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Faculty of Engineering
Handbook
1996



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Faculty of Engineering Handbook **1996**

The University attempts to ensure that the information contained in the handbook is correct as at 6 November 1995. The University reserves the right to vary any matter described in the handbook at any time without notice.



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:

Corporate Responsibilities Unit
University Secretary's Division

Design:

UTS News and Design Services

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ADDRESSES AND TELEPHONE NUMBERS

POSTAL ADDRESS

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Broadway
New South Wales 2007 Australia

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International: +61 2 330 1990
Fax: (02) 330 1551

From July 1996

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

All other numbers listed in this publication with a prefix of 330 will have a new prefix of 9514 e.g. 330 5555 will become 9514 5555.

STREET ADDRESSES

City campus

- Broadway
No. 1 Broadway, Ultimo
- Harris Street, Ultimo
Building 6
702–730 Harris Street
Bon Marche Building
755 Harris Street
645 Harris Street
- Haymarket
Corner Quay Street and Ultimo Road
Haymarket, Sydney
- Blackfriars
Blackfriars Street, Chippendale

- Smail Street
3 Smail Street, Ultimo
- Wembley House
839–847 George Street, Sydney
- Bulga Ngurra
23–27 Mountain Street, Ultimo
- 82–84 Ivy Street, Chippendale

Kuring-gai campus

Eton Road
Lindfield
(PO Box 222, Lindfield NSW 2070)

