction. This subject aims to provide understanding of the production, material characteristics and properties, main uses, and testing to relevant Australian standards. A knowledge of these materials is essential in the design and construction of civil engineering structures.

Assessment: assignments and laboratory reports 30 per cent, quizzes 20 per cent, final examination 50 per cent.

**47135****Fluid Mechanics**

CE/SE/CEE

4cp; 3hpw; prerequisites: 47127 Mechanics of Solids 1; 33221 Engineering Mathematics 2A; subject coordinator: Dr S Beecham

Fluid Mechanics is the foundation subject for the Water Engineering strand within the Civil Engineering course. It also provides a basic knowledge of fluid mechanics for structural engineering students. The subject's aim is to introduce students to concepts of fluid statics and dynamics, going from the basic principles of mathematics and physics to the empirical procedures used in civil engineering applications.

Assessment: assignments 20 per cent, quiz and final examination 60 per cent, laboratory work 10 per cent, group project 10 per cent.

**47137****Mechanics of Solids 2**

CE/SE/CEE

3cp; 3hpw; prerequisite: 47127 Mechanics of Solids 1; subject coordinator: Dr K L Lai

Develops an understanding of the behaviour of a range of deformable solids beyond those considered in the prerequisite subject. On completion of this subject, the students should understand the behaviours of deformable solids responsible for all types of internal action on various cross-sections. This subject forms a sound knowledge to develop the fundamental principles for structural analysis and design.

Assessment: assignments 15 per cent, mid-semester quiz 35 per cent, final examination 50 per cent.

**47140****Concrete Design I**

CE/SE/CEE

3cp; 3hpw; prerequisite: 47127 *Mechanics of Solids 1*; corequisite: 47137 *Mechanics of Solids 2*; subject coordinator: Mrs A Gardner

On completion of this subject, the student should: understand the behaviour under load of reinforced concrete beams, one-way and two-way slabs, and short columns; be able to analyse from first principles reinforced concrete sections subjected to bending moment and/or axial compression at any stage of loading up to ultimate; be able to design and detail reinforced concrete beams, one-way and two-way slabs, and short columns, considering all common limit states, except torsion; have some familiarity with the Standards Australia Concrete Structures Standard and some awareness of typical design aids. The subject aims to provide students with a grounding in fundamental principles applicable to the design of all concrete structures.

Assessment: assignments 15 per cent, mini-quizzes 15 per cent, mid-semester examination 25 per cent, final examination 45 per cent.

**47141****Structural Analysis I**

CE/SE/CEE

3cp; 3hpw; prerequisite: 47131 *Structural Mechanics*; subject coordinator: Dr R Karim

This subject teaches students methods, amenable to hand calculations, for the analysis of indeterminate structures, and covers the influence coefficient and the applicability of influence lines to the design of structural frameworks.

Assessment: assignments 15 per cent, two quizzes 40 per cent, final examination 45 per cent.

**47142****Environmental Engineering**

CE/SE/CEE

3cp; 3hpw; prerequisite: 65023 *Engineering Chemistry*; subject coordinator: Prof S Vigneswaran

This subject introduces civil engineering students to basic environmental concepts and the environmental consequences of typical engineering activities in order for them to have a basic understanding of selected environmental science topics. It helps them to: be familiar with main aspects of NSW

environmental legislation with respect to civil engineering activities; have a broad knowledge on current environmental problems; be able to determine likely environmental consequences of several types of engineering activities; and be aware of procedures which can be used to avoid or reduce adverse environmental impacts.

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

**47144****Timber Design**

CE/SE/CEE

3cp; 3hpw; prerequisite: 47127 *Mechanics of Solids 1*; subject coordinator: Mr K Crews

Aims to broaden the student's knowledge of timber as a structural material and its modern usage, and to develop a professional capability for design and construction of economical timber structures.

Assessment: assignments 50 per cent, mid-semester quiz 10 per cent, final examination 40 per cent.

**47145****Hydraulics**

CE/CEE

3cp; 3hpw; prerequisite: 47135 *Fluid Mechanics*; subject coordinator: Dr S Beecham

Hydraulics follows the introductory Fluid Mechanics subject in the Water Engineering strand. It aims to consolidate students' knowledge of fluid principles, and to cover principles of open channel flow.

On completion, students will have a deeper knowledge of fluid flow principles, and a proficiency in solving problems and performing design calculations for open channel flow systems.

Assessment: assignments 20 per cent, laboratory reports 20 per cent, quizzes/examination 60 per cent.

**47146****Soil Mechanics**

CE/SE/CEE

4cp; 3hpw; subject coordinator: Dr G J Ring

As a particulate and multiphase material, soil displays many characteristics which are distinctly different from those of other engineering materials. In order to design foundations and earth structures it is essential

to understand the basic soil behaviour under different stresses and environmental conditions. The main aim is to study the components of soil and their interrelationships, soil classification for engineering purposes, stresses and failure conditions in a soil mass, and stress-strain characteristics.

Assessment: quizzes, assignments and laboratory reports 50 per cent, final examination 50 per cent.

#### 47149

##### Construction

CE/SE/CEE

3cp; 3hpw; prerequisite: 47128 Surveying 1B; subject coordinator: A/Prof T Anderson

Promotes an interest in and an understanding of some of the equipment and techniques associated with civil engineering construction work.

On completing the subject the student should: have a well-developed awareness of the equipment, processes and methods associated with construction work; be able to identify many of the day-to-day problems encountered on construction sites; and be able to participate actively in the evolution of the solution to construction problems.

The subject is the first in the Construction and Management strand of the course.

Assessment: assignments 60 per cent, final examination 40 per cent.

#### 47150

##### Concrete Design 2

CE/SE/CEE

4cp; 3hpw; prerequisite: 47140 Concrete Design 1; subject coordinator: Mr C Wilkinson

On completion of this subject students should: appreciate the effects of and reasons for prestressing concrete beams; understand the behaviour under load of simply supported prestressed concrete beams; be able to analyse from first principles prestressed concrete sections at any stage of loading up to ultimate; be able to design and detail simple prestressed beams considering all common limit states, except torsion; have some familiarity with relevant provisions of the Standards Australia Concrete Structures Standard and some awareness of available software design aids.

Assessment: assignments 15 per cent, mini-quizzes 15 per cent, mid-semester examination 25 per cent, final examination 45 per cent.

#### 47151

##### Structural Analysis 2

CE/SE/CEE

4cp; 3hpw; prerequisites: 47141 Structural Analysis 1; 47133 Numerical Methods in Engineering; subject coordinator: Dr A Saleh

In this subject students will master the analysis of structures using the stiffness method and become familiar with the computer application in this field. Students are also introduced to concepts of material and geometric non-linearities and to problems of elastic stability.

Assessment: quizzes 50 per cent, final examination 50 per cent.

#### 47152

##### Public Health Engineering

CE/SE/CEE

3cp; 3hpw; prerequisite: 47142 Environmental Engineering; subject coordinator: Dr P Hagare

Provides civil engineering students with a basic knowledge about water quality, the types of water pollution and objectives, processes and technology of wastewater and water treatment, in order for them to become familiar with the water quality constituent, measurement methods and standards; major types of water pollution in NSW; different water and wastewater treatment processes used in NSW; rationale of choice of treatment alternatives; and introductory design of treatment processes used commonly in NSW.

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

#### 47153

##### Probability and Statistics

CE/SE/CEE

3cp; 3hpw; prerequisite: 47112 Computer Applications; subject coordinator: Dr A Saleh

Many areas of engineering are involved with gathering and evaluating large amounts of data. Two aspects are important: the presentation of these data and what inferences can be drawn from these data. The science of statistics deals with these aspects. This subject aims to introduce the student to these areas of statistical analysis. Particular emphasis is placed both on promoting an awareness in students of the variability of design input data, and on the tools required to analyse this variability.

Assessment: assignments 10 per cent, class test 30 per cent, final examination 60 per cent.

**47154****Concrete Technology**

CE/SE/CEE

3cp; 3hpw; prerequisite: 47134 Construction Materials; subject coordinator: Dr R Sri Ravindrarajah

Concrete is one of the essential materials used in civil engineering construction. The main objective is to provide a basic understanding of concrete technology in relation to production, materials characteristics and properties, durability, and testing in accordance with relevant Australian standards.

Assessment: assignments and laboratory reports 30 per cent, quizzes 20 per cent, final examination 50 per cent.

**47155****Hydrology**

CE/CEE

3cp; 3hpw; prerequisite: 47135 Fluid Mechanics; subject coordinator: A/Prof G O'Loughlin

Students are introduced to the principles and methods of engineering hydrology, with particular concentration on Australian practice. On completion, students should understand basic principles of hydrology, and be aware of procedures used in Australia. They should be able to estimate design flow rates for various situations, and be familiar with basics of reservoir yield analysis and hydrological modelling.

Assessment: exercises and assignments 50 per cent, quizzes and examination 50 per cent.

**47156****Soil Engineering**

CE/SE/CEE

3cp; 3hpw; prerequisite: 47146 Soil Mechanics; subject coordinator: A/Prof M R Hausmann

Building on the knowledge of soil properties developed in Soil Mechanics, this subject introduces the solutions to problems of stability and deformation related to shallow footings, retaining structures, deep foundations (piles, piers and caissons), embankments, excavations and natural slopes. The methods of stability analysis presented are based on the Mohr-Coulomb failure law and cover the assessment of bearing capacity, earth pressure and slope stability. Elastic as well as consolidation theory are applied to deformation problems, including settlement, rotation and lateral deflection.

Assessment: quizzes and laboratory reports 50 per cent, final examination 50 per cent.

**47159****Project Planning**

CE/SE/CEE

3cp; 3hpw; prerequisite: 47149 Construction; subject coordinator: A/Prof T Anderson

Provides students with a detailed knowledge of a number of techniques which guide engineers in their managerial decision making.

On completing the subject the student should be able to: apply the rigorous techniques of critical path method networks as well as other planning systems; analyse cash flows associated with alternative courses of action and have an understanding of benefit-cost analysis; understand the basic principles of primary and detailed cost estimating; and predict the likely production of earthmoving equipment and correctly balance fleets of machinery.

Assessment: assignments 15 per cent, project 35 per cent, final examination 50 per cent.

**47160****Concrete Design 3**

CE/SE/CEE

3cp; 3hpw; prerequisite: 47140 Concrete Design 1

On completion of this subject, the student should understand the behaviour under load, and be able to analyse, design and detail the following reinforced concrete components additional to those covered in 47140 Concrete Design 1: retaining walls, footings, slender columns and flat slabs. In addition the subject deals with the design of a complete building, and aims to develop an approach to conceptual design, the development and consideration of alternatives and selection of appropriate structural systems for concrete buildings.

Assessment: assignments 15 per cent, mini-quizzes 15 per cent, mid-semester examination 25 per cent, final examination 45 per cent.

**47161****Steel Design I**

CE/SE/CEE

3cp; 3hpw; prerequisites: 47137 Mechanics of Solids 2; 47141 Structural Analysis 1; subject coordinator: Mr C Wilkinson

The objective is for students to acquire competence in the design of structural steel elements in accordance with the Australian



Standard AS4100-1900: Steel Structures and to form a sound basis for progressing into more advanced steel subjects. Upon completion of this subject, students should be capable of proportioning a complete framework.

Assessment: assignments 15 per cent, mid-semester quiz 35 per cent, final examination 50 per cent.

### 47162

#### Advances in Pollution Control

CE/CEE

3cp; 3hpw; prerequisite: 47152 Public Health Engineering

This is an advanced subject intended to give an overview of advances in pollution control technologies and management practices in order for students to become familiar with: the pollution control management strategies adopted by different industries; advanced technologies used to produce water suitable for reuse; and technologies used in the upgrading of water and wastewater treatment plants.

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

### 47164

#### Metals Technology

CE/SE

3cp; 3hpw; prerequisite: 47134 Construction Materials; subject coordinator: Dr H Chung

Deals with the behaviour of metals under various service conditions and loads with particular reference to structural steel. Provides the background knowledge on the material aspects of AS4100-1900: Steel Structures, thereby augmenting students' understanding of the principles of steel design. In addition, it will help the students in selecting the appropriate grade of steel for a particular project, specifying the relevant tests for quality control and interpreting the test results.

Assessment: assignment and laboratory reports 30 per cent, quizzes 20 per cent, final examination 50 per cent.

### 47166

#### Geotechnical Engineering

CE

3cp; 3hpw; prerequisite: 47156 Soil Engineering; subject coordinator: Dr G J Ring

The geotechnical design process involves understanding the nature of soils at a site and predicting the interaction between those soils and any construction carried out on the site. The theories of soil behaviour developed in 47146 Soil Mechanics and the methods of analysis treated in 47156 Soil Engineering give the student the theoretical background on which design techniques may be built. However, soil and rock, being natural materials, are very variable. This course aims to develop a design philosophy which will allow this variability to be correctly covered in the design. This design philosophy is based partly on the theoretical background (the science) and partly on practical experience and engineering judgment (the art of geotechnical design).

Assessment: assignments 10 per cent, field work 20 per cent, design project 30 per cent, final examination 40 per cent.

### 47167

#### Road Engineering

CE/CEE

3cp; 3hpw; prerequisites: 47156 Soil Engineering; 47159 Project Planning; 47155 Hydrology; subject coordinator: Mr P Kenny

Provides students with a general introduction to Australian methods for the analysis and design of various road components.

Assessment: assignments and reports 50 per cent, final examination 50 per cent.

### 47168

#### Surveying 2

CE/CEE

3cp; 3hpw; prerequisite: 47149 Construction; subject coordinator: Mr A Brady

Widens senior students' horizons regarding advanced survey methods, instruments and theory as applied to civil engineering projects. Students will be given a choice of the practical exercises undertaken so that the subject may be tailored to suit their particular needs or interests in the area of work they find most relevant to them.

Assessment: quiz 30 per cent, practical reports and assignments 30 per cent, final examination 40 per cent.

**47171****Steel Structures and Concept Design I**

CE/SE

4cp; 3hpw; prerequisites: 47161 Steel Design I; 47141 Structural Analysis I; 47137 Mechanics of Solids 2; subject coordinator: Dr S Parsanejad

The objectives are: to help students gain familiarity and competence in the complete design of typical steel structures; and to involve students in the philosophy and methodology of structural design with the aim of achieving coherence from previously acquired knowledge.

Assessment: project 50 per cent, two quizzes 50 per cent.