St Leonards campus

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

Yarrawood conference and research centre

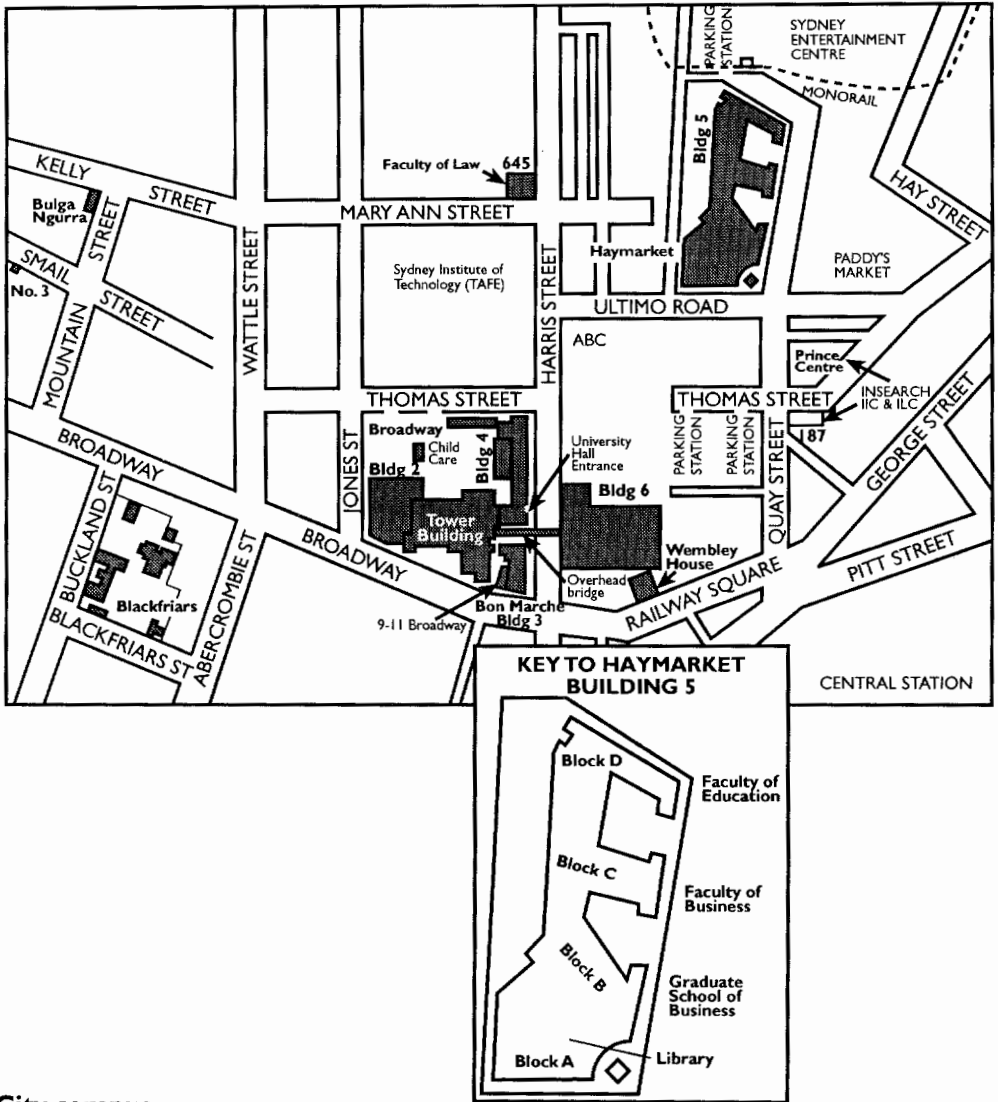
Hawkesbury Road
Yarramundi 2753

Stroud

Lot AFP 161894
The Bucketts Way
Booral 2425

CAMPUS MAPS

CITY CAMPUS



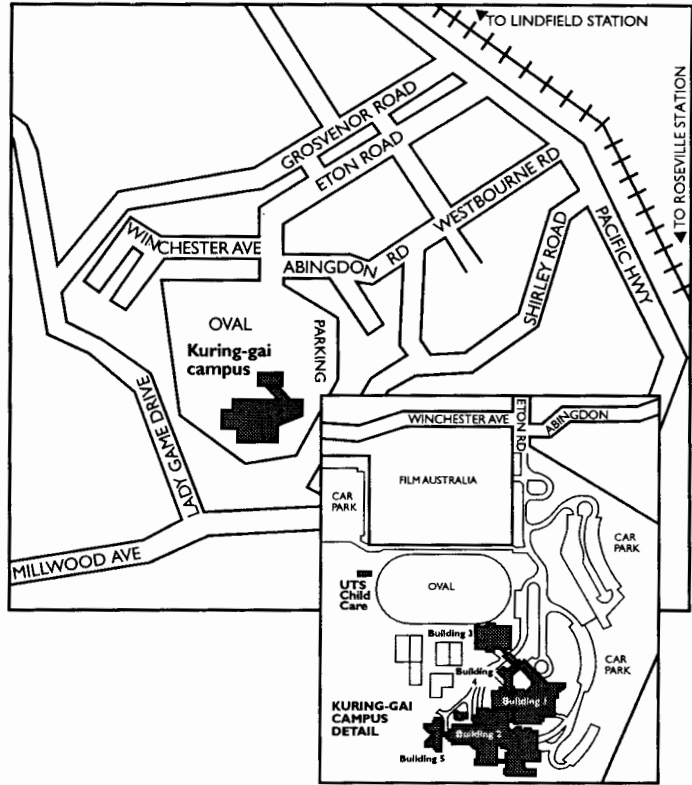
City campus

- Broadway
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Building 6
702–730 Harris Street
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645 Harris Street
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Corner Quay Street and Ultimo Road
Haymarket, Sydney
- Blackfriars
Blackfriars Street, Chippendale
- Smail Street
3 Smail Street, Ultimo
- Wembley House
839–847 George Street, Sydney
- Bulga Ngurra
23–27 Mountain Street, Ultimo
- 82–84 Ivy Street, Chippendale

Kuring-gai campus

Eton Road
Lindfield
(PO Box 222, Lindfield
NSW 2070)

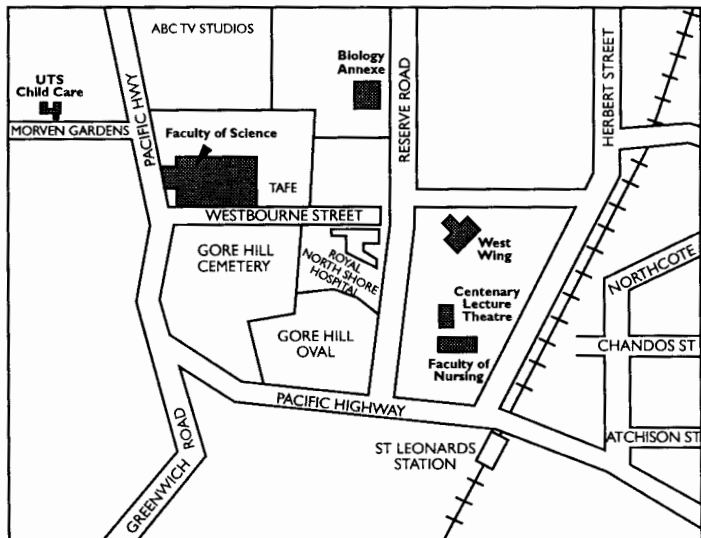
KURING-GAI CAMPUS



ST LEONARDS CAMPUS

St Leonards campus

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



PRINCIPAL DATES FOR 1996¹

AUTUMN SEMESTER

January

- 9 Release of HSC results
- 12 Formal supplementary examinations for 1995 Spring semester students
- 12 Closing date for changes of preference to the Universities Admissions Centre (UAC) from 1995 NSW HSC applicants (by 6.00 p.m.)
- 15–30 Enrolment of students at City campus
- 26 Australia Day – public holiday
- 26 Public school holidays end
- 31 Enrolment of new undergraduate students at City campus including UAC and direct applicants (and 1–5 February)

February

- 1–5 Enrolment of new undergraduate students at City campus including UAC and direct applicants (and 31 January)
- 6–23 Enrolment of students at City campus

March

- 4 Classes begin
- 15 Last day to enrol in a course or add subjects
- 29 Last day to change to 'pay now/up-front' HECS payment
- 29 Last day to apply for leave of absence without incurring student fees/charges²
- 29 Last day to withdraw from a subject without financial penalty²
- 31 HECS census date

April

- 1 Public school holidays begin
- 5 Good Friday – public holiday
- 8 Easter Monday – public holiday
- 9 Graduation period begins
- 12 Last day to withdraw from a course or subject without academic penalty²
- 8–12 Vice-Chancellors' Week (non-teaching)

- 12 Public school holidays end
- 25 Anzac Day – public holiday
- 26 Provisional examination timetable available
- 30 Last day to apply to graduate in Spring semester 1996

May

- 1 Applications available for selected undergraduate courses for Spring semester
- 7 Graduation period ends
- 13 Applications available for postgraduate courses
- 17 Examination Masters due
- 31 Final examination timetable available
- 31 Closing date for selected undergraduate applications for Spring semester

June

- 10 Queen's Birthday – public holiday
- 14 Last teaching day of Autumn semester
- 14 Closing date for postgraduate applications for Spring semester
- 15–28 Formal examination period (and 1–5 July)

July

- 1 Public school holidays begin
- 1–5 Formal examination period (and 15–28 June)
- 5 Autumn semester ends
- 8–12 Vice-Chancellors' Week (non-teaching)
- 12 Public school holidays end
- 15–19 Formal alternative examination period for Autumn semester students
- 19 Release of Autumn semester examination results
- 22 Formal supplementary examinations for Autumn semester students
- 22–26 Confirmation of Spring semester programs
- 25–26 Enrolment of new and readmitted students and students returning from leave/concurrent study

SPRING SEMESTER

July

29 Classes begin

August

- 1 Applications available for undergraduate courses
- 2 Last day to withdraw from full-year subjects without academic penalty²
- 5 Applications available for postgraduate courses
- 9 Last day to enrol in a course or add subjects
- 23 Last day to apply for leave of absence without incurring student fees/charges² (Spring enrolments only)
- 30 Last day to change to 'pay now/up-front' HECS payment
- 30 Last day to withdraw from a subject without financial penalty²
- 30 Last day to apply to graduate in Autumn semester 1997
- 31 HECS census date

September

- 6 Last day to withdraw from a course or subject without academic penalty²
- 20 Provisional examination timetable available
- 27 Closing date for undergraduate applications via UAC (without late fee)
- 27 Closing date for inpUTS Special Admission Scheme applications
- 30 Public school holidays begin
- 30 Graduation period begins
- 30 Vice-Chancellors' Week (non-teaching) begins
- 30 Closing date for postgraduate applications (in some faculties)

October

- 4 Vice-Chancellors' Week (non-teaching) ends
- 4 Graduation period ends
- 7 Labour Day – public holiday
- 11 Public school holidays end
- 11 Examination Masters due
- 25 Final examination timetable available
- 31 Closing date for postgraduate research and course award applications
- 31 Closing date for undergraduate applications via UAC (with late fee)
- 31 Closing date for undergraduate applications direct to UTS (without late fee)

November

- 8 Last teaching day of Spring semester
- 9–29 Formal examination period
- 29 Spring semester ends

December

- 9–13 Formal alternative examination period for Spring semester students
- 20 Release of Spring semester examination results
- 23 Public school holidays begin

¹ Information is correct as at 15 November 1995. The University reserves the right to vary any information described in Principal Dates for 1996 without notice.

² HECS/Postgraduate course fees will apply after the HECS census date.

PREFACE

This handbook is one of 10 faculty/institute handbooks: Business; Design, Architecture and Building; Education; Engineering; Humanities and Social Sciences; International Studies; Law; Mathematical and Computing Sciences; Nursing; and Science. Each handbook provides general information about the faculty/institute as well as detailed information on the courses and subjects offered.

The handbooks are part of a suite of 13 publications which also comprise the University *Calendar* and the undergraduate and postgraduate student handbooks. The *Calendar* contains the University By-law, which all students should read. It also includes a list of the University's courses, giving the name, abbreviation and title as indicated on the testamur. Copies of the *Calendar* are held in the University Library and faculty offices, and may be purchased at the Co-op Bookshop.

The student handbooks provide information on the rights and responsibilities of students and on the services and facilities available to them. They will assist you in your dealings with the University's administration and tell you whom to contact if you have a problem or need advice. You should make sure that you read the student rules published in these handbooks. Copies of the student handbooks are provided free to students at enrolment.

Other publications providing information of a general nature are the *UAC Guide* and the *UTS Undergraduate Studies Guide* which are available from the UTS Information Service.

For information not provided in any of the publications mentioned e.g. additional information on courses, methods of assessment and book lists, you should contact the UTS Information Service or your faculty office. If in doubt, don't hesitate to ask.

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

FACULTY MISSION STATEMENT

The Faculty's purpose is to develop and teach that combination of intellectual capability and practical knowledge essential to the professional practice of engineering and the furtherance of engineering enterprise. This requires commitment to quality not only in engineering science and technology, but equally in the process of engineering—the application and management of technology to produce commercially, economically, environmentally and socially viable goods and services.

The Faculty promotes these ideals through its undergraduate courses, its postgraduate and continuing professional education programs, and the research programs and professional activities of its staff and students; and through its continuing commitment to the Women in Engineering program and its contribution to the Australian Graduate School of Engineering Innovation. It seeks to interact continually and closely with industry and the practising profession, to be dynamic in both its contributions and its responses to professional and public developments, and to support the wellbeing of Australia as a member of the international community.

The Faculty seeks to engage all of its staff and students in the pursuit of these corporate aims. It tries to maintain a dynamic balance between the organisation of managed group programs with specified goals, the encouragement of initiatives by individual members of staff, and the establishment of diverse yet selective linkages with other disciplines, academic institutions and enterprises in Australia and overseas.

The Faculty believes this statement of purpose and aims to be in accordance with the corresponding statements by the University.

THE FACULTY OF ENGINEERING

The Faculty of Engineering has a strong vocational orientation. Its courses have been designed to achieve standards of educational and professional competence which equip graduates to play an effective role in industry immediately upon gaining their qualification.

The Faculty's most important distinguishing feature is its commitment to the philosophy of cooperative education—the belief that the development of fully professional engineers requires both academic and industrial training and these should be experienced concurrently. Industrial experience is therefore an essential feature of all undergraduate engineering courses. Graduate programs and other activities also involve close association with industry and the engineering profession, and the Faculty maintains working contacts with many hundreds of employers of engineers.

COURSES OFFERED

The Faculty has four schools. They offer these courses:

School of Civil Engineering

- Bachelor of Engineering in Civil Engineering
- Bachelor of Engineering in Civil and Environmental Engineering
- Bachelor of Engineering in Structural Engineering

School of Electrical Engineering

- Bachelor of Engineering in Electrical Engineering
- Bachelor of Engineering in Computer Systems Engineering
- Bachelor of Engineering in Telecommunications Engineering

School of Mechanical Engineering

- Bachelor of Engineering in Mechanical Engineering
- Bachelor of Engineering in Manufacturing Systems Engineering

Bachelor of Engineering in Mechanical or Manufacturing Systems Engineering and Master of Design

The Graduate School of Engineering

- Doctor of Philosophy
- Master of Engineering (by thesis)
- Master of Engineering (by coursework)
- Master of Engineering in Telecommunications Engineering
- Master of Engineering in Groundwater Management
- Master of Engineering Practice
- Master of Engineering Management
- Master of Technology
- Master of Local Government Management
- Graduate Diploma in Engineering and Graduate Certificate in Engineering
- Graduate Diploma in Local Government Engineering
- Graduate Diploma in Engineering in Groundwater Management
- Graduate Certificate in Environmental Engineering and Management

Faculty-based courses

- Bachelor of Engineering/Bachelor of Arts in International Studies
- Bachelor of Technology in Manufacturing Engineering
- Bachelor of Technology in Aerospace Operations

WOMEN IN ENGINEERING

The Faculty has set up a Women in Engineering program to increase the number of women enrolling and graduating in engineering schools at the University. The program aims to foster a learning environment which promotes the interests and needs of women students. Special support is offered in liaising with academic staff, meeting with practising

engineers, organising social meetings, and in seeking industrial experience placements.