**47175****Water Resources Engineering**

CE/CEE

3cp; 3hpw; prerequisites: 47145 Hydraulics; 47155 Hydrology; subject coordinator: Dr S Beecham

After studying detailed aspects of water engineering in earlier subjects, students will consider the full scope of water resources engineering and the water industry in this subject. The main topics to be considered are: world water resources; water resource development; functions (e.g. water supply, irrigation) and infrastructure; environmental effects; social aspects; planning; management; and systems analysis.

Assessment: exercises and assignments 50 per cent, quizzes and examinations 50 per cent.

**47176****Ground Modification**

CE

3cp; 3hpw; prerequisite: 47156 Soil Engineering; subject coordinator: A/Prof M Hausmann

Introduces methods of ground modification for the purpose of improving the engineering properties of soils and rocks, such as: strength, compressibility, tendency to shrink and swell, durability, permeability, potential for liquefaction, and variability. Emphasis is placed on laboratory and field testing, design criteria, methods of analysis and performance evaluation. The main topics are compaction, dewatering, soil stabilisation of admixtures, grouting, soil reinforcement by inclusions and confinement. Additional geotechnical

construction processes described include preloading, electro-osmosis, thermal stabilisation (ground freezing or heating), soil and rock anchors, and the use of geosynthetics.

By discussing ways of modifying soils by mechanical, hydraulic, physical, chemical and other means, the student gains a deeper understanding of basic soil and rock properties. After completing this subject, a designer or construction engineer will be better able to evaluate alternative solutions when confronted with difficult foundation conditions or marginal building materials.

Assessment: assignment and quizzes 50 per cent, project 50 per cent.

**47177****Transportation Engineering**

CE/CEE

3cp; 3hpw; prerequisite: 47167 Road Engineering; subject coordinator: Mr P Kenny

Provides students with a basic understanding of the issues involved in planning for transport and making transport work more effectively in the community.

Assessment: practical reports and class assignments 50 per cent, final examination 50 per cent.

**47178****Project Economics**

CE/SE/CEE

3cp; 3hpw; prerequisite: 47159 Project Planning; subject coordinator: A/Prof G O'Loughlin

Advances students' knowledge and competence in economic and financial management associated with civil engineering projects.

On completion the student should: have a well-developed understanding of the economic framework within which selection of engineering projects is made; be able to provide reasoned advice on the tangible and intangible benefits and costs of projects; be competent in financial management techniques such as benefit-cost analysis, economic project evaluation, intangible and multiple objective analysis, sensitivity and probability analysis; and have an understanding of the roles of engineers in business, including financial and marketing functions.

Assessment: assignments 30 per cent, project 30 per cent, final examination 40 per cent.

**47179****Construction Contracts**

CE/SE/CEE

3cp; 3hpw; prerequisite: 47159 Project Planning;  
subject coordinator: A/Prof T Anderson

Provides a general appreciation of some of the important aspects of contract management.

On completing the subject the students should have: a good understanding of the powers and duties of the parties to a construction contract; a sound knowledge of the Standard General Conditions of Contract; and an awareness of the activities and functions associated with the administration of civil engineering contracts.

Assessment: class assignments 20 per cent, quizzes 20 per cent, final examination 60 per cent.

**47189****Management for Engineers**

CE/SE/CEE

4cp; 3hpw; prerequisites: 47149 Construction;  
47159 Project Planning; 47179 Construction  
Contracts; corequisite: 47178 Project Economics;  
subject coordinator: A/Prof T Anderson

Develops an awareness of the theories of management and an understanding of the techniques and principles associated with the general management of projects and organisations.

This subject is the capstone subject of the Construction and Management strand of the course and aims to develop a broad view of the role an engineer may take in industry and society.

Assessment: assignments 35 per cent, class assessment 20 per cent, final examination 45 per cent.

**47237****Domestic Building Design and Construction**

SE

3cp; 3hpw; prerequisite: 47127 Mechanics of  
Solids 1; corequisite: 47137 Mechanics of Solids 2;  
subject coordinator: Mr K Crews

Aims to familiarise the students with local government's statutory regulation and the structural behaviours of domestic buildings with load-bearing walls, and to give a comprehensive coverage of all components of domestic buildings with emphasis on building services, construction aspects and maintenance.

Assessment: assignment 65 per cent, quiz 10 per cent, final quiz 25 per cent.

**47265****Finite Element Analysis**

SE

3cp; 3hpw; prerequisites: 47151 Structural Analysis  
2; 47133 Numerical Methods in Engineering;  
subject coordinator: Dr A Saleh

Provides an insight into the finite element method and its utilisation in solving civil engineering problems. The theoretical fundamentals underlying the method will be highlighted. Finite element software packages will be used to demonstrate the versatility and limitation of the method and to provide hands-on experience to enable students to use such software effectively.

Assessment: quizzes and assignments 50 per cent, final examination 50 per cent.

**47267****Approximate Methods in Structural Analysis**

SE

3cp; 3hpw; prerequisites: 47141 Structural Analysis  
1; 47137 Mechanics of Solids 2; 47140 Concrete  
Design 1; 47161 Steel Design 1; subject  
coordinator: Dr S Parsanejad

This subject explores the assumptions underlying the approximate methods of analysis and their justification and equips students with analytical tools for rapid determination of approximate internal actions which can be used either for preliminary design of structural elements or for detection of gross errors in the results obtained from rigorous computer-based analysis.

Assessment: assignments 30 per cent, two quizzes 70 per cent.

**47268****Dynamics of Structures**

SE

3cp; 3hpw; prerequisites: 47151 Structural Analysis  
2; 47133 Numerical Methods in Engineering;  
subject coordinator: A/Prof B Samali

Introduces students to basic concepts and fundamental principles of structural dynamics and their application to structural design and analysis of dynamically sensitive structures such as tall buildings, towers, chimney stacks, foot bridges, and others. Upon the completion of the subject the student is expected to understand the nature of dynamic (time

varying) loads such as those produced by wind, earthquakes, rotating machinery, trains, human beings and other sources, and assess the response of civil engineering structures to such loads by taking into account the load-structure interaction, leading to design of structures satisfying both the strength and serviceability requirements.

Assessment: assignments 40 per cent, three quizzes 60 per cent.

## 47270

### Concrete Design 4

CE/SE

*3cp; 3hpw; prerequisites: 47150 Concrete Design 2; 47141 Structural Analysis 1; subject coordinator: Prof K Faulkes*

On completion of this subject, the student should understand and be able to analyse the effects of prestress on prestressed concrete tension members, continuous beams, flat slabs and band-beam structures, should understand the behaviour of these structures under load up to failure and should be able to design them in accordance with the Australian Concrete Structures Standard. In addition, the subject may cover one or more of the following: design for torsion of reinforced and prestressed concrete members; prestressed concrete water retaining structures; prestressed concrete columns.

Assessment: assignments 15 per cent, mini-quizzes 15 per cent, mid-semester examination 25 per cent, final examination 45 per cent.

## 47275

### Bridge Design

SE

*3cp; 3hpw; prerequisites: 47150 Concrete Design 2; 47161 Steel Design 1; subject coordinator: Prof S Bakoss*

An introduction to the Australian practice of bridge design. Students are taught to analyse bridge components using manual and computerised methods and to design a selected structure in accordance with the current code of practice. On completion of the subject the student should be familiar with structural systems and methods applied to the design of typical bridges and should be capable of designing a small- to medium-span highway bridge in accordance with the Australian standard.

Assessment: four assignments 60 per cent, seminar 10 per cent, two quizzes 30 per cent.

## 47277

### Loading on Building Structures

SE

*3cp; 3hpw; prerequisite: 47268 Dynamics of Structures; subject coordinator: A/Prof B Samali*

Familiarises students with various types of loads and phenomena responsible for inducing stresses and strains in building structures, and develops an understanding of probabilistic concepts underlying the determination of various loads on structures for serviceability as well as strength calculations. Upon the completion of the subject the student should be able to arrive at load combinations which are likely to produce most adverse effects on a building structure.

Assessment: assignments 40 per cent, three quizzes 60 per cent.

## 47278

### Structural Stability

SE

*3cp; 3hpw; prerequisites: 47151 Structural Analysis 2; 47133 Numerical Methods in Engineering; subject coordinator: Prof S Bakoss*

A study of the behaviour of slender members subjected to compression and/or flexure. This subject will examine the factors which contribute to the onset of buckling in single members and will develop the understanding of the behaviour of slender frames subjected to loads which cause buckling. It will enable students to apply computer-based methods to analyse practical frames to assess their stability.

Assessment: assignments 50 per cent, final examination 50 per cent.

## 47281

### Steel Structures and Concept Design 2

SE

*3cp; 3hpw; prerequisite: 47171 Steel Structures and Concept Design 1; subject coordinator: Dr S Parsanejad*

Provides an understanding of the behaviour of composite beams and plastically deformed steel frames and develops familiarity with the relevant code provisions and their underlying concepts.

Assessment: two projects 50 per cent, two quizzes 50 per cent.

**47285**

**Design Project**

SE

*6cp; 6hpw; prerequisites: 47171 Steel Structures and Concept Design 1; 47160 Concrete Design 3; subject coordinator: Prof S Bakoss*

Develops the ability of students to take a substantial structural project from an initial functional brief to the stage where it can be documented for construction. Students will be required to prepare and assess concept designs in terms of functional requirements of a project brief. The preferred options will then be developed to a preliminary design stage followed by the preparation of final design documentation.

Assessment: preparation and assessment of conceptual designs 35 per cent, preliminary designs 30 per cent, final design and documentation 35 per cent.

**47287**

**Structural Testing**

SE

*3cp; 3hpw; prerequisites: 47137 Mechanics of Solids 2; 47151 Structural Analysis 2; 47150 Concrete Design 2; subject coordinator: Dr R Karim*

Students are expected to familiarise themselves with techniques on contemporary instrumentation for measuring the strength and behaviour of concrete and steel structures in the field and/or in the laboratory. The subject aims to provide students with information necessary for the design and application of structural models and to present techniques for the analysis of test data.

Assessment: assignments 10 per cent, laboratory reports 50 per cent, examinations and quizzes 40 per cent.

**47288**

**High-rise Buildings**

CE/SE

*3cp; 3hpw; prerequisites: 47277 Loading on Building Structures; 47267 Approximate Methods; subject coordinator: Dr S Parsanejad*

Enhances the understanding of the behaviour of structural systems with special reference to characteristics inherent in tall buildings, and brings about coherence from previously learnt knowledge.

Assessment: project 30 per cent, assignments 20 per cent, two quizzes 50 per cent.

**47301**

**Railway Engineering (Elective)**

CE/SE

*3cp; 3hpw; subject coordinator: Mr A Brady*

An introduction to the design, construction and maintenance concepts of railway track and bridges. On completion of the lecture program the student should be able to design, independently, a branch line or a siding complex according to State Rail of NSW standards. An understanding of track-train interrelationships and their effect on track structure should also have been obtained.

The subject also provides specific information on the design of a railway bridge structure on the basis that the student already has the knowledge to design a road bridge.

Assessment: trade design project 40 per cent, bridge design project 30 per cent, quiz 30 per cent.

**47302**

**Welding (Elective)**

CE/SE

*3cp; 3hpw; prerequisite: 47164 Metals Technology; subject coordinator: Dr H Chung*

Introduces students to the aspects of welding which affect the efficiency of fabrication and serviceability of steel structures. Deals with the advantages and disadvantages of common welding methods, quality and strength of welds, inspection and economic considerations.

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

**47303**

**Land Development (Elective)**

CE/SE

*3cp; 3hpw; subject coordinator: Mr A Brady*

Provides information for senior engineering students interested in local government or land development projects. Students are introduced to aspects of the land development process from acquisition of raw land through to the marketing of developed land. On completing the subject the student should: have an understanding of the land development process and the key participants in that process; understand the techniques of site analysis, concept and detailed designing of land development projects; appreciate the scope for incorporating environmental and street management principles in the design

process; and understand the legislative requirements of land development.

The subject is structured in three modules:

Module 1: Context of Land Development: development processes, nature of clients, site contexts, market contexts, financial contexts, legal contexts.

Module 2: Site Analysis and Design: site analysis, concept planning, designing with environment in mind, residential street layout, subdivision design.

Module 3: Development Approvals and Appeals: financial viability, development applications and approvals, Section 94 contributions, Land and Environment Court.

Assessment: assignments 70 per cent, final examination 30 per cent.

### 47305

#### Risk and Reliability Analysis (Elective)

CE/SE

3cp; 3hpw; prerequisite: 47113 Computer Programming; subject coordinator: Mr J Irish

Introduces students to principles of reliability analysis and application of probability theory to engineering problems, so as to gain an understanding of its significant role in all aspects of engineering planning and design, including: the formulation of engineering problems and evaluation of systems performance under conditions of uncertainty; systematic development of design criteria, explicitly taking into account the significance of uncertainty; and the logical framework for risk assessment and risk-benefit trade-off analysis relative to decision making.

The principal aim is to emphasise the wider roles of probability theory in engineering, with special attention on problems related to civil and structural engineering, construction management, hydrologic and water resources planning, transportation planning, and wind and earthquake engineering.

The subject is concerned mainly with the practical applications and relevance of probability concepts of engineering. The necessary mathematical concepts are developed in the context of engineering problems and through illustrations of probabilistic modelling of physical situations and phenomena in non-abstract terms.

Assessment: assignments 30 per cent, two quizzes 70 per cent.

### 47306

#### Geomechanics (Elective)

CE/SE

3cp; 3hpw; prerequisites: 47156 Soil Engineering; completion of 47166 Geotechnical Engineering strongly recommended; subject coordinator: A/Prof M Hausmann

The theory and practice of soil–structure interaction for buildings. The design of foundations, the effects of the behaviour of foundations and soils on buildings and the effects of the stiffness of the superstructure on the behaviour of foundations are investigated. On completion of this subject the students should understand: how to choose the appropriate soil model for a given situation; how to use analytical methods of soil–structure interaction for the design of foundations; and how to employ field experimental studies in the design of foundations.

Assessment: assignments 20 per cent, quiz 20 per cent, report 60 per cent.

### 47307

#### Construction Management (Elective)

CE/SE

3cp; 3hpw; prerequisites: 47149 Construction; 47159 Project Planning; 47179 Construction Contracts; subject coordinator: A/Prof T Anderson

Provides a complete and detailed framework for the administration and control of civil engineering construction projects. The subject builds on the knowledge developed in Construction, Project Planning and Construction Contracts.

On completing the subject the student should have: a good understanding of the role of a construction manager and the management information systems that assist his or her functioning and decision making; an understanding of the process of team development and industrial relations issues; a mastery of a number of computer software packages that offer streamlined site administration in the areas of time and cost control; an appreciation of the scope and impact of quality assurance and risk management techniques and procedures.