PRIZES

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 University *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

School of Civil Engineering

- 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

School of Electrical Engineering

- 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

School of Mechanical Engineering

- 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 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.

The Association of Professional Engineers, Scientists and Managers, Australia (APESMA) provides advice and assistance on employment-related matters for professional engineers, scientists and managers. Student members receive a publication *The Student Update* three times a year, which gives practical insight into the workplace and employment issues that affect them as professional engineers. For more information and student membership application forms call APESMA on (02) 264 9500.

LOCATION AND STAFF

Faculty Office

Level 7, Building 2
 Broadway, City campus
 Telephone: 330 2604

Postal address:
 PO Box 123
 Broadway NSW 2007

School of Civil Engineering

Level 5, Building 2
 Broadway, City campus
 Telephone: 330 2630

School of Electrical Engineering

Level 24, Building 1
 Broadway, City campus
 Telephone: 330 2433

School of Mechanical Engineering

Level 6, Building 2
 Broadway, City campus
 Telephone: 330 2669

Graduate School of Engineering

Level 7, Building 2
 Broadway, City campus
 Telephone: 330 2606

The Office of the Dean of Engineering, Faculty Office and the Women in Engineering Office are located on Level 7, Building 2, Broadway. Staff associated with these areas are:

	Room	Ext
<i>Dean of Engineering</i> P J Parr	7092	2599
<i>Faculty Administrator</i> D J Carraro	7093	2594
<i>Secretary to the Dean</i> E Tu	7091	2596
<i>Director, Bachelor of Technology in Manufacturing Engineering</i> D Eager	628	2687
<i>Associate Professor and Director, Management Studies in Engineering</i> J V Parkin	7087	2638
<i>Director, International Engineering Program</i> P Maloney	7100	2591

<i>Director, Industrial Liaison</i> J G Crowe	7097	2592
<i>Women in Engineering Coordinator</i> M Boman	7072	2602 2601
<i>Administrative Officer – Finance and Operations</i> M G Rothery	7098	2600
<i>Administrative Secretaries</i> R Ciudad (BTech)	630	2664
L B M Smith	7105	2604
<i>Faculty Assistant</i> J A Lillo	7105	2026
<i>Industrial Liaison Officers (Part-time)</i> M R Collison		
P J Doyle	7105	2605

Staff associated with the Schools are listed in the School sections of this handbook.

COURSE CODES

Undergraduate courses

EC07	Bachelor of Engineering in Civil and Environmental Engineering
EC03	Bachelor of Engineering in Civil Engineering
EC00	Bachelor of Engineering in Civil Engineering (cross-institution)
EE04	Bachelor of Engineering in Computer Systems Engineering
EE03	Bachelor of Engineering in Electrical Engineering
EE00	Bachelor of Engineering in Electrical Engineering (cross-institution)
EM07	Bachelor of Engineering in Manufacturing Systems Engineering
EM03	Bachelor of Engineering in Mechanical Engineering
EM00	Bachelor of Engineering in Mechanical Engineering (cross-institution)
EC04	Bachelor of Engineering in Structural Engineering
EE06	Bachelor of Engineering in Telecommunications Engineering
E003	Bachelor of Engineering/Bachelor of Arts in International Studies
EM06	Bachelor of Engineering/Master of Design
E011	Bachelor of Technology in Aerospace Operations

E010 Bachelor of Technology in
Manufacturing Engineering

Postgraduate courses

Please note that course codes for *commencing students in 1996* may differ from those for some *continuing students*.

Research awards

New students

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

Continuing students

EC55 Doctor of Philosophy (Civil
Engineering)
EE53 Doctor of Philosophy (Electrical
Engineering)
E055 Doctor of Philosophy
(Groundwater Management)
EM55 Doctor of Philosophy (Mechanical
Engineering)
EC51 Master of Engineering (by thesis)
(Civil Engineering)
EE51 Master of Engineering (by thesis)
(Electrical Engineering)
E056 Master of Engineering (by thesis)
(Groundwater Management)
EM51 Master of Engineering (by thesis)
(Mechanical Engineering)

Coursework awards

New students

EP81 Master of Engineering (by
coursework)
EP82 Master of Engineering (by
coursework) (Energy Planning and
Policy)
EP83 Master of Engineering (by
coursework)
(UTS – Thomson Software
Engineering program)
E057 Master of Engineering in
Groundwater Management
EP84 Master of Engineering in
Telecommunications Engineering

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

Continuing students

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

UNDERGRADUATE COURSES

Bachelor of Engineering

DESCRIPTION

Undergraduate courses are available in Civil, Structural, Civil and Environmental, Electrical, Computer Systems, Telecommunications, Mechanical, 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.18). 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 Head of School, 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 undergraduate and post-graduate student handbooks 1996.)

Each course has an intake of students in March each year. Courses offered by the Schools of Civil, Electrical and Mechanical Engineering **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 Head of School.

Entry from HSC: Selection is based on a Tertiary Entrance Rank (TER). For admission based on the 1994 NSW HSC examination the required levels of TER were 75.0 for Civil/Structural Engineering, 82.0 for Civil and Environmental, 77.0 for Electrical Engineering, 92.0 for Computer Systems Engineering, 87.0 for Telecommunications Engineering and 70.0 for Mechanical/Manufacturing Systems Engineering.

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: Schools of 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.

Exemptions/advanced standing based on completed TAFE Associate Diplomas are listed in Schedule 1 at the back of this handbook. Completion of particular TAFE qualifications does not necessarily mean that applicants with those qualifications will be offered a place at UTS.

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.

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 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, 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.

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

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 Head of School, 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 20 Engineering Co-op Scholarships are expected to be awarded in 1996. The scholarships will be awarded to students who are successful in the 1995 HSC examinations (or equivalent) and entering any of the Bachelor of Engineering courses at UTS in 1996. 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 1995 sponsors of the Engineering Co-op Scholarship program were: BP Australia, CMPS&F Pty Ltd, Gutteridge, Haskins & Davey, Leighton Contractors, Institute of Municipal Engineering Australia, McMillan, Britton & Kell, Ove Arup, Rose Consulting, Canon, Keycorp Pty Ltd, Optus, Pacific Power, Stanilite, 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 and advisers in each school 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 Head of School, 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 Head of School 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. Schools publish 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 Head of School.