Assessment: final examination 30 per cent, project submission 40 per cent, skills test 30 per cent.

**47449****Introduction to Environmental Economics and Law**

CEE

3cp; 3hpw; prerequisite: 47142 Environmental Engineering; subject coordinator: A/Prof G O'Loughlin

The subject will provide students with an understanding of ecological sustainability and two of the key strategies – environmental law and environmental economics – by which it may be achieved. The development of environmental legislation as a means of containing environmental damage will be described; and more contemporary developments towards addressing the core issues of sustainability through both national and, increasingly, international legislation will be evaluated. Difficulties in applying standard economic approaches to environmental goods will be discussed, and methods of incorporating environmental considerations more effectively into economic frameworks will be reviewed. Such approaches will be illustrated through case studies. More complex reconciliations yet to be made between ecology and economy will be detailed. Further developments in environmental law and economics which may be needed to achieve ecological sustainability will be highlighted.

Assessment: three assignments 30 per cent, group project and presentation 40 per cent, two quizzes 30 per cent.

**47450****The Built Environment**

CEE

3cp; 3hpw; prerequisite: 47142 Environmental Engineering; subject coordinator: Mr K Halstead

Urbanisation as currently practised has very adverse environmental consequences. This course will take an ecological approach to evaluating the various systems which comprise the contemporary city. Effects of urbanisation on the hydrological cycle, on energy and other materials-use will be examined in terms of their environmental costs, and alternative technological or strategic approaches will be considered. The relationship between wildlife and urban development will be addressed and ways to optimise urban wildlife values are discussed. The effect of current transportation systems will be examined and alternative strategies considered. The particular environmental problems associated with the manufacturing

industry, waste disposal and development in coastal areas will be reviewed and more environmentally appropriate strategies proposed. The extent to which change towards more sustainable urban forms can be assisted by legislative and planning initiatives, for example total catchment management, will be addressed. Finally consideration will be given to the processes of political, social and institutional changes.

Assessment: three assignments 30 per cent, major report and presentation 40 per cent, two quizzes 30 per cent.

**47452****Pollution Control and Management**

CEE

3cp; 3hpw; prerequisite: 47142 Environmental Engineering; subject coordinator: A/Prof S Vigneswaran

This subject introduces students to solid and hazardous waste management, and air and noise pollution control. The first part of this subject will provide a good understanding of the management of solid and hazardous waste: quantity, quality and trends; collection, transfer and disposal; waste reduction, recycle and recovery; solid and hazardous waste management strategies in NSW. The second part of this subject will examine air and noise pollution arising from various industrial and urban sources and the control methods. Particular attention will be given to the legal framework and management strategies for air and noise pollution control.

Assessment: mid-term quiz 20 per cent, final quiz 40 per cent, four assignments 20 per cent, two laboratory assignments 20 per cent.

**47465****Environmental Hydraulics**

CEE/CE

3cp; 3hpw; prerequisite: 47145 Hydraulics; corequisite: 47155 Hydrology; subject coordinator: A/Prof G O'Loughlin

This subject extends the coverage of hydraulics in earlier subjects to the study of hydraulic aspects of environmental systems, such as water distribution networks and sewers, and water bodies receiving pollution loads. It is intended to give students a grounding in water supply and sewerage practice, and to provide a foundation for understanding receiving water models describing rivers, lakes, estuaries and aquifers.

Assessment: exercises and assignments 50 per cent, quiz and examination 50 per cent.

### 47476

#### Land Conservation

CEE

3cp; 3hpw; prerequisite: 47146 Soil Mechanics; subject coordinator: Dr P Hazelton

This course gives an overview of geotechnical aspects of environmental engineering. It concentrates on two areas of prime concern – land degradation through soil erosion and through groundwater contamination. In the soil erosion section of the course, water erosion resulting from engineering works is discussed and the methods of controlling erosion are detailed. In the groundwater contamination section, the principles of contaminant flow in soil and rock are explained and methods of numerical modelling are treated. Students are encouraged to apply the subject matter through typical design examples.

Assessment: mid-term quiz 30 per cent, final quiz 50 per cent, four assignments 20 per cent.

### 47482

#### Waste Minimisation

CEE

3cp; 3hpw; prerequisite: 47142 Environmental Engineering; subject coordinator: A/Prof S Vigneswaran

The course will stress an integrated approach to waste minimisation through the consideration of product life cycles, using clean technologies. Strategies will be presented which address waste minimisation opportunities during materials extraction and refinement, product design, manufacture, use and disposal. Methods such as waste minimisation assessment and environmental auditing will be described and existing institutional, policy and legislative frameworks for waste minimisation in Australia and abroad will be evaluated. Institutional, economic, political, technological, socio-cultural/psychological barriers to the more efficient use of the waste minimisation concept will be considered. Illustration of the issues raised will be by way of case studies.

Assessment: three assignments 20 per cent each, two quizzes 40 per cent each, major project and presentation 40 per cent.

### 47997

#### Professional Experience (Sandwich)

### 47999

#### Professional Experience (Part-time)

CE/SE/CEE

Subject coordinator: Dr G J Ring

This is the Professional Experience subject for Civil Engineering, Structural Engineering, and Civil and Environmental Engineering degrees. Enrolment in it indicates that the student is currently obtaining industrial experience. Ninety weeks of approved industrial experience must be gained prior to graduation. Students must become familiar with the Faculty's industrial experience requirements and rules which are set out on p.33 of this handbook.

### 48070

#### Engineering Materials

BT

6cp; subject coordinator: Mr 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.

Topics covered will include In Chemistry; electronic structure of the atom, periodic table, chemical bonding, states, stoichiometry, thermochemistry, aqueous solutions, metals, electrochemistry, organic chemistry. In Materials Science; 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 J Dartnall

This subject builds on students' knowledge of mathematics from their 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 the students to confidently use numerical techniques in subsequent subjects and the work environment.

Topics covered will 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 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 covered will 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 devel-

opment 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 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: Ms H 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 graphical 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 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 will also be discussed. A case study approach will be taken.

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.

**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 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: Mr D Eager

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 covered will 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 J Dartnall*

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

Topics covered will 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 Ward*

This subject provides basic knowledge of the management of maintenance in 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 covered will include an introduction to the financial considerations of asset management, such as Net Present Value and De-

preciation; 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; prerequisite: 48072 Information Technology; 48071 Numerical Methods; corequisite: 48203 Technological Change and Strategic Planning; subject coordinator: A/Prof R Spencer*

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 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 covered will 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 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.

**48301****Mechanical Services**

BT

*6cp; subject coordinator: Mr D 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 4x10 per cent; 2x15 per cent; and 1x 25 per cent.

**48302****Computer Aids for Airconditioning Design**

BT

*6cp; subject coordinator: Mr D Eager*

This subject provides an introduction to the use of micro-version software for: 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 programmes 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; corequisites: nil; subject coordinator: Mr D 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 course 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; and that they will 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 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; prerequisite: 48071 Numerical Methods; 48302 Computer Aids for Airconditioning Design; 48070 Engineering Materials; corequisites: nil; subject coordinator: Mr D 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 assignment projects 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.

**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 covered will 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 the student with skills and understanding in various aspects of flight and ground operations. This is the second subject in the Aerospace Operations subject. 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, and facilitates 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 the student with a global view of aerospace operations, and allows students 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.

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 the student with a global view of aerospace operations, and allows students 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. 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 I**

*BEBA*

*8cp; prerequisites: 99014 Language and Culture 4; 59341 Modernisation and Globalisation; 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 and 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**

*BEBA*

*24cp; prerequisite: 48501 International Practice of Engineering I; 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 field of UTS engineering studies.

### 48503

#### Review of Overseas Experience

BEBA

*3cp; 2hpw; prerequisite: 48502 International Practice of Engineering 2; coordinator: Mrs HT McGregor*

Guides students through the process of experiential learning to ensure that they achieve the maximum benefit from their international experience, and to provide opportunities for individual students 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.

Assessment: assignments 100 per cent (research papers, learning proposals, oral and written reports and career plan).

### 48504

#### Australian Engineering on the International Scene

BEBA

*3cp; 2hpw; prerequisite: 48502 International Practice of Engineering 2; coordinator: Mrs HT McGregor*

The 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.

Assessment: assignments 100 per cent (research papers, oral and written reports).

### 48505

#### Project

BEBA

*10cp; prerequisite: 48502 International Practice of Engineering 2; coordinator: Dr S Parsanejad*

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 requirement, 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.

Assessment: project report 100 per cent.

### 48997

#### Industrial Experience (Sandwich)

BEBA

Students must enrol in Industrial Experience each time they undertake a period of work experience, whether in Australia or overseas.

### 51131

#### Communications I

CE/SE/CEE

*3cp; 3hpw; subject coordinator: Ms K Fry*

The objectives are to help students understand the format, structure and conventions of technical, written and speech reporting; to apply these skills to the writing of professional papers; and to alert students to the principles of communication inherent in speech, writing, listening and reading situations.

Assessment: one essay 25 per cent, one report 25 per cent, oral report 25 per cent, quiz 25 per cent.

### 51161

#### Communications 2

CE/SE/CEE

*3cp; 3hpw; prerequisite: 51131 Communications I; subject coordinator: Ms K Fry*

The objectives are to help students nearing graduation to communicate effectively in speech and writing with the wide range of

people encountered not only in the workplace but also with those beyond the employing organisation; to emphasise to students the difficulties of communicating technical detail to those lacking in either the expertise or the 'culture of engineering'; to help students articulate in a public way the concerns and viewpoints of the engineer in society; and to strengthen and reinforce students' understanding and techniques in technical research writing and organisational reporting.

Assessment: report 25 per cent, seminar 25 per cent, class assignments 25 per cent, quiz 25 per cent.

## 52107

### History of Ideas

EE/CSE

8cp; 3hpw

*Faculty of Humanities and Social Sciences*

Designed to familiarise students with major currents in social thought in a global context, as a grounding for later years and advanced units pertinent to professional practice.

## 54230

### Aboriginal Social and Political History

6cp; 3hpw

*Faculty of Humanities and Social Sciences*

The subject is a campus-wide elective. It will examine and analyse the impact of colonialism on indigenous peoples, with particular reference to the Aboriginal inhabitants of this region. The emergence of Aboriginal social and political movements will be presented as the basis for repossession of traditional heritages in land and culture.

Assessment: participation 10 per cent, minor essay (1500 words) 30 per cent, major essay (2500 words) 60 per cent.

## 55080

### Information Issues

ET

6cp; 3hpw; prerequisite: 45125 *Engineering Discovery*

*Faculty of Humanities and Social Sciences*

The objectives of this subject are to enable the student to: develop a critical awareness of the complexity of issues surrounding information, information technology and telecommunications; and become competent in a number of skills including locating and retrieving

information existing in different media, sorting, recording, organising and presenting information to meet a number of different purposes.

## 59325

### Science Technology and Human Values

EE/CSE/ET

8cp; 3hpw

*Faculty of Humanities and Social Sciences*

Introduces students to a range of literature interpreting the sciences and technologies. Develops in students concepts of social and ethical responsibility in the practices of scientific and technological development. Enables students to develop their own perspectives on a range of issues that relate to applications of science and technology. Provides consideration of human values and social issues as they are discussed within and beyond various scientific and technological discourses.

Assessment: major project 60 per cent, scientific or technical issue review 20 per cent, participation 20 per cent.

## 59341

### Modernisation and Globalisation

BEBA

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 globalisation 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.



**65023****Engineering Chemistry***CEE/CE/SE and MEE/MSE**6cp; 6hpw; subject coordinator: Dr J Kalman*

This subject provides students with the basic knowledge of chemistry needed for understanding engineering materials and processes. It covers the following topics: mole concept, stoichiometry, structure of the atom, atomic spectra, periodic table, chemical bonding, electrochemistry and corrosion, gas laws, change of state, colloids, solution equilibria, basic organic chemistry, polymers and the structure of solids.

Assessment: laboratories 10 per cent, quizzes 30 per cent, final examination 60 per cent.

**65026****Chemistry***BT**4cp; 3hpw; subject coordinator: Dr B Young  
School of Physical Sciences, Chemistry*

Provides the basic knowledge of chemistry for understanding manufacturing processes.

Covers the following topics: electronic structure of the atom, periodic table, chemical bonding, states, stoichiometry, thermochemistry, aqueous solutions, metals, electrochemistry, organic chemistry. In covering these topics the following applications should be mentioned: water impurities, softening, seawater and desalination, cells, corrosion, combustion, oil and refined products, petrochemicals, polymers, food-simple chemistry and calorific values.

Assessment: assignments 30 per cent, examination 70 per cent.

**65071****Corrosion Technology for Engineers***MEE**4cp; 3hpw; prerequisite: 65023 Engineering Chemistry; corequisite: 67021 Materials Engineering I*

Develops a practical understanding of corrosion processes and mitigation practice.

Provides a detailed survey of the various forms of corrosion, and discusses the use of appropriate anti-corrosion techniques in terms of modern theory and practice. Some attention is given to the economics of alternative anti-corrosion methods. Lectures are complemented by extensive practical work which emphasises the applied nature of the subject.

The subject extends the prior knowledge that students have of the mechanical behaviour of metals, so that corrosion resistance also is considered an important aspect of materials selection.

Assessment: laboratory reports 30 per cent, final examination 70 per cent.

**66032****Geology for Engineers***CE/SE/CEE**3cp; 3hpw; subject coordinator: Dr S Sangameshwar*

Introduces students to the areas of classical geology – rocks and minerals; landscape forming process; elementary rock mechanics.

Assessment: classwork 50 per cent, final examination 50 per cent.

**67021****Materials Engineering I***MEE/MSE**4cp; 4hpw; prerequisite: 65023 Engineering Chemistry*

Introduces students to the relationship between structure, properties, processing and applications of real materials relevant to mechanical engineering. Gives mechanical engineering students a basis for understanding of materials properties, selection, use and durability.

Introduction to metals, ceramics, polymers, and composites used in mechanical engineering, structures, defects, phase diagrams, nucleation, diffusion, dislocations, annealing, mechanical properties, fracture, polymers, polymerisation, adhesives, corrosion, durability, basic processing methods for materials. Design and materials selection for mechanical engineers.

Assessment: laboratory 25 per cent, quizzes 25 per cent, final examination 50 per cent.

**67022****Materials Science for Engineers***CE/SE/CEE**3cp; 3hpw; corequisite: 65023 Engineering Chemistry; subject coordinator: Dr W Yeung*

This is the first of several subjects in the course which deal with the behaviour of civil engineering materials under various service conditions and loads. The subject provides the student with a basic understanding of properties of materials which is essential for their selection, design, use and durability. It

covers the fundamentals on which more advanced materials subjects as well as design subjects in later stages are built.