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

Head of School. 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. These will be identified by individual schools.

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 when required by the School. 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.

Schools will require students 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)
- 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 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 eight credit points. Students enrolling in

language electives should first seek approval from their School.

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 on ways to develop appropriate language skills and cultural awareness. For further information students should contact the Faculty Office or their Academic Adviser.

Bachelor of Engineering/ Bachelor of Arts in International Studies (E003)

DESCRIPTION

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
- Structural 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
Stages 1, 2		
— Group meetings	0	
Stage 3		
971xxx Language and Culture 1	8	6
44997 Industrial Experience		
Stage 4		
972xxx Language and Culture 2	8	6
Stage 5		
973xxx Language and Culture 3	8	6
59341 Modernisation and Globalisation	8	4
Stage 6		
974xxx Language and Culture 4	8	6
Stage 7		
48501 International Practice of Engineering 1 (overseas university / industry)	8	

Stage 8

48502	International Practice of Engineering 2 (overseas university)	24	
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Stage 9

48503	Review of Overseas Experience	3	2
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Stage 10

976xxx	Contemporary Society 2	8	4
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Stage 11

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Stage 12

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 Technology in Manufacturing Engineering (E010)

DESCRIPTION

The Bachelor of Technology degree in Manufacturing Engineering is an initiative of the Faculty of Engineering. The course aims to develop the skills of middle-level engineering technologists in manufacturing industry and builds on work already completed in selected NSW TAFE Associate Diploma courses. One-and-a-half years of full-time academic credit is given for the Associate Diploma.

The program requires three years of part-time study and is designed to articulate with the engineering services or manufacturing groups of Associate Diploma programs. Coursework will cover four main areas: commercial skills and management, computing and CAD/CAM, communication and engineering documentation and quality manufacturing.

The course is not designed to articulate with a Bachelor of Engineering degree, although progression to that degree is possible.

ADMISSION

The entry requirement is a NSW TAFE Associate Diploma in Computer Integrated Manufacturing, Control, Electrical, Industrial, Mechanical, Manufacturing or Production Engineering. Applicants with an Associate Diploma in another technology area or an equivalent qualification will be considered for admission.

Selection: It is anticipated that 50 places will be made available in 1996. Students will be selected on the strength of their previous academic performance in Associate Diploma courses. Previous industrial experience and an indication of support from a current employer will also be of importance.

Industrial experience: At least 12 months' experience in the manufacturing industry prior to entry is required. Preference will be given to students who are working in this sector at the time of their enrolment and who are supported by their employer.

Exemptions: No exemptions will be granted. Students who can show that they have satisfactorily completed work equivalent to one of the subjects in this program will be required to undertake an alternative subject.

ATTENDANCE PATTERN

One afternoon and evening and another evening for each of 14 weeks during each semester. Overall course length is three years.

USE OF COMPUTERS

Students will be expected to have personal access to an appropriate computer. They will be encouraged to have their own computer early in the course.

MEMBERSHIP OF THE INSTITUTION OF ENGINEERS, AUSTRALIA

UTS expects that holders of the Bachelor of Technology degree should qualify for membership of the Institution of Engineers, Australia in the grade of Engineering Technologist. However, this will not be known with certainty until formal accreditation of the course has been completed by the Institution. The Course Director will be happy to discuss this with students.

INQUIRIES

General inquiries can be made by telephone during office hours on 330 2664 or 330 2666. Applications for admission should be made using the appropriate form which can be obtained from the UTS Information Service, No. 1 Broadway NSW 2007.

COURSE STRUCTURE

Stage 1		CP	HPW
48010	Introduction to Manufacturing	4	3
48011	Computing for Manufacturing and Management	4	4
65026	Chemistry	4	3

Stage 2

48020	Communication in Manufacturing and Management	4	3
48021	Numerical Methods	4	4
48022	Materials for Manufacturing	4	3

Stage 3

48030	The Industrial Environment	4	3
48031	Computer-aided Drawing and Design	4	4
48040	Management for Manufacturing	4	3

Stage 4

48041	Computer-aided Manufacturing	4	4
24221	Principles of Marketing	4	3
25310	Financial Management for Manufacturing Engineering	4	3

Stage 5

48050	Engineering Documentation	3	3
48051	Metrology and Inspection	3	3
48053	Technological Change and Strategic Planning	3	2
79370	Law and Contracts for Manufacturing	3	2

Stage 6

48060	Quality for Manufacturing	3	3
48061	Design for Manufacture	3	3
48062	Terotechnology (Maintenance Management)	3	2
48052	Professional Review	3	2

STAFF AND LOCATION OF FACILITIES

The office of the Bachelor of Technology in Manufacturing Engineering program is located in the Engineering Building (Building 2), City campus, Broadway. The inquiries office and academic staff offices are on Level 6. Laboratories and classrooms are on Levels 2, 3 and 6.

The names and office locations of academic and support staff are set out below. The University's telephone number is 330 1990 and staff may be reached at the extensions below. Messages may be left,

either in person or by telephone, at the inquiries office ext 2664 or 2666.

	Room	Ext
<i>Director, Bachelor of Technology in Manufacturing Engineering</i>		
Mr David Eager	2/628	2687
<i>Director, Bachelor of Technology in Aerospace Operations</i>		
Mr L Reece	2/416	2587
<i>Lecturers</i>		
Mr J Dartnall	2/622	2541
Ms C Killen	2/629	2697
<i>Support Staff</i>		
<i>Administrative Secretary</i>		
Ms R Ciudad	2/630	2664

Bachelor of Technology in Aerospace Operations (E011)

DESCRIPTION

The Bachelor of Technology in Aerospace Operations is offered in Singapore. It is a UTS degree offered through Summershire Education Consultants Private Limited, Singapore.

The course leads to an engineering technologist degree. It is available to holders of a Diploma in an appropriate field from Singapore Polytechnic (or equivalent), and is designed to equip them to function as technical managers in the aerospace industry. On completion, graduates will be admitted to the degree of Bachelor of Technology.

The course is designed to be completed in two-and-a-half years of part-time study. Subjects are offered in sequence, in four- or eight-week periods, in four-week modules. Each module consists of 18 hours of lectures in the first week, 12 hours of tutorials in the second and third week, with the exam and/or assignment deadline being at the end of the fourth week. Each module is rated at three credit points.

The subjects cover the main areas of:

- Aerospace operations and the aerospace industry
- Computer and information technology and applications
- Communication and documentation
- Commercial subjects and management.

ADMISSION

Applicants for admission must hold the Singapore Polytechnic Diploma in Mechanical or Electrical Engineering, or equivalent. Industrial experience gained and other studies completed will also be taken into account in assessing applications.

EXEMPTIONS

No exemptions will be granted. It is believed that there is always further learning that can take place in every subject area, hence the philosophy will be

to give experienced students extra assignments to assist this process.

ATTENDANCE PATTERN

The course will commence in the second half of each year, in August/September, and continue for two-and-a-half years with a minor break in December-January and a longer break in the middle of the year. It will be completed in December, thus requiring two-and-a-half years of four-week blocks of sequential part-time study.

USE OF COMPUTERS

Students will be expected to have access to an appropriate personal computer and will be encouraged to acquire their own computer early in the course.

MEMBERSHIP OF THE SINGAPORE INSTITUTE OF AEROSPACE ENGINEERS

The course is endorsed by the Singapore Institute of Aerospace Engineers, and students enrolled in the course are strongly encouraged to become student members of SIAE. Student members who have completed the course, and who have five years working experience in the aerospace industry, will be admitted to corporate membership of SIAE. The course is also supported by SIA Engineering Company Pte Ltd.

INFORMATION

An information evening is planned to be held in July, about a month before classes commence. Details of this can be obtained from Sumbershire.

INQUIRIES

General inquiries can be made by telephone during office hours on 330 2664 or 330 2666. Applications for admission should be made directly to Sumbershire Education Consultants Pte Ltd, Singapore.

COURSE STRUCTURE

Semester 1

- 48111 Aerospace Operations 1 (3cp)
- 48112 Numerical Methods (3cp)
- 48113 Aerospace Materials and Processes (6cp)

Semester 2

- 48114 Information Technology (6cp)
- 48121 Communication (3cp)
- 48132 Technological Change and Strategic Planning (3cp)
- 48133 Design Awareness (3cp)
- 48123 Computer-aided Drawing and Design (3cp)

Semester 3

- 48124 Total Quality Management (3cp)
- 48134 Computer Applications in the Aerospace Industry (3cp)
- 24107 Marketing (3cp)
- 48131 Documentation (3cp)

Semester 4

- 48125 Aerospace Operations 2 (6cp)
- 48135 Aircraft Maintenance Management (6cp)
- 48141 Engineering Management 1 (3cp)

Semester 5

- 48142 Engineering Management 2 (3cp)
- 48143 Aerospace Operations 3 (6cp)
- 48144 The Industrial Culture (3cp)
- 48145 Professional Review (3cp)

STAFF AND LOCATION OF FACILITIES

In Singapore:
Sumbershire Education Consultants Pte Ltd
79 Robinson Rd, #13-01 CPF Building
Singapore 0104

At UTS: The office of the Bachelor of Technology in Aerospace Operations program is located in the Engineering Building (Building 2), City campus, Broadway.

	Room	Ext
<i>Director, Bachelor of Technology in Aerospace Operations</i>		
Mr L Reece	2/416	2587
<i>Support staff</i>		
<i>Administrative Secretary</i>		
Ms R Ciudad	2/630	2664

SCHOOL OF CIVIL ENGINEERING

The School offers Bachelor's degrees in Civil Engineering, Structural Engineering and Civil 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 things, 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.

UTS offers two specialisations within the field of civil engineering, covered in depth by the courses in structural engineering and civil and environmental engineering.

Structural Engineering involves the design, construction and operation of the structural framework and elements making up bridges, high-rise buildings, reservoirs and all other facilities which carry loads or resist forces. Stresses and structural behaviour under loads must be determined for structures ranging from an aeroplane fuselage to an offshore platform for oil drilling.

Environmental engineering is a new and evolving field, and 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.

All three 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 (EC03)

SANDWICH ATTENDANCE PATTERN

Academic requirements¹

		CP	HPW
Stage 1			
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
Stage 2			
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
Stage 3			
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
Stage 4			
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
Stage 5			
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

or

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 ² Project ³	3	3

Stage 8

47189	Management for Engineers Project ² Electives ³	4	3
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PART-TIME ATTENDANCE PATTERN

Academic requirements¹

		CP	HPW
Year I			
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		
<i>Autumn semester</i>		
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
<i>Spring semester</i>		
65023	Engineering Chemistry	6 6
33221	Engineering Mathematics 2A	3 3
47142	Environmental Engineering	3 3
47128	Surveying 1B	3 3
Year 3		
<i>Autumn semester</i>		
47137	Mechanics of Solids 2	3 3
47149	Construction	3 3
66032	Geology for Engineers	3 3
67022	Materials Science for Engineers	3 3
<i>Spring semester</i>		
47135	Fluid Mechanics	4 3
47131	Structural Mechanics	3 3
47134	Construction Materials	3 3
47146	Soil Mechanics	4 3
Year 4		
<i>Autumn semester</i>		
47140	Concrete Design 1	3 3
47144	Timber Design	3 3
47152	Public Health Engineering	3 3
47153	Probability and Statistics	3 3
<i>Spring semester</i>		
47145	Hydraulics	3 3
47141	Structural Analysis 1	3 3
47150	Concrete Design 2	4 3
47154	Concrete Technology	3 3
Year 5		
<i>Autumn semester</i>		
47151	Structural Analysis 2	4 3
47156	Soil Engineering	3 3
47159	Project Planning	3 3
47168	Surveying 2	3 3
<i>Spring semester</i>		
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		
<i>Autumn semester</i>		
47164	Metals Technology	3 3
47166	Geotechnical Engineering	3 3
<i>or</i>		
47176	Ground Modification	3 3
47167	Road Engineering Electives ³	3 3
<i>Spring semester</i>		
47155	Hydrology	3 3
47171	Steel Structures and Concept Design 1	4 3
47175	Water Resources Engineering	3 3
47179	Construction Contracts Project ² Electives ³	3 3