Assessment: assignments and laboratory reports 30 per cent, quizzes 20 per cent, final examination 50 per cent.

## 67023

### Materials Technology

EE/ET

3cp; 3hpw; prerequisite: 68031 Engineering Physics I (Electrical)

Develops the student's familiarity with commonly used electrical engineering materials to the extent that he/she would classify them in order of hardness, strength, thermal and electrical conductivity, density, dielectric constant and permeability.

Materials covered include ferrous and non-ferrous metals, plastics and ceramics. The subject includes the topics of measurement of material properties, joining techniques. General production techniques and the selection methods are covered but the emphasis is placed on the properties and selection of metals, ceramics, polymers and composites in electronic devices and instruments.

Assessment: laboratory work 20 per cent, assignment 5 per cent, quizzes 25 per cent, final examination 50 per cent.

## 67061

### Materials Engineering 2

MEE/MSE

4cp; 4hpw; prerequisites: 67021 Materials Engineering I; 46220 Solid Mechanics I; corequisite: 46820 Engineering Statistics

This is a design-oriented subject concerned with predicting material behaviour under various operating conditions. These operating conditions include the environment, the loads and the expected life. The subject uses mathematical models of material behaviour based on theoretical considerations where these are known, or on empirical relationships which have been found to work in practice. Topics include fracture mechanics, fatigue, stress relaxation, creep and creep-rupture in metals and plastics, viscoelasticity, corrosion and the behaviour of adhesives and composites.

Assessment: tutorial assignments 10 per cent, laboratory reports 15 per cent, formal examinations 75 per cent.

## 68011

### Engineering Physics (Mechanical)

MEE/MSE

4cp; 4hpw; prerequisite: 33122 Engineering Mathematics I; subject coordinator: A/Prof P F Logan

Provides the students with a good basis in thermal physics, waves and optics, electricity and magnetism, which will be developed further in later courses.

This is a foundation physics course for mechanical engineering students. It covers the fundamentals of thermal physics, wave motion including sound and light, and electricity and magnetism.

Assessment: class tests 20 per cent, laboratory reports 20 per cent, final examination 60 per cent.

## 68012

### Electrical Engineering I (Mechanical)

MEE/MSE

4cp; 4hpw; prerequisites: 68011 Engineering Physics (Mechanical); 33120 Engineering Mathematics I

Introduces the basic theory of electricity and magnetism and the theoretical and practical aspects of electrical machines. The subject includes a study of magnetic fields and the force exerted by magnetic fields on currents, magnetic fields resulting from current flow and current flow resulting from changing magnetic fields; permanent and electromagnets; magnetic materials and circuits; transients and ac circuit theory; three-phase systems; single and three-phase transformers; dc generators and motors; three-phase induction motors and synchronous motors.

Assessment: laboratory work 25 per cent, assignments 10 per cent, two class tests 20 per cent, final examination 45 per cent. To pass this subject, students must score at least 40 per cent in the final examination.

## 68021

### Engineering Physics (Civil)

CE/SE/CEE

6cp; 6hpw; corequisites: 33121 Engineering Mathematics IA; 47117 Statics; subject coordinator: A/Prof P F Logan

Forms the essential foundation for the Civil Engineering and Structural Engineering degrees. It seeks to provide the student with a good basis in dynamics, waves and optics,

thermal physics, and electricity and magnetism which will be further developed in later subjects. Students are introduced to the basic techniques of measurement.

Assessment: laboratory 17 per cent, continuous assessment 23 per cent, final examination 60 per cent.

### 68022

#### Engineering Physics (Civil) (Part-Time)

CE/SE/CEE

3cp; 3hpw; corequisites: 33121 Engineering Mathematics 1A; 47117 Statics; subject coordinator: A/Prof P F Logan

Forms the essential foundation for the Civil Engineering and Structural Engineering degrees. It seeks to provide the student with a good basis in dynamics, waves and optics, thermal physics, and electricity and magnetism which will be further developed in later subjects. Students are introduced to the basic techniques of measurement.

Assessment: laboratory 17 per cent, continuous assessment 23 per cent, final examination 60 per cent.

### 68031

#### Engineering Physics I (Electrical)

EE/CSE/ET

6cp; 6hpw; subject coordinator: A/Prof P F Logan

Students will master the fundamental concepts of static and dynamic mechanics, fluid mechanics and thermal physics and gain a deep understanding of the nature and application of the concepts of power and energy; students should be able to understand the process of scientific method, set up and conduct experiments to test hypotheses and correctly interpret results.

It is a foundation physics subject for electrical engineering students. It covers the fundamentals of dynamics and statics, fluid mechanics and thermal physics. Students are introduced to the basic techniques of measurement.

Assessment: continuous assessment 20 per cent, laboratory work 20 per cent, final examination 60 per cent.

### 68032

#### Engineering Physics 2 (Electrical)

EE/CSE/ET

3cp; 3hpw; prerequisite: 68031 Engineering Physics 1 (Electrical); subject coordinator: A/Prof P F Logan

Provides the student with a good basis in waves and optics, atomic and nuclear physics and magnetism which will be further developed in later subjects. Particular emphasis is placed on developing in students a deep understanding of wave phenomena in preparation for later subjects such as electromagnetics, field and waves, power apparatus and systems.

Assessment: continuous assessment 20 per cent, laboratory work 20 per cent, final examination 60 per cent.

### 68033

#### Engineering Physics 3 (Electrical)

EE

3cp; 3hpw; prerequisites: 68032 Engineering Physics 2 (Electrical); 67023 Materials Technology

An introduction to the properties of materials such as conductors, dielectrics and magnetic materials. Some statistical methods for analysing complex systems are presented, and the practical relevance of these to materials with engineering applications is emphasised.

Assessment: laboratory work 30 per cent, assignments 20 per cent, quiz 10 per cent, examination 40 per cent.

### 68034

#### Electrical Power Generation

EE

3cp; 3hpw; prerequisite: 68031 Engineering Physics 1 (Electrical)

This is a basic subject on energy and power for electrical engineering students. It covers the laws of thermodynamics: T-S diagrams; different thermodynamic cycles including the Otto, Diesel and steam engines; refrigeration cycles, thermal generation technology; nuclear reactors; nuclear fusion; MHD; solar energy; alternative energy including wind, hydro, waves, tidal and geothermal; the distribution and storage of energy including pumped storage and batteries; the efficient use of energy; pollution; the economics, politics and planning of energy production and use.

**79370****Law and Contracts**

BT

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

This subject provides a basic knowledge of law and contracts in the commercial engineering and technical environment. It prepares students for the procedures of operating and negotiating contractual matters as a client, consultant or contractor.

Topics covered will include an introduction to Australian law; the sources of law and systems of law; legal skills; civil wrongs and torts; an introduction to the elements of contract; engineering contracting; parties; the contract life cycle; legal aspects, and commercial and technical conditions; the administration of engineering contracts, including the tendering process, price adjustment, planning, contract organisation, application of quality assurance, safety and security; environment laws; product liability; and intellectual property.

Assessment: two assignments of 25 per cent, class participation 10 per cent, examinations 40 per cent.

**79371****Legal Issues in Telecommunications**

ET

6cp; 3hpw; prerequisite: 45661 Communication Networks  
Faculty of Law

Introduces engineering students to some of the legal issues which impact on providers of telecommunications services and products. After a brief coverage of general issues such as intellectual property, contract law and professional liability, the subject focuses on telecommunications law. The *Telecommunications Act 1992*, the *Radiocommunications Act 1992* and the *Broadcasting Services Act 1992* are each studied and the implications of the regulatory framework on business activity in telecommunications products and services are investigated.

Assessment: assignments 60 per cent, take-home examination 40 per cent.

**91379****Environmental Science for Engineers**

MEE

4cp; 3hpw

Provides a sound introduction to the principles and concepts of environmental science, so that students may gain an understanding of ecosystem dynamics, the human-induced disturbances to which such systems are subject, and approaches aimed at avoidance and remediation of damage caused to ecosystem and global balance.

Assessment: one seminar or poster presentation 30 per cent, one assignment desk study 30 per cent, final examination 40 per cent.

**91650****Introduction to Environmental Biology**

CEE

3cp; 3hpw

Faculty of Science

The aim of the subject is to provide a sound introduction to the principles and concepts of environmental science, so that students may gain an understanding of ecosystem dynamics, the human-induced disturbances to which such systems are subject, and approaches aimed at avoidance and remediation of damage caused both at the local ecosystem, and at the global, level.

Assessment: one seminar or poster presentation 20 per cent, one assignment–desk study 30 per cent, final examination 50 per cent.

**91651****Environmental Microbiology for Engineers**

CEE

3cp; 3hpw; prerequisite: 91650 Introduction to Environmental Biology  
Faculty of Science

This subject introduces students to the nature of biological organisms classified as microorganisms and the significance of microbial activities for engineering considerations involving environmental impacts. The course will provide an overview of the growth characteristics of microorganisms and the environmental factors which influence microbial growth. This introduction will be developed into an appreciation of microbial activities: in decomposition processes; in the transformations of elements in biogeochemical cycles; and as potential pathogens

in waters and groundwaters. The impact of microbial activities on wastewater treatment strategies and the stability of construction materials and in public health engineering, and their potential use in bio-remediation and bio-reclamation, will be discussed.

Assessment: three assignment 20 per cent, mid-term and final quizzes 50 per cent, major group projects and presentation 30 per cent.

### 97xxxx

#### **International Studies: Language and Culture 1**

#### **International Studies: Language and Culture 2**

#### **International Studies: Language and Culture 3**

#### **International Studies: Language and Culture 4**

##### **BEBA**

*8cp; 6hpw; prerequisite: language proficiency and placement test; coordinated by the UTS Institute for International Studies*

A sequence of four Language and Culture subjects designed to prepare UTS students for living in their culture or society of specialisation during their period of in-country study. In practical terms, students cannot usually acquire a high degree of competence after studying a language part time for only two years in a Sydney classroom and living in a country for an academic year.

Students who begin learning a language after entry to the International Studies program can expect to learn language survival skills for their period of in-country study, and to lay a strong foundation for further language acquisition after graduation. Students with competence in or exposure to a language other than English before entry to UTS are also encouraged to follow the International Studies program. However, to meet their needs, each Language and Culture program may have a number of levels of entry.

Students will be expected to improve their language skills in speaking, comprehension, reading and writing. In exceptional circumstances, students with an advanced working competence in a language may be exempted from further language study but required to substitute alternative units of instruction. Further details are available from the Institute for International Studies.

Assessment: may be based on a variety of tests including oral and written examinations,

language competency tests, and practical applications.

- 971111 Chinese Language and Culture 1
- 972111 Chinese Language and Culture 2
- 973111 Chinese Language and Culture 3
- 974111 Chinese Language and Culture 4
- 971414/5 French 1
- 972414/5 French 2
- 973414/5 French 3
- 974414/5 French 4
- 971311 Indonesian Language and Culture 1
- 972311 Indonesian Language and Culture 2
- 973311 Indonesian Language and Culture 3
- 974311 Indonesian Language and Culture 4
- 971211 Japanese Language and Culture 1
- 972211 Japanese Language and Culture 2
- 973211 Japanese Language and Culture 3
- 974211 Japanese Language and Culture 4
- 971101 Modern Standard Chinese Language and Culture 1
- 972101 Modern Standard Chinese Language and Culture 2
- 973101 Modern Standard Chinese Language and Culture 3
- 974101 Modern Standard Chinese Language and Culture 4
- 971320 Spanish Language and Culture 1
- 972320 Spanish Language and Culture 2
- 973320 Spanish Language and Culture 3
- 974320 Spanish Language and Culture 4
- 971320 Thai 1
- 972320 Thai 2
- 973320 Thai 3
- 974320 Thai 4

### 976xxx

#### **International Studies: Contemporary Society 2**

##### **BEBA**

*8cp; 3-4hpw; coordinated by the UTS Institute for International Studies*

A detailed and specific introduction that attempts to identify not only the structure of the politics, society and economy in the country of specialisation, but also their more dynamic aspects. No previous knowledge of the culture or language of major is required, and all teaching will be conducted in English. These Contemporary Society units are offered in collaboration with the Faculty of Humanities and Social Sciences.

- 976101 Chinese East Asia
- 976111 Contemporary China
- 976211 Contemporary Japan
- 976501 Contemporary Latin America
- 976301 Contemporary South-East Asia
- 976401 Contemporary Europe

## POSTGRADUATE COURSES

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, followed by 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.

Specialist (specific award) courses are identified below as follows:

Master of Engineering Management	MEM
Master of Engineering in Telecommunications Engineering	ME(TE)
Master of Engineering in Groundwater Management	ME(GWM)
Master of Local Government Management	MLGM
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)

### 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 – FT)**

**42777**

**ME Thesis (Mechanical – F/T)**

**42778**

**ME Thesis (Mechanical – P/T)**

**42987**

**PhD Thesis (Mechanical – P/T)**

**42988**

**PhD Thesis (Mechanical – FT)**

**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.

## SUBJECTS TAUGHT IN THE FACULTY OF ENGINEERING

**44152**

**Groundwater Engineering Project (F/T)**

**44153**

**Groundwater Engineering Project (F/T)**

**44156**

**Groundwater Engineering Project (P/T)**

*Availability: ME(GWM) only; 24cp*

**44157**

**Groundwater Engineering Project (P/T)**

*Availability: GDE(GWM) only; 12cp; subject coordinator: Prof M J Knight, National Centre for Groundwater Management*

**49001**

**Judgment and Decision Making**

*Availability: all courses (core for MEM); 6cp; 3hpw; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinator: A/Prof J V Parkin, Graduate School of Engineering*

This subject presents a critique 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 reasoning, argument construction, persuasion and negotiation. Real decision behaviour is discussed using sociological and behavioural models of decisions in bureaucracies and firms.

Assessment: two assignments 25 per cent each; two quizzes 25 per cent each.

**49002**

**Project Management**

*Availability: all courses (core for MEM); 6cp; 3hpw; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinator: Mr D Eager, Mechanical Engineering*

The emphasis will be 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 principals, contractors and sub-contractors will be 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; block release or 3hpw; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinator: Dr D Sharma, Graduate School of Engineering*

This subject deals with the effect of economics on activities and management in two ways, aiming: to provide an understanding of the economic forces that shape the environment of engineering activities; to provide engineering managers with economics-related techniques of decision making and management.

Main topics: macroeconomic issues and policies; microeconomic market theory; theory of the firm; project evaluation and cost-benefit analysis; intangibles and risk; an introduction to operations research and systems engineering, finance and project accounting, project management.

Assessment: four assignments 30 per cent, two seminars 30 per cent, final examination 40 per cent.

**49004**

**Systems Engineering for Managers**

*Availability: all courses (core for MEM); 6cp; 3hpw; prerequisite: Judgment and Decision Making, or equivalent, in addition to a completed first degree in Engineering or a cognate discipline; corequisite: 49002 Project Management; subject coordinator: Prof W R Belcher, Graduate School of Engineering*

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 encounters 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 (core for MEM); 6cp; normally block release; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinator: Dr R Ward, Mechanical Engineering*

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 Irish, Civil Engineering*

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 Johnston, Mechanical Engineering*

The 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 Johnston, Mechanical Engineering*

The 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 Johnston, Mechanical Engineering*

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.

**49021****Evaluation of Energy Investments**

*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; corequisite: 49023 Energy and Environmental Economics (recommended); subject coordinator: Dr D Sharma, Graduate School of Engineering*

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, quiz 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); 3cp; block attendance; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinator: Dr D Sharma, Graduate School of Engineering*

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, examinations 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 Energy Investments; subject coordinator: Dr D Sharma, Graduate School of Engineering*

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, Graduate School of Engineering*

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 Analysis

*Availability: limited (core in Energy Planning and Policy programs for ME, MTech); 3cp; 3hpw; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinator: Dr D Sharma, Graduate School of Engineering*

Probability concepts; sampling and estimation; regression analysis; statistical tests; analysis of variance; simultaneous equations; time series methods; econometric models and applications; introduction to statistical packages.

Assessment: assignments 60 per cent, examinations 40 per cent.

## 49026

### Electricity Sector Planning

*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, Graduate School of Engineering*

Topics include the nature of electricity planning; planning perspectives; 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, Graduate School of Engineering*

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, examinations 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, Graduate School of Engineering*

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, examinations 60 per cent.

## 49029

### Environmental 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, Graduate School of Engineering*

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, examinations 60 per cent.

### 49031

#### **Information Structures, Perception and User Interface Design**

*Availability: all courses; 6cp; 3hpw or block attendance; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinator: A/Prof A Ginige, Electrical Engineering*

This subject will look at how authors will create information and how users will 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, Electrical Engineering*

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 coordinators: Dr G Hong, Mr J McCaffrey, Mechanical Engineering*

The 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 the 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 2 or more semesters; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinators: Prof W R Belcher, A/Prof B Samali, Graduate School of Engineering*

The 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: 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; prerequisite: enrolment in a UTS research or coursework program at Master's or Doctoral level; subject coordinators: Prof W R Belcher, A/Prof B Samali, Graduate School of Engineering*

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

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

Assessment: 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; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinator: Mrs H McGregor, Mechanical Engineering*

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; prerequisite: postgraduate enrolment in a Faculty of Law research or coursework program; subject coordinator: Prof W R Belcher, Graduate School of Engineering*

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; prerequisite: 46240 Solid Mechanics 3, or 47151 Structural Analysis 2 or equivalent; subject coordinators: Mr R Wiltshire, Mechanical Engineering and Dr A Saleh, Civil Engineering*

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 nonlinearity; 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.

**49052–49076****Graduate Project<sup>1</sup>**

*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 coordinator: A/ Prof R M Spencer, Graduate School of Engineering*

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 an 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: based on the preparation of a written report and a seminar presentation.

<sup>1</sup> Graduate Project

49052	Graduate Project (18cp in 1 semester)
49053	Graduate Project (19cp in 1 semester)
49054	Graduate Project (20cp in 1 semester)
49055	Graduate Project (21cp in 1 semester)
49056	Graduate Project (22cp in 1 semester)
49057	Graduate Project (23cp in 1 semester)
49058	Graduate Project (24cp in 1 semester)
49060	Graduate Project (18cp in 2 semesters)
49061	Graduate Project (19cp in 2 semesters)
49062	Graduate Project (20cp in 2 semesters)
49063	Graduate Project (21cp in 2 semesters)
49064	Graduate Project (22cp in 2 semesters)
49065	Graduate Project (23cp in 2 semesters)
49066	Graduate Project (24cp in 2 semesters)
49070	Graduate Project (18cp in 3 semesters)
49071	Graduate Project (19cp in 3 semesters)
49072	Graduate Project (20cp in 3 semesters)
49073	Graduate Project (21cp in 3 semesters)
49074	Graduate Project (22cp in 3 semesters)
49075	Graduate Project (23cp in 3 semesters)
49076	Graduate Project (24cp in 3 semesters)

**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, Graduate School of Engineering*

This subject offers students maximum educational opportunity to benefit from short courses and other learning experiences available through the Faculty of Engineering. Enrolment for credit is approved by the Head of the Graduate School, on the recommendation of the relevant Program Director, for a program of study to be undertaken and assessed within a prescribed period. Approval requires demonstration by the candidate to the Program Director of a special learning need or development opportunity consistent with the other requirements of the candidate's program.

Assessment: individual assessment requirements are agreed in a learning contract according to each individual program of study being undertaken. Normally assessment includes written and oral components and the demonstration of enhanced engineering capability in the application of principles.

49082	Special Course A	2cp
49083	Special Course A	3cp
49084	Special Course A	4cp
49086	Special Course A	6cp
49092	Special Course B	2cp
49093	Special Course B	3cp
49094	Special Course B	4cp
49096	Special Course B	6cp

**49102****Traffic and Transportation**

*Availability: all courses; 6cp; block release totalling 36hrs; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinator: Mr P Kenny, Civil Engineering*

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 AUSTRROADS.

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 totalling 36hrs; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinator: Mr C Holmes, Civil Engineering*

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.

Topics 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, classwork 10 per cent.

### 49104

#### Asset Maintenance Management

*Availability: all courses (core for GD(LGE)); 6cp; block release totalling 36hrs; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinator: Mr W Neville, Civil Engineering*

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 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 totalling 36hrs; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinator: Prof S Vigneswaran, Civil Engineering*

The objective of this subject is to concentrate on the design, operation and maintenance of municipal wastewater treatment plants, sewerage 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; and trouble-shooting and problem solving.

Assessment: two assignments 30 per cent, mid-semester examination 25 per cent, formal final examination 45 per cent.

### 49106

#### Road Engineering Practice

*Availability: all courses (core for GD(LGE)); 6cp; block release totalling 36hrs; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinator: Mr P Kenny, Civil Engineering*

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, AUSTRROADS 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 totalling 36hrs; prerequisite: nil, though some previous experience in hydraulics and hydrology is assumed; subject coordinator: A/Prof G O'Loughlin, Civil Engineering*

This subject aims to: refresh students in basic principles and methods of hydraulics and hydrology; familiarise students with methods of urban drainage set out in recent manuals, with an emphasis on flood protection and integration with stormwater quality enhancement; and provide an overview of rural design flood estimation, erosion protection, flood mitigation and coastal engineering.

Assessment: five assignments 50 per cent, final examination 50 per cent.

**49108****Local Government Law**

*Availability: all courses (core for GD(LGE)); 6cp; block release totalling 36hrs; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinator: Mr K Halstead, Civil Engineering*

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 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 O'Loughlin, Civil Engineering*

This subject deals with engineering design and coastal structures, with particular reference to the natural behaviour of water waves and their

interactions with the coastline. Topics covered include wave generation processes and wave forecasting methods; linear and nonlinear wave theories and their limits of validity; wave characteristics in deep intermediate and shallow water depths; wave shoaling and breaking; wave refraction and diffraction; wave scattering and radiation; full and partial standing waves; field measurements and statistical analysis of random waves; estimation of extreme waves; tides and other long-period water level fluctuations; estuarine hydraulics; coastal sedimentation; coastline management; 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 three sessions of 1.5 days each; prerequisite: 47155 Hydrology or equivalent, as part of a completed first or higher degree in Engineering or a cognate discipline; subject coordinator: A/Prof G O'Loughlin, Civil Engineering*

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) they 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 1.5 days with optional tutorials; prerequisites: 47155 Hydrology; 47152 Public Health Engineering, or equivalent; subject coordinator: A/Prof G O'Loughlin, Civil Engineering*

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, they 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 30hrs; 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 Irish, Civil Engineering*

This subject provides students with: experience in a field of hydrology; the confidence to use a range of statistical tools; and 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, end-of-semester examination 40 per cent.

#### 49121

##### Environmental Assessment and Planning

*Availability: all courses (core for GC(EEM)); 6cp; 3hpw; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinators: Mr K Halstead, Civil Engineering, and Dr J Broadbent, Faculty of Design, Architecture and Building*

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

##### Environmental Engineering and Management Practices

*Availability: all courses (core for GC(EEM)); 6cp; 3hpw; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinators: Prof S Vigneswaran, Civil Engineering and Dr M Dawson, Faculty of Science*

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

##### Industrial Waste Minimisation

*Availability: all courses (core for GC(EEM)); 6cp; 3hpw; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinators: Prof S Vigneswaran, Civil Engineering and Dr J Broadbent, Faculty of Design, Architecture and Building*

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; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinator: A/Prof G O'Loughlin, Civil Engineering*

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 2 days; prerequisites: a completed first degree in Engineering or cognate discipline (Natural Resources, Agriculture, Science, Law) and 2 years of related work experience; subject coordinator: Mr J Irish, Civil Engineering*

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, are developed.

Topics include semantics of risk and hazard; risk as a social construct; principles of risk management; steps in risk engineering; risk perception, risk communication, and acceptability of risks; statutory provisions in NSW relating to environmental risks; legal principles relating to environmental risks (liability etc.); checklists and scoping for impact assessment and auditing; risks to health and to ecosystems; comparing risks; quantified and qualitative risk assessment methods; discussion of some specific environmental hazards in the context of risk amelioration; risk assessment in emergencies; financial tools in the management of environmental risks; environmental auditing procedures.

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

#### 49126

##### **Land Resource and Environmental Management**

*Availability: all courses; 6cp; 3hpw or block release; prerequisite: 47142 Environmental Engineering, or equivalent; subject coordinator: Dr P Hazelton, Civil Engineering*

This subject introduces students to basic concepts and principles of land resource planning and environmental management. On completion the student should be able to interpret and evaluate physical limitations and their effects on urban planning and development. The various stages of management of land with special problems, such as contaminated land, effluent and sludge disposal sites and recreational and open space should be clearly understood.

Assessment: three assignments 50 per cent, two quizzes 50 per cent.

#### 49131

##### **Medium Span Bridges**

*Availability: all courses; 6cp; 3hpw; prerequisite: a completed first or higher degree in Engineering or a cognate discipline with strong background in the design of civil engineering structures; subject coordinator: Prof S Bakoss, Civil Engineering*

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, two quizzes 35 per cent.

### 49132

#### Stability of Structures

*Availability: all courses; 6cp; 3hpw; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinator: Dr A Saleh, Civil Engineering*

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, Civil Engineering*

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, Civil Engineering*

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; an 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, Civil Engineering*

Introduces basic concepts and fundamental principles in wind engineering and their application to structural design and analysis of structures, such as buildings, towers, chimneystacks 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 Bakoss, Civil Engineering*

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), multistorey 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; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinator: Dr G Ring, Civil Engineering*

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 nonlinear 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 Hausman, Civil Engineering*

The subject provides practical guidelines and methods of analysis for improving the engin-

earing 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, Civil Engineering*

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 an 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 S Ravindrarajah, Dr HW Chung, Civil Engineering*

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; damage 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: Prof K W Yates, Electrical Engineering*

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; prerequisite: 45661 Computer Networks or equivalent; subject coordinator: A/Prof A Seneviratne, Electrical Engineering*

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: Prof K W Yates, Electrical Engineering*

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: A/Prof T Buczkowska, Electrical Engineering*

The subject exposes students to theoretical and practical aspects of modern communication network design, including teletraffic engineering and network performance modelling. The course offers 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 by 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; prerequisite: 49203 Telecommunications Signal Processing, or equivalent; subject coordinator: A/Prof S Reisenfeld, Electrical Engineering*

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. 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 Electromagnetic Compatibility**

*Availability: all courses; 6cp; 3hpw; prerequisite: 45264 Fields and Waves, or equivalent, as part of a completed first or higher degree in Electrical Engineering or a cognate discipline; subject coordinator: Dr A Sanagavarapu, Electrical Engineering*

Compliance with electromagnetic compatibility regulation is becoming mandatory for engineering products. This course provides an understanding of the underlying concepts of analysis, modelling and design for achieving electromagnetic compatibility.

Assessment: continuous assessment of a variety of assignments negotiated by the student with the subject 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 Sanagavarapu, Electrical Engineering*

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 subject coordinator.

#### 49208

##### **Telecommunications Management**

*Availability: all courses; 6cp; 3hpw or full-day block modes; prerequisite: 45145 Engineering Statistics, or equivalent; subject coordinator: A/Prof T Buczkowska, Electrical Engineering*

The subject provides an integrated technology management perspective on communications infrastructure and services and the changing telecommunications and information techno-

logy 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 examination 30 per cent.

#### 49211

##### **Software Engineering Principles**

*Availability: all courses (core for UTS–Thomson SEP Graduate Certificate); 6cp; block release; prerequisites: a completed first or higher degree in Engineering or a cognate discipline, and some programming experience, ideally in industry; subject coordinator: Mr J Leaney, Electrical Engineering*

This subject develops understanding of the field of software engineering including software engineering process, techniques, and application. Topics include software systems, software quality, the software development process, process models (waterfall and its variants, prototyping, exploratory programming, formal transformations etc.), development paradigms (functional, structured, logic, object-oriented), development methodologies, and software project management.

Assessment: classwork, assignments, essay, examinations 50 per cent, major project (industry involvement where possible) 50 per cent.

#### 49212

##### **Object-oriented Languages**

*Availability: all courses (core for UTS–Thomson SEP Graduate Certificate); 6cp; block release; prerequisite: 49211 Software Engineering Principles, or equivalent; subject coordinator: Mr J Leaney, Electrical Engineering*

This subject aims to improve student understanding of object-oriented software development – a relatively new approach to software development promising enhanced

productivity, software reuse and software maintainability. The subject assists students to understand the implications of this new software paradigm, and develops an ability to utilise this understanding in engineering applications. Topics include the OO paradigm, OO analysis and design, comparison of methodologies and languages, evaluation of OO tools and OO development environments.

Assessment: 50 per cent major development project, 50 per cent learning contract.