Stage 7		
<i>Autumn semester</i>		
47177	Transportation Engineering	3 3
47178	Project Economics Project ² Electives ³	3 3
<i>Spring semester</i>		
47189	Management for Engineers Project ² Electives ³	4 3

¹ Industrial Experience, 47997 (Sandwich) and 47999 (Part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

² 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

³ Electives to be between 12 and 18 credit points such that the course requirements of 192 credit points is met. Electives can be selected from the School's postgraduate subjects. Any subjects offered by other schools of the University may also be taken up to a maximum of 6 credit points.

Bachelor of Engineering in Structural Engineering (EC04)

SANDWICH ATTENDANCE PATTERN

Academic requirements¹

	CP	HPW
Stage 1		
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
Stage 2		
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
Stage 3		
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
Stage 4		
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
Stage 5		
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 ²	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 ³	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 ² Project ³	3	3

PART-TIME ATTENDANCE PATTERN

Academic requirements¹

	CP	HPW
Year 1		
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
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 ² Project ³	3	3

Spring semester

47285	Design Project	6	6
47288	High-rise Buildings Electives ² Project ³	3	3

¹ Industrial Experience, 47997 (Sandwich) and 47999 (Part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

² Electives to be between 6 and 9 credit points so that the course requirements of 192 credit points is met.

³ 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

Bachelor of Engineering in Civil and Environmental Engineering (EC07)

SANDWICH ATTENDANCE PATTERN

Academic requirements¹

		CP	HPW
Stage 1			
33121	Engineering		
	Mathematics 1A	3	3
47110	Introduction to Civil Engineering	3	3
47112	Computer Applications	3	3
47117	Statics	4	3
47118	Surveying 1A	3	3
65023	Engineering Chemistry	6	6
68021	Engineering Physics	6	6
Stage 2			
33122	Engineering		
	Mathematics 1B	3	3
47113	Computer Programming	3	3
47127	Mechanics of Solids 1	4	3
47128	Surveying 1B	3	3
51131	Communication 1	3	3
67022	Materials Science for Engineers	3	3
91650	Introduction to Environmental Biology	3	3
Stage 3			
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
Stage 4			
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

Stage 5

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 ³	3	3

Stage 8

47177	Transportation Engineering	3	3
47189	Management for Engineers	4	3
47482	Waste Minimisation Electives ² Project ³	3	3

PART-TIME ATTENDANCE PATTERN

Academic requirements¹

		CP	HPW
Year 1			
<i>Autumn semester</i>			
33121	Engineering		
	Mathematics 1A	3	3
68022	Engineering Physics (part-time)	3	3
47117	Statics	4	3
47120	Graphics	4	3
<i>Spring semester</i>			
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
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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 Electives ² Project ³	3	3
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Spring semester

47175	Water Resources Engineering	3	3
47189	Management for Engineers Project ³	4	3

¹ Industrial Experience, 47997 (Sandwich) and 47999 (Part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

² Electives to be between 6 and 9 credit points so that the course requirements of 192 credit points is met.

³ 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 School of Civil Engineering, 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 schools in the Faculty of Engineering (with the permission of these schools);
- subjects offered by other faculties within UTS, including language subjects, business studies and science (up to the six-credit-point limit set by the School of Civil Engineering);
- subjects offered through other BE degree courses and 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 1996:

	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 1996:

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.17 of this handbook).

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 Damages 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 1996. Further information about graduate subjects can be obtained through the School Office.

Staff and location of facilities

The School of Civil Engineering is located in the Engineering Building (Building 2), City campus, Broadway. The School Office and academic staff offices are on Level 5. Laboratories and classrooms are on Levels 1, 2 and 5.

The names, office locations and professional interests of academic and senior support staff are listed below. The University's telephone number is 330 1990 and staff can be reached at the extension numbers given below. Messages may be left, either in person or by telephone, at the School Office, Room 2/511 ext 2615.

	Room	Ext
<i>Head of School</i>		
Associate Professor G G O'Loughlin	511C	2644
Water Engineering		
<i>Deputy Head of School</i>		
Mr E A Brady	511A	2627
Surveying		