### 49213

#### Human–Machine Interfaces and Software Implementation

*Availability: all courses; 6cp; regular, twice-weekly evening sessions for half the semester with lectures, laboratory work, tutorials, and industrially oriented project work; prerequisites: 49211 Software Engineering Principles; 49212 Object-oriented Languages; 49214 UNIX and C; subject coordinator: Mr J Leaney, Electrical Engineering*

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 UTS–Thomson SEP Graduate Certificate); 6cp; 3hpw or block release; prerequisite: 45123 Software Development 1 or equivalent; subject coordinator: Mr M Sifer, Electrical Engineering*

This subject assists engineers to become competent in constructing C programs which use a range of UNIX features, building on assumed programming experience in another language. It covers the concepts behind the UNIX operating system which facilitate the close integration of processes and files, the UNIX shell and selected utilities and the C programming language.

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 UTS–Thomson SEP Graduate Certificate); 6cp; 3hpw or block release; prerequisite: 49211 Software Engineering Principles, or equivalent; subject coordinator: Mr J Leaney, Electrical Engineering*

This subject aims to provide an understanding of the meaning, role and usage of verification and validation in the software development process. The subject covers all aspects of software verification and validation. This includes unit testing, integration testing, system testing, acceptance testing, development of test plans. The subject details development of testing, testing techniques, testing documentation, use of testing tools etc.

Assessment: classwork, assignments and examinations 50 per cent, major project (industry involvement where possible) 50 per cent.

### 49225

#### Software Project Management

*Availability: all courses (core for UTS–Thomson SEP Graduate Certificate); 6cp; 3hpw or block release, or part-time; prerequisite: 49211 Software Engineering Principles, or equivalent; subject coordinator: Mr J Leaney, Electrical Engineering*

This subject aims to develop understanding of the general issues in project management, and, in particular, the peculiarities of software project management. Material covered includes productivity, software metrics, project planning and software project estimating. Prior knowledge of general project management is desirable but not essential.

Assessment: classwork, a learning contract and a major project 80 per cent and an examination 20 per cent.

### 49233

#### Software Requirements Specification

*Availability: all courses (core for UTS–Thomson SEP Master's degree); 9cp; block release; subject coordinator: Mr J Leaney, Electrical Engineering*

This subject aims to develop specific skills for analysing, specifying, designing and testing of real-time software systems. It covers major aspects of requirements capture and analysis, software specification (using StP in the context

of the Software Development Reference System), software design (first introducing SASD and then focusing on object-oriented design of real-time systems) and software verification techniques. The subject has a strong practical focus reinforcing process concepts through experience with methods and tools relevant to industry.

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: joint UTS–Thomson Software Engineering Program only; 9cp; block release; subject coordinator: Mr J Leaney, Electrical Engineering*

This subject develops ability at project level to determine and apply an appropriate software development process. The subject covers general project management (including such issues as resourcing and scheduling), the development of project management plans, quality assurance and software quality project plans, configuration management and the use of appropriate tools (such as SPMS+), and general software verification and validation. The subject has a strong practical focus, and provides experience with the production of appropriate documentation through group and project work.

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

### 49235

#### Real-time Operating Systems

*Availability: joint UTS–Thomson Software Engineering Program only; 6cp; block release; subject coordinator: Mr J Leaney, Electrical Engineering*

This subject has dual aims, developing the following:

1. Skills in languages appropriate to real-time software systems. The subject covers object-oriented software development using the C++ language (including a coverage of the OO methodology, tools,

processes and implementation issues), software development using the Ada language (focusing on those aspects specific to developing real-time software), and real-time UNIX systems, using POSIX to illustrate various concepts.

2. Understanding of the use of real-time software engineering in specific application domains. The subject shows how software engineering can be used to facilitate the development of high-quality applications in these domains, viz databases (database models, data handling languages, database security and integrity) and telecommunications systems (transmission types and media, networks, applications).

Assessment: C++ development learning contract 25 per cent, real-time Ada learning contract 25 per cent, real-time UNIX learning contract 25 per cent, application learning contract 25 per cent.

### 49236

#### Software Development Project

*Availability: joint UTS–Thomson Software Engineering Program only; 6cp; block release; subject coordinator: Mr J Leaney, Electrical Engineering*

The major goal of this subject is to promote the development of the student's 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 provide experience of aspects of teamwork and its implications. The project involves students working together in groups of four (in varying roles) during the complete development of a software system. The project is defined in such a way that cost is not critical but deadlines are 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.

**49241****Hypermedia Technologies**

*Availability: all courses; 6cp; 3hpw or block release; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinator: A/Prof A Ginige, Electrical Engineering*

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 Lowe, Electrical Engineering*

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****Design 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, Electrical Engineering*

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; prerequisite: 45562 Data Acquisition and Distribution Systems, or equivalent; subject coordinator: A/Prof H Nguyen, Electrical Engineering*

This subject covers general concepts applicable to the design of all medical instrumentation systems, the measurement of bio-potentials and critical-care analytes for diagnostic purposes, and the design of bio-medical devices for therapeutic purposes. The subject includes three modules covering sensors and amplifiers, vital sign monitoring for diagnostic purposes, and physiological intervention/closed-loop control.

Assessment: assignments 25 per cent, project work and seminar 50 per cent (includes 20 per cent for seminar), final examination 25 per cent.

**49271****Computer Architecture**

*Availability: all courses; 6cp; 3hpw; prerequisite: 45143 Computer Hardware, or equivalent; subject coordinator: Mr N J Carmody, Electrical Engineering*

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



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

#### 49272

##### **Adaptive and Multivariable Control**

*Availability: all courses; 6cp; 3hpw; prerequisite: 45581 Analogue and Digital Control, or equivalent; subject coordinator: Dr J G Nicol, Electrical Engineering*

This subject covers advanced techniques for modelling, analysis and design of systems suited to multivariable, adaptive or optimal control. Laboratory projects are conducted on a continuous basis throughout the semester. Topics include direct and inverse Nyquist arrays, characteristic locus, robust control, pole shifting techniques, identification algorithms, minimum variance control, self-tuning adaptive regulator, linear quadratic regulator design, state estimation and the Kalman filter.

Assessment: laboratory work including two seminar presentations 50 per cent, three out of four assignments 50 per cent.

#### 49273

##### **Random Signal Theory**

*Availability: all courses; 6cp; 3hpw; prerequisite: 45145 Engineering Statistics, or equivalent; subject coordinator: A/Prof S Reisenfeld, Electrical Engineering*

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, Electrical Engineering*

This subject covers advanced topics in robotics and robot programming, including mechanical manipulation using robots, actuation, sensing and vision systems, and robotic applications.

Upon completion of the course, the student is expected to be competent to program and control robots with up to six degrees of freedom. In addition, the student is expected to have sufficient understanding to build robots with two-dimensional (terrestrial) and three-dimensional (aquatic) motions using advanced techniques such as subsumption architecture and artificial intelligence.

Assessment: assignments 30 per cent, laboratories and quizzes 10 per cent, final examination 60 per cent.

#### 49275

##### **Neural Networks and Fuzzy Logic**

*Availability: all courses; 6cp; 3hpw; prerequisite: 45581 Analogue and Digital Control, or equivalent; subject coordinator: A/Prof H Nguyen, Electrical Engineering*

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, final examination 25 per cent.

#### 49276

##### **Sliding Mode Control**

*Availability: all courses; 6cp; 3hpw or block release; prerequisite: 45581 Analogue and Digital Control, or equivalent; subject coordinator: A/Prof HT Nguyen, Electrical Engineering*

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 the 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.

**49308****Rapid Response Manufacturing**

*Availability: all courses; 6cp; 3hpw or block mode; prerequisite: 46710 Materials Processing, or equivalent; subject coordinator: A/Prof R M Spencer, Mechanical Engineering*

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 or block mode; prerequisite: 46820 Engineering Statistics, or equivalent; subject coordinator: A/Prof R M Spencer, Mechanical Engineering*

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 quality assurance practices manuals 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, Mechanical Engineering*

This subject develops concepts and methods for dealing with some advanced topics in heat transfer. These include boiling, natural convection and radiation. Numerical simulation and practical laboratory experiments are important components of the course.

Assessment: assignments, projects and/or an examination.

**49312****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 Mack, Mechanical Engineering*

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 D Eager, Faculty of Engineering*

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 coordinator: Mr T Brown, Mechanical Engineering*

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****Product Design for Marketing and Manufacture**

*Availability: all courses; 6cp; 3hpw or block release; prerequisite: 46710 Materials Processing, or equivalent; subject coordinator: A/Prof R M Spencer, Mechanical Engineering*

The subject is structured around three modules: Marketing, Development, 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 per cent. Depending on project results, an optional summative test is available for module integration and grade clarification.

**49377****Process Control Studies**

*Availability: all courses; 6cp; 3hpw or block release; prerequisite: 46531 Control Engineering 1, or equivalent; subject coordinator: Mr K Stillman, Mechanical Engineering*

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; prerequisite: 46830 Numerical Analysis, or equivalent; subject coordinator: Mr K Stillman, Mechanical Engineering*

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 examination 30 per cent.

**49451****Environment of Professions in Local Government**

*Availability: all courses (core for MLGM); 6cp; block release totalling 36 hrs; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; subject coordinator: A/Prof JV Parkin, Graduate School of Engineering*

This subject establishes an understanding of cross-disciplinary competencies available in the professions working in local government. This provides a foundation for exploring management applications in later subjects.

Assessment: essay 40 per cent, class presentation 15 per cent, professional analysis 30 per cent, debate 15 per cent.

#### 49452

##### **Environmental Management**

*Availability: all courses (core for MLGM); 6cp; block release totalling 36hrs; prerequisite: 49451 Environment of Professions in Local Government, or equivalent; subject coordinator: A/Prof J V Parkin, Graduate School of Engineering*

This subject examines current environmental issues and their implications at the local level. Global, national and local policy approaches are evaluated as a basis for developing local government multidisciplinary management approaches.

Assessment: three assignments 25 per cent each, case studies 15 per cent, debate 10 per cent.

#### 49453

##### **Infrastructure Management**

*Availability: all courses; 6cp; block release totalling 36hrs; prerequisite: 21731 Resource Management, or equivalent; subject coordinator: Mr K Halstead, Civil Engineering*

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.

#### 49454

##### **Managing Local Enterprise**

*Availability: all courses (core for MLGM); 6cp; block release totalling 36hrs; prerequisites: 21729 Human Resource Management (Public); 49453 Infrastructure Management, or equivalents; subject coordinator: A/Prof K Sproats, Centre for Local Government Education and Research*

This subject, together with 21758 Strategic Management (Public), forms the capstone of the course. Students prepare a management plan for a selected local development issue (such as unemployment or environmental degradation). The emphasis is on issues in a Council's external environment.

Assessment: essay 20 per cent, presentation of case study 30 per cent, local enterprise management plan 50 per cent.

#### 49550

##### **Computing for Groundwater Specialists (non credit)**

*Availability: ME(GWM), GDE(GWM) only; (no cp); block release totalling 24hrs; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; 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 36hrs; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; 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 totalling 36hrs; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; 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 Fortran programming,

mainframes, microcomputer operation systems, databases, spreadsheets, word processing, elements of geostatistics and graphical packages with applications related to groundwater processes, and groundwater computing projects will be covered.

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; prerequisite: a completed first or higher degree in Engineering or a cognate discipline; 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.

## SUBJECTS TAUGHT IN THE FACULTY OF BUSINESS

### 21718

#### Organisation Analysis and Design

*Availability: MEM core subject; 6cp; 3hpw; subject coordinator: A/Prof I Palmer, Faculty of Business*

The central concern of this subject is to develop skills in organisational analysis and on the basis of this to develop diagnostic and prescriptive skills in regard to organisations. The content focuses on the description and analysis of organisations as formal structures, political systems and cultural entities.

### 21720

#### Employment Relations

*Availability: MEM elective subject; 6cp; 3hpw; subject coordinator: Ms K Spooner, Faculty of Business*

An introduction to the areas of industrial relations and human resource management. The historical steps in the development of the human resource function and the forces which have shaped its development are examined. The major functions of employment relations managers are explored, as well as the relationship between the human resource and the industrial relations functions in the modern organisation. The nature of industrial relations and the various theoretical approaches to the subject are examined. A study is made of the nature of industrial conflict and the contribution to understanding made by several conflict theorists. The structure and functioning of the formal industrial tribunal systems in Australia are examined, as well as the form and function of the employer and employee organisations party to employment relations. The nature and impact of efficiency restructuring and enterprise bargaining upon the management of employment relations are also examined.

### 21728

#### Public Sector Management

*Availability: MLGM core subject, MEM elective; 6cp; 3hpw; subject coordinator: Ms J Johnston, Faculty of Business*

Provides a broad conceptual framework for studying approaches to public sector management for any of the three levels of government

in Australia. The move by governments away from the traditional public administration model towards a corporate management model for the public sector model presents many issues and dilemmas for managers. Students will explore, discuss and debate these issues through readings of contemporary literature and class presentations. Topic areas include catalysts for reform; mandates for change; resource management; commercialisation; corporatisation; privatisation; strategic management; performance management; marketing; project management and implementation; performance monitoring; accountability and evaluation; leadership, values and ethics; public service; and the future.

### 21729

#### **Human Resource Management (Public)**

*Availability: MLGM core subject; 6cp; 3hpw; subject coordinator: Mr R Van Munster, Faculty of Business*

In this subject students examine the management and development of an organisation's most valuable resource, its staff. Human resource management is treated as primarily a line management function with specialist personnel staff acting in an advisory and support capacity. The subject deals, in the first instance, with the people aspect of management in terms of recruitment, selection and development of staff motivation and leadership. This is followed by a critical examination of HRM at the organisation level focusing especially on the strategic importance of the HRM function. Finally, current policies, practices and developments are examined in the context of the political, legislative and industrial relations framework of the public sector.

### 21731

#### **Resource Management**

*Availability: MLGM core subject; 6cp; 3hpw; subject coordinator: Mr R Van Munster, Faculty of Business*

Students develop practical management skills, from accounting and finance in: budget and cash management; cost control through variance analysis; cost minimisation through internal audit; cost-volume-profit analysis; financial statement analysis as applied to specialist settings in the public sector. Topics include current issues and implications for public and community managers from current

legislation; management accounting; financial accounting; finance; and application of above to specialist settings.

### 21741

#### **Operations Management**

*Availability: MEM elective subject; 6cp; 3hpw; subject coordinator: Mr D Davis, Faculty of Business*

An introduction to the management of operations. Topics include techniques for improving information and process flows; service operations; planning, scheduling and controlling production; materials management (including just-in-time philosophies, materials requirement planning); total quality management; benchmarking for best practice; process re-engineering; and manufacturing and service operations strategy.

### 21758

#### **Strategic Management (Public)**

*Availability: MLGM core subject; 6cp; 3hpw; prerequisite: completion of all subjects other than 49454 Managing Local Enterprise; subject coordinator: Ms J Johnston, Faculty of Business*

Provides a comprehensive understanding of strategic management as it applies to the public sector. As a private sector technique, strategic management has been adopted by the public sector to enhance efficiency, effectiveness and economy of the public sector at a time of diminishing resources. Students will examine the normative model of strategic management which involves the development of a corporate mission, vision, outcomes, strategies and performance indicators. The less formal aspects which relate to power, behavioural and intuitive aspects of strategic decision making will be considered. The impact of the political environment on strategic management practices will also be explored. Students will work within the theoretical and conceptual frameworks of strategic management to critically assess contemporary strategic management practices in the public sector using corporate plans and case study material.

**21779****Management Skills**

*Availability: MEM elective subject; 6cp; 3hpw; prerequisite: 21718 Organisation Analysis and Design; subject coordinator: Ms J Johnston, Faculty of Business*

This subject deals experientially with the interpersonal skills needed by managers to lead teams successfully. It takes the individual's awareness of his/her skills and interpersonal style as its starting point and goes on to examine basic communication skills such as listening, counselling and nonverbal behaviour. Applied skills are then dealt with including interviewing skills, time management, goal setting, delegation, group facilitation and meetings management, decision making, conflict management and negotiating skills and organisational communication skills. There is some treatment of interpersonal communication theory.

**21813****Managing People**

*Availability: MEM core subject; 6cp; 3hpw; subject coordinator: Mr R Connor, Faculty of Business*

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 are 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, examination 40 per cent.

**22747****Accounting for Managerial Decisions**

*Availability: MEM core subject; 6cp; 3hpw; subject coordinator: Mr L Moysa, Faculty of Business*

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 examination 40 per cent.

**24734****Managerial Marketing**

*Availability: MEM elective subject; 6cp; 3hpw; subject coordinator: Dr D Darby, Faculty of Business*

This subjects views marketing as a key managerial decision-making area, in particular relating to the organisation and its environment. Drawing extensively on the literature in marketing management, the subject will adopt a case method approach to the exposition of the nature and complexity of managerial marketing decision making and at the same time develop knowledge and skills for effectively managing the complexity of exchange processes.

**25742****Financial Management**

*Availability: MEM elective subject; 6cp; 3hpw; prerequisites: 22747 Accounting for Managerial Decisions; 49003 Economic Evaluation; subject coordinator: A/Prof L Perry, Faculty of Business*

Topics include the conceptual basis of financial decisions; accounting statements and cash flow; net present value; the valuation of debt and equity; capital budgeting issues; risk and return; the capital asset pricing model (CAPM), capital structure; determinants in the optimal balance of debt and equity; dividend policy; leasing.

## SUBJECTS TAUGHT IN THE FACULTY OF SCIENCE

### 66014

#### Hydrogeology

*Availability: ME(GWM) and GDE(GWM) core subject; 6cp; block release totalling 36hrs; 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

#### Hydrogeochemistry

*Availability: ME(GWM) and GDE(GWM) core subject; 6cp; block release totalling 36hrs; 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 totalling 36hrs; 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 totalling 36hrs; 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 totalling 36hrs; 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 totalling 36hrs; 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.



# ***Alphabetical list of subjects***

Aboriginal Social and Political History	54230	Combustion and Air Pollution	46441
Accounting for Managerial Decisions	22747	Commercial Issues in Telecommunications	27001
Adaptive and Multivariable Control	49272	Communication Protocols	49202
Advanced Concrete Technology	49151	Communications 1	51131
Advanced Engineering Computing	46840	Communications 2	51161
Advanced Fluid Dynamics	46442	Communications Channels	45669
Advanced Geomechanics	49141	Communications Systems	45681
Advanced Ground Modification	49142	Computational Fluid Dynamics	49312
Advanced Heat Transfer	49311	Computer Applications	47112
Advanced Robotics	49274	Computer Architecture	49271
Advanced Studies in Electromagnetic Compatibility	49206	Computer Hardware	45143
Advanced Teletraffic Engineering	49204	Computer Programming	47113
Advances in Pollution Control	47162	Computer Systems Analysis	45372
Aerospace Maintenance and Management	48404	Computer Systems Design	45383
Aerospace Operations 1	48401	Computer-aided Design of Electronic Circuits	45582
Aerospace Operations 2	48402	Computer-aided Drafting (CAD)	46321
Aerospace Operations 3	48403	Computer-aided Manufacturing	46336
Airconditioning Design	48305	Computer Aids for Airconditioning Design	48302
Analogue and Digital Control	45581	Computing 2	46811
Analogue Electronics	45153	Computing 3	46821
Application of Timber in Engineered Structures	49136	Computing for Groundwater Specialists (non credit)	49550
Applications of Optimisation in Engineering	49381	Concrete Design 1	47140
Applied Dynamics	46141	Concrete Design 2	47150
Appropriate Technology	46343	Concrete Design 3	47160
Approximate Methods in Structural Analysis	47267	Concrete Design 4	47270
Asset Maintenance Management	49104	Concrete Technology	47154
Australian Engineering on the International Scene	48504	Construction	47149
Biomedical Instrumentation	49261	Construction Contracts	47179
Bridge Design	47275	Construction Management (elective)	47307
Broadband Telecommunications Networks	45667	Construction Materials	47134
Building Construction Technology	48304	Contaminated Site Management	66025
Built Environment, The	47450	Contemporary Society 2	976xxx
Bulk Materials Handling	49316	Contextual Studies	45154
Chemistry	65026	Continuous and Discrete Systems	45141
Coastal Engineering	49111	Control Engineering 1	46531
Combined and Cogeneration Power Plants	49033	Control Engineering 2	46541
		Corrosion Technology for Engineers	65071
		Damage and Repair of Concrete Structures	49152

Data Acquisition and Distribution Systems	45562	Engineering Discovery	45125
Database Structures and Management	31141	Engineering Economics	46642
Design 1	46331	Engineering Ethics	49010
Design 2	46332	Engineering for Lawyers	49045
Design and Manufacture with Adhesives	49317	Engineering Graphics	46311
Design Awareness for the Aero Industry	48405	Engineering in Australian Society	49009
Design for Manufacture	48205	Engineering Management	46632
Design for Manufacturing	46335	Engineering Management	48075
Design of Hypermedia Information Systems	49243	Engineering Materials	48070
Design Project	47285	Engineering Mathematics 1	33120
Digital Systems	45364	Engineering Mathematics 1A	33121
Digital Techniques	45113	Engineering Mathematics 1B	33122
Digital Transmission	45663	Engineering Mathematics 2	33220
Discrete Mathematics	35111	Engineering Mathematics 2A	33221
Domestic Building Design and Construction	47237	Engineering Mathematics 3 (Electrical)	33310
Dynamics of Mechanical Systems	46130	Engineering Physics (Civil)	68021
Dynamics of Structures	47268	Engineering Physics (Civil) (P/T)	68022
Economic Evaluation	49003	Engineering Physics (Mechanical)	68011
Einstein's Universe	46143	Engineering Physics 1 (Electrical)	68031
Electrical Engineering 1	45116	Engineering Physics 2 (Electrical)	68032
Electrical Engineering 1 (Mechanical)	68012	Engineering Physics 3 (Electrical)	68033
Electrical Engineering 2	45124	Engineering Practice	45115
Electrical Engineering 2 (Mechanical)	45931	Engineering Research Methodology	49041
Electrical Power Generation	68034	Engineering Research: The Cutting Edge	45267
Electricity Sector Planning	49026	Engineering Speculation	46344
Electromagnetics	45242	Engineering Statistics	45145
Electromechanical Systems	45342	Environment of Professions in Local Government	49451
Electronic Devices and Circuits	45144	Environmental Assessment and Planning	49121
Employment Relations	21720	Environmental Engineering	47142
Energy and Environmental Economics	49023	Environmental Engineering and Management Practices	49122
Energy Demand Analysis and Forecasting	49027	Environmental Hydraulics	47465
Energy Modelling	49024	Environmental Management	49452
Energy Resources and Technology	49022	Environmental Microbiology for Engineers	91651
Engineering and Society	46630	Environmental Policy for Energy Systems	49029
Engineering Chemistry	65023	Environmental Risk Assessment	49125
Engineering Communication	45135	Environmental Science for Engineers	91379
Engineering Communication	46620	Ergonomics	46040
Engineering Communication and Documentation	48074	Evaluation of Energy Investments	49021
Engineering Communication and Documentation	49044	Fields and Waves	45264
		Financial Management	25742
		Finite Element Analysis	47265

## 194 ALPHABETICAL LIST OF SUBJECTS

Finite Element Applications	46241	Information Structures, Perception and User Interface Design	49031
Finite Element Applications in Structural Mechanics	49047	Information Technology	48072
Fluid Machines	46445	Infrastructure Management	49453
Fluid Mechanics	46420	Inspection and Instrumentation	48202
Fluid Mechanics	47135	Integrated Services Networks	49201
Fluid Mechanics for Manufacturing	46435	International Engineering	49011
Geology for Engineers	66032	International Practice of Engineering 1	48501
Geomechanics (elective)	47306	International Practice of Engineering 2	48502
Geophysics and Remote Sensing of Groundwater Resources	66016	International Studies: Language and Culture 1	971xxx
Geopollution Management	66017	International Studies: Language and Culture 2	972xxx
Geotechnical Engineering	47166	International Studies: Language and Culture 3	973xxx
Graduate Project	49052–49076	International Studies: Language and Culture 4	974xxx
Graduate Seminar	49040	Introducing Aboriginal Cultures and Philosophies	015115
Graphics	47120	Introduction to Civil Engineering	47110
Ground Modification	47176	Introduction to Computing	46810
Groundwater Computing	49554	Introduction to Engineering	46310
Groundwater Engineering Project (F/T)	44152	Introduction to Environmental Biology	91650
Groundwater Engineering Project (F/T)	44153	Introduction to Environmental Economics and Law	47449
Groundwater Engineering Project (P/T)	44156	Introduction to Manufacturing Systems	46312
Groundwater Engineering Project (P/T)	44157	Introduction to Neuro Fuzzy Systems	45585
Groundwater Geophysics	66018	Judgment and Decision Making	49001
Groundwater Modelling	49555	Kinematics and Dynamics of Machines	46140
Heat Transfer	46431	Land Conservation	47476
High-rise Buildings	47288	Land Development (elective)	47303
History of Ideas	52107	Land Resource and Environmental Management	49126
Human–Machine Interfaces and Software Implementation	49213	Law and Contracts	79370
Human Resource Management (Public)	21729	Legal Issues in Telecommunications	79371
Hydraulics	47145	Loading on Building Structures	47277
Hydrogeochemistry	66015	Local Government Law	49108
Hydrogeology	66014	Machine Design	46341
Hydrology	47155	Maintenance Management	48204
Hypermedia Technologies	49241	Management and Industrial Relations	49103
Industrial Design	46345	Management for Engineers	47189
Industrial Experience (P/T)	45999	Management Skills	21779
Industrial Experience (sandwich)	45997	Managerial Marketing	24734
Industrial Experience (sandwich)	48997	Managing Local Enterprise	49454
Industrial Waste Minimisation	49123		
Information Issues	55080		

Managing People	21813	Operating Systems	45353
Manufacturing Process Systems	48201	Operations Management	21741
Manufacturing Processes	46715	Operations Research	46835
Manufacturing Systems	46725	Organisation Analysis and Design	21718
Manufacturing Systems Design	46337	Paradigms of Intelligence	31926
Manufacturing Systems Planning	46726	PhD Thesis (Civil – F/T)	43988
Manufacturing Systems: Quality	46735	PhD Thesis (Civil – P/T)	43987
Materials Engineering 1	67021	PhD Thesis (Electrical – F/T)	41988
Materials Engineering 2	67061	PhD Thesis (Electrical – P/T)	41987
Materials Processing	46710	PhD Thesis (Eng – F/T)	49988
Materials Science for Engineers	67022	PhD Thesis (Eng – P/T)	49987
Materials Technology	67023	PhD Thesis (Groundwater Mgt – F/T)	44988
Mathematical Modelling	45266	PhD Thesis (Groundwater Mgt – P/T)	44987
Mathematics 1	35101	PhD Thesis (Mechanical – F/T)	42988
Mathematics 2	35102	PhD Thesis (Mechanical – P/T)	42987
ME Thesis (Civil – F/T)	43777	Physical Design and Production	45274
ME Thesis (Civil – P/T)	43778	Policy and Planning of Energy Conservation	49028
ME Thesis (Electrical – F/T)	41777	Pollution Control and Management	47452
ME Thesis (Electrical – P/T)	41778	Power Apparatus and Systems	45252
ME Thesis (Eng – F/T)	49777	Power Cycles	46444
ME Thesis (Eng – P/T)	49778	Power Electronics	45463
ME Thesis (Groundwater Mgt – F/T)	44777	Power Equipment Design	45482
ME Thesis (Groundwater Mgt – P/T)	44778	Power Systems	45464
ME Thesis (Mechanical – F/T)	42777	Principles of VLSI Design	45584
ME Thesis (Mechanical – P/T)	42778	Probability and Statistics	47153
Measurement and Instrumentation	46530	Process Control Studies	49377
Mechanical Services	48301	Product Design for Marketing and Manufacture	49318
Mechanics 1	46110	Production and Cost Control	46742
Mechanics 2	46122	Professional Development	48073
Mechanics for Manufacturing	46125	Professional Experience (P/T)	46999
Mechanics of Machines	46121	Professional Experience (P/T)	47999
Mechanics of Solids 1	47127	Professional Experience (sandwich)	46997
Mechanics of Solids 2	47137	Professional Experience (sandwich)	47997
Medium Span Bridges	49131	Professional Practice	46992
Metals Technology	47164	Programmable Controllers and Applications	46540
Methods for Energy Analysis	49025	Project	47002
Metrology and Instrumentation	46535	Project	47003
Modernisation and Globalisation	59341	Project	47004
Mono Media Technologies	49242	Project	47006
Network Theory	45134	Project	47009
Neural Networks and Fuzzy Logic	49275	Project	47012
Numerical Methods	45265	Project	47015
Numerical Methods	48071	Project	48505
Numerical Methods in Engineering	47133		
Object-oriented Languages	49212		

## 196 ALPHABETICAL LIST OF SUBJECTS

Project A	45155	Soil Engineering	47156
Project A	46033	Soil Mechanics	47146
Project B	46034	Solid Mechanics 1	46220
Project B (Instrumentation and Control)	45388	Solid Mechanics 2	46230
Project B (Power and Machines)	45473	Solid Mechanics 3	46240
Project Economics	47178	Special Course A	49082-86
Project Management	45166	Special Course B	49092-96
Project Management	49002	Stability of Structures	49132
Project Planning	47159	Statics	47117
Public Health Engineering	47152	Statistical Hydrology	49114
Public Sector Management	21728	Steel and Composite Design	49133
Quality and Reliability	46740	Steel Design 1	47161
Quality for Manufacture	48206	Steel Structures and Concept Design 1	47171
Quality Planning and Analysis	49309	Steel Structures and Concept Design 2	47281
Railway Engineering (Elective)	47301	Storm Runoff Regulation	49107
Random Signal Theory	49273	Strategic Management (Public)	21758
Rapid Response Manufacturing	49308	Structural Analysis 1	47141
Real-time Object-oriented Software Development	49234	Structural Analysis 2	47151
Real-time Operating Systems	49235	Structural Dynamics	49134
Real-time Software and Interfacing	45163	Structural Mechanics	47131
Refrigeration and Airconditioning	46443	Structural Stability	47278
Resource Management	21731	Structural Testing	47287
Review of Overseas Experience	48503	Structures	46340
Risk and Reliability Analysis (Elective)	47305	Surface Hydrology and Groundwater	49551
Risk Management in Engineering	49006	Surveying 1A	47118
Road Engineering	47167	Surveying 1B	47128
Road Engineering Practice	49106	Surveying 2	47168
Robotics	46142	Sustainable Technological Development	49032
Robotics and Flexible Manufacturing	46701	Systems Engineering	45176
Science Technology and Human Values	59325	Systems Engineering for Managers	49004
Service Control Systems	48303	Technological Change	49005
Signal Processing	45666	Technological Change and Strategic Planning	48203
Signal Theory 1	45151	Telecommunications for Managers	45901
Signal Theory 2	45152	Telecommunications Management	49208
Sliding Mode Control	49276	Telecommunications Signal Processing	49203
Software Development 1	45123	Teletraffic Engineering	45668
Software Development 2	45133	Terotechnology	46640
Software Development Project	49236	Thermodynamics	46421
Software Engineering	45363	Thermodynamics for Manufacturing	46436
Software Engineering Principles	49211	Thermofluids	46430
Software Project Management	49225	Thermofluids for Manufacturing	46437
Software Requirements Specification	49233	Thesis 1	45182
Software Verification and Validation	49217	Thesis 2	45183

Timber Design	47144	Waste Minimisation	47482
Traffic and Transportation	49102	Water Quality Management	49124
Transmission Systems	49205	Water Resources Engineering	47175
Transportation Engineering	47177	Water Supply and Wastewater Management	49105
UNIX and C	49214	Wave Propagation for Microwave and Mobile Communications	49207
Urban Stormwater Flood Management	49112	Wind Engineering	49135
Urban Stormwater Pollution Management	49113	Welding (elective)	47302

# Boards and committees

## FACULTY BOARD IN ENGINEERING

### 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 V S Ramsden

Professor V Vigneswaran

*Faculty Administrator*

Ms D J Carraro

### Nominated members

To be advised

*Nominee of the University Librarian*

*Nominee of the Director, CLT*

*Nominee of the Dean from the Faculty Board in Business*

*Nominee of the Dean from the Faculty Board in Mathematical and Computing Sciences*

*Nominee of the Dean from the Faculty Board in Science*

### Registered members

To be advised

### Elected student members

To be advised

## ADVISORY COMMITTEES

(as at 30 November 1996)

### Civil Engineering Advisory Committee

#### Chairperson

Mr Neil Turner

Plant Manager,

Ductile Iron Pipeline systems

Tubemakers of Australia Limited

#### Industry members

Mr Alan Chappel

Managing Director

Connell Wagner NSW Pty Ltd

Dr John Nutt

Senior Partner

Ove Arup and Partners Consulting Engineers

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 Vagulaus

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

Associate Professor Geoff O'Loughlin

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

Dr Robert Gill  
Project Leader  
Ultrasonics Laboratory  
CSIRO Division of Radiophysics

### UTS staff

Professor Peter Parr  
Dean, Faculty of Engineering

Professor Warren Yates  
Associate Dean, Undergraduate Studies

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  
Sales Director  
James N Kirby Pty Ltd

Mr Paul Dewar  
Engineering Manager—Boilers, Fuel and  
Water Systems  
Power Plant Engineering  
Pacific Power Services

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

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  
Sales Director  
James N Kirby Pty Ltd

### **Industry members**

Mr David Lewis  
Manufacturing Systems  
Manufacturing Training Division of TAFE

Mr Con Lyras  
Manager Planning and Facilities  
Qantas Airways Ltd

Mr Norm Argent  
Executive Director  
ACMCA 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

### **UTS staff**

Chairperson  
Professor Peter Parr  
Dean, Faculty of Engineering

Mr David Eager  
Director, Bachelor of Technology in  
Manufacturing Engineering,  
Faculty of Engineering

### **Secretary**

Ms Ruth Ciudad

# Staff list

## *Professor and Dean of Engineering*

P J Parr, MSc, PhD (Belf), FIEAust, CPEng

## *Secretary to the Dean*

E Tu

## *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)

## *Faculty Network Manager*

K C Barnes, BA (Macq)

## *Director, Industrial Liaison*

J G Crowe, BE (Q'ld), MEngSc (UNSW), FCIT, MIEAust, CPEng

## *Director, International Engineering Program*

P Maloney, BA (Macq), MA (Syd)

## *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

## **Women in Engineering Program**

### *Director*

B Holland, BA (Syd), GradDipComm (NSWIT), MScSoc (UNSW)

### *Coordinators*

M Boman, BA (Q'ld), GradCertAppSc (Deakin)

N Mitchell, BE (Monash), GradDipScComm (ANU)

## **Staff Groups**

### **Administration and Information**

#### **General staff**

\* Denotes Group Head

S Ali

*Administrative Assistant*

J Brown

*Faculty Assistant*

S Bryce

*Administrative Assistant (P/T)*

B Buckenmaier

*Graduate Studies Officer*

M R Collison

*Administrative Assistant (P/T)*

\* D J Carraro, BA (UNE)

*Faculty Administrator*

J Chetcuti

*Word Processor Operator (P/T)*

R Ciudad

*Administrative Assistant*

L Dixon

*Administrative Assistant, National Centre for Groundwater Management*

P J Doyle

*Administrative Assistant (P/T)*

Y Hua, BA (Anhui U), DipMgt (Shenzen U), MBA (CQU)

*Administrative Manager*

K Johnston

*Administrative Secretary*

M Leondis

*Administrative Secretary*

C Lew

*Administrative Assistant*

M Nunan

*Administrative Assistant*

M R Rothery

*Manager, Planning and Information*

R Saunders, BA (Macq)

*Executive Assistant*

L B Smith

*Administrative Secretary*

S Suseelar

*Administrative Assistant, Centre for Local Government Education and Research*

S Tanuwijaya  
*Executive Officer*

R L Tay  
*Administrative Secretary*

C Taylor  
*Administrative Officer*

E Tu  
*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**

\* Denotes Group Head

P H Alt  
*Assistant Laboratory Manager*

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*

J R Grove  
*Workshop Manager*

H J Hefka  
*Technical Officer*

J C Holmes  
*Senior Technical Officer*

D R Hooper  
*Technical Officer*

W Howes  
*Technical Officer*

\* I A Hutchings, BE (NSWIT)  
*Engineer*

A Lah, BE (NSWIT)  
*Engineer*

R Mak  
*Senior Technical Officer*

H J McMahon  
*Technical Officer*

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**

\* Denotes Group Head

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 (UHK), 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*

J Li, BSc (Eng), MSc, PhD (TCD)  
*Research Engineer*

M R Karim, BSc (B'desh Engineer), MSc  
(Middle East Tech Uni), 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 (Tehran), BSc (CSU),  
MSc, PhD (Lehigh)  
*Senior Lecturer*

R Sri Ravindrarajah, BSc (Sri Lanka), 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

\* Denotes Group Head

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 (Leicester), MSc  
(Lond), PhD (Alberta), CertEngGCH  
(UNSW)  
*Senior Lecturer, National Centre for  
Groundwater Management*

H H Ngo, BSc, MSc (National U 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 (Sri Lanka), MSc (AIT),  
DrIng (Montpellier), DSc (Inst Nat  
Polytechnique, Toulouse)  
*Professor of Environmental Engineering*

K Walsh, BSc (UNSW)  
*Research Microbiologist, National Centre for  
Groundwater Management*

## Electrical Engineering

### Academic staff

\* Denotes Group Head

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*

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*

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)

*Lecturer*

**General staff**

A C Curgenvin

*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*

L Weber

*Director, Microelectronics Fabrication Centre*

**Computer Systems Engineering**

**Academic staff**

\* Denotes Group Head

A J Boswell, BE (UTS)

*Associate Lecturer*

N C Carmody, BE, MEngSc (UNSW)

*Senior Lecturer*

M Dabin

*Co-Director, Software Engineering Program (seconded from Campus Thomson, Paris)*

C R Drane, BSc, PhD (Syd), MIEEE, MAIP

*Professor of Computer Systems Engineering*

K K Fung, BSc (UHK), MSc (Lond), MIEE

*Senior Lecturer*

\* A Ginige, BSc (Mech) (Moratuwa), PhD (Cambridge), MIEEE, AMIEE

*Associate Professor*

J R M Leaney, BE, ME (UNSW), SMIREE

*Senior Lecturer*

D B Lowe, BE, PhD (UTS)

*Senior Lecturer*

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 (UTS)

*Lecturer*

M J Sifer, BSc (UNSW), MAppSc (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 Witjetilaka, BEng (Warwick)

*Engineer*

P M Yardley

*Analyst/Programmer*

**Telecommunications Engineering**

**Academic staff**

\* Denotes Group Head

\* T A Aubrey, BE (UTS), SIEEE

*Lecturer*

J S Daba, BSc (Houston), MSc, PhD (Purdue)

*Lecturer*

M P Eckert, BSE (Tulane), MSE, PhD (Philadelphia)

*Lecturer*

T Ginige, BSc (Eng) (Moratuwa), ME (UTS)

*Associate 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 Seneviratne, BSc (Hons) (Middx), PhD  
(Bath)  
*Associate Professor*

K W Yates, BSc, BE, PhD (Syd), FIEAust,  
CPEng, SMIREE, MIEEE, SMIEEE  
*Professor of Electrical Engineering*

### **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*

G J Ingram  
*Analyst/Programmer*

K Moore  
*Network Services Officer*

C O'Toole  
*Network Services Officer*

M Reyntjes  
*Video and Computer Systems Officer*

W A Symons, BE (NSWIT)  
*Engineer and Manager, Research Computing  
Centre*

### **Mechanical Engineering**

#### **Academic staff**

\* Denotes Group Head

T A Brown, BE (UTS), GradIEAust, Peng  
*Lecturer*

G Hong, BE, ME (Huazhong Univ Science &  
Technology), PhD (Cambridge)  
*Lecturer*

B P Huynh, BE, MEngSc, PhD (Syd),  
MASME  
*Lecturer*

S F Johnston, BE, ME (UNSW), FIEAust,  
CPEng  
*Associate Professor*

A N F Mack, BSc, BE, MEngSc, PhD (Syd),  
SMAIAA  
*Senior Lecturer*

J Madadnia, BE (Sharief), MSc (Lond), DIC,  
PhD (Liverpool)  
*Lecturer*

G M Marks, BE (NSWIT), CPEng, MIMarE  
*Senior Lecturer*

J A Reizes, BE, ME, PhD (UNSW), FIEAust,  
CPEng  
*Professor of Mechanical Engineering*

F C O Sticher, BE, PhD (Syd)  
*Lecturer*

K A Stillman, BE (Syd), MEng (NSWIT),  
MIICA  
*Senior Lecturer*

\* R M Wiltshire, MSc (Cranfield), MIEAust,  
CPEng  
*Senior Lecturer*

N Zhang, BE (Northeastern Univ, Shenyang),  
ME (Shanghai Jiao Tong Univ), PhD (Tokyo)  
*Lecturer*

### **Manufacturing**

#### **Academic staff**

\* Denotes Group Head

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*

C P Killen, BSME (Virginia), MEM (UTS)  
*Lecturer*

H T McGregor, BS (Drexel), MA (Macq)  
*Associate Professor*

R M Spencer, DipME (Q'ld), MSc (UMIST),  
PhD (UNSW), FIEAust, CPEng  
*Associate Professor*

\* F B Swinkels, BE (NSWIT), PhD (Cantab),  
FIEAust, CPEng  
*James N Kirby Professor of Manufacturing  
Engineering*

## Engineering Management and Practice

### Academic staff

\* Denotes Group Head

W R Belcher, BE, MEngSc (Q'ld), PhD (Lond), DIC, FIEAust, CPEng, MIEE  
*Professor of Electrical Engineering*

M Boman, BA (Q'ld), GradCertAppSc (Deakin)

*Coordinator, Women in Engineering Program*

P Bryce, BSc, PhD (UNSW), FIREE, MSSRE  
*Associate Professor*

\* J G Crowe, BE (Q'ld), MEngSc (UNSW), FCIT, MIEAust, CPEng  
*Director, Industrial Liaison*

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*

N Mitchell, BE (Monash), GradDipScComm (ANU)  
*Coordinator, Women in Engineering Program*

P J Parr, MSc, PhD (Belf), FIEAust, CPEng  
*Professor of Electrical Engineering*

D Sharma, BScEng (Punjab U), 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*

## 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)

*Lecturer/Project Officer*

R Mellor, MPS (UNSW)

*Administrative Officer*

C Taylor

*Administrative Assistant*

S Suseelar

## 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 (Leicester), MSc (Lond), PhD (Alberta), CertEngGCH (UNSW)

*Lecturer*

R G McLaughlan, BSc (Melb), GradDipCivEng, MAppSc, PhD (UNSW)

*Research Microbiologist*

K Walsh, BSc (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

e-mail [info.office@uts.edu.au](mailto:info.office@uts.edu.au)

**International inquiries**

International Programs +61 2 9514 1531

e-mail [intlprograms@uts.edu.au](mailto:intlprograms@uts.edu.au)

**World Wide Web** <http://www.uts.edu.au>

ISSN 1036-0670

Price \$9