<i>Professors of Civil Engineering</i>			Dr R Sri Ravindrarajah	509	2625
Emeritus Professor			Concrete Technology		
K A Faulkes	526	2646	Dr G L Ring	506	2622
Structural Engineering			Soil Engineering		
Professor S L Bakoss	528	2629	Dr A Saleh	517	2635
Structural Mechanics			Structural Mechanics and Analysis		
<i>Associate Professors</i>			<i>Honorary Associate</i>		
Mr T A Anderson	521	2639	Mr J L Irish	501	2617
Construction and Management			Water and Environmental Engineering		
Dr M R Hausmann	527	2645	<i>Academic staff</i>		
Soil Engineering			<i>Fractional-time</i>		
Dr B Samali	513	2632	Mrs A P Gardner	536	2648
Structural Dynamics and Structural Mechanics			Mr C Wilkinson	518	2631
Dr S Vigneswaran	523	2641	Structural Mechanics – Fabric Structures		
Environmental Engineering			<i>General staff</i>		
<i>Academic staff</i>			<i>Secretary to Head of School</i>		
Dr S C Beecham	507	2623	Mrs L Venglinsky	511	2630
Water Engineering			<i>General Secretary</i>		
Dr H W Chung	519	2637	Mrs S Ali	511	2650
Construction Materials			<i>P/T Word Processor Operator</i>		
Mr K Crews	503	2619	Ms J Chetcuti	511	2616
Timber Engineering			<i>Project Engineering Manager</i>		
Mrs P Hagare	520	1952	Mr M J Taragel	114C	2519
Environmental Engineering			<i>Engineer in Charge</i>		
Mr K Halstead	522	2640	Mr I A Hutchings	116J	2512
Local Government Engineering			<i>Engineers</i>		
Dr P A Hazelton	512	2661	Mr A Lah	560A	1338
Environmental Engineering			Mr H H Ngo	547	2653
Dr J W Ivering	529	2647	<i>Senior Technical Officers</i>		
Civil Engineering Design			Mr J Holmes	542	2514
Dr M R Karim	505	2621	Mr M Benitez	116M	2516
Structural Mechanics			Mr P M Chatfield	560A	1024
Mr P J Kenny	502	2618	Mr J P Martinus	1/2A252	1029
Roads and Transport			<i>Technical Officers</i>		
Dr K L Lai	510	2626	Mr H Hefka	116N	2515
Structural Mechanics Design and Construction			Mr D R Hooper	116N	2518
Mr P C Liu	508	2624	Mr W Howse	102B	2502
Civil Engineering Design			Mr J McMahan	204	2537
Dr S Parsanejad	504	2620	Mr St J Parmigiani	116M	2517
Design of Steel Structures and Structural Analysis			<i>Senior Laboratory Craftsmen</i>		
Dr M Patarapanich	524	2642	Mr H Myers	1/2A253B	1026
Water Engineering			Mr S Graham	253	1026
			<i>Stores Officer</i>		
			Mr S E Gabor	205B	2536

SCHOOL OF ELECTRICAL ENGINEERING

The School offers Bachelor's degrees in Electrical Engineering, Computer Systems Engineering, 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 of not only software programming, but 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 (EE03)

SANDWICH ATTENDANCE PATTERN

Academic requirements¹

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

Stage 5

45151 Signal Theory 1	3	3
45154 Contextual Studies	3	3
45252 Power Apparatus and Systems	6	6
45155 Project A	3	3
45264 Fields and Waves	3	3
45153 Analogue Electronics	6	6

Stage 6

45163 Real-time Software and Interfacing	3	3
45152 Signal Theory 2	3	3
45166 Project Management	3	3
68035 Communications Physics	3	3
45266 Mathematical Modelling	3	3
45661 Communications Networks	3	3
Electives	6	6

Stage 7

45662 Signal Processing	3	3
45678 Project B (Tel)	3	3
45182 Thesis 1	3	3
45663 Digital Transmission	3	3
45664 Communications Engineering	3	3
45668 Teletraffic Engineering	3	3
45176 Systems Engineering	4	3
45274 Physical Design and Production	3	3

Stage 8

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

Power and Machines strand

CP HPW

Stage 5

45151 Signal Theory 1	3	3
45154 Contextual Studies	3	3
45252 Power Apparatus and Systems	6	6
45153 Analogue Electronics	6	6
45155 Project A	3	3
45265 Numerical Methods	3	3

Stage 6

45163 Real-time Software and Interfacing	3	3
45264 Fields and Waves	3	3

45166	Project Management	3	3
45461	Power Circuit Theory	3	3
45481	Dynamics of Electric Machines	3	3
45274	Physical Design and Production	3	3
45482	Power Equipment Design	3	3
45462	Power Electronics	3	3

Stage 7

45152	Signal Theory 2	3	3
45182	Thesis 1	3	3
45176	Systems Engineering	4	3
45472	Project B (P&M)	3	3
	Electives	6	6

Stage 8

45483	Power Systems Analysis and Protection	6	6
45484	Electrical Variable Speed Drives	3	3
45183	Thesis 2	12	6
68034	Electrical Power Generation	3	3

Instrumentation and Control strand

CP HPW

Stage 5

45151	Signal Theory 1	3	3
45154	Contextual Studies	3	3
45252	Power Apparatus and Systems	6	6
45153	Analogue Electronics	6	6
45155	Project A	3	3
45264	Fields and Waves	3	3

Stage 6

45163	Real-time Software and Interfacing	3	3
45152	Signal Theory 2	3	3
45166	Project Management	3	3
45561	Digital Systems Design	3	3
45581	Analogue and Digital Control	6	6
45265	Numerical Methods	3	3
	Elective	3	3

Stage 7

45562	Data Acquisition and Distribution Systems	6	6
45662	Signal Processing	3	3
45577	Project B (I&C)	3	3
45182	Thesis 1	3	3
45176	Systems Engineering	4	3

45274	Physical Design and Production	3	3
	Elective	3	3

Stage 8

45183	Thesis 2	12	6
	Elective 1 (I&C)	3	3
	Elective 2 (I&C)	3	3
	Social Science elective	6	3

PART-TIME ATTENDANCE PATTERN**Academic requirements¹**

CP HPW

Stage 1*Autumn semester*

35101	Mathematics 1	6	6
68031	Engineering Physics 1	6	6
45115	Engineering Practice ²	3	3

Spring semester

35111	Discrete Mathematics	3	3
45113	Digital Techniques	3	3
68032	Engineering Physics 2	3	3
45116	Electrical Engineering 1	3	3
45125	Engineering Discovery ²	3	3

Stage 2*Autumn semester*

35102	Mathematics 2	6	6
45123	Software Development 1	6	6

Spring semester

45124	Electrical Engineering 2	6	6
68033	Engineering Physics 3	3	3
45135	Engineering Communication	3	3
45133	Software Development 2	3	3

Stage 3*Autumn semester*

33310	Engineering Mathematics 3	6	6
45134	Network Theory	6	6
67023	Materials Technology	3	3

Spring semester

45144	Electronic Devices and Circuits	6	6
45145	Engineering Statistics	3	3
45242	Electromagnetics	3	3

Stage 4

Autumn semester

45141	Continuous and Discrete Systems	6	6
45143	Computer Hardware	3	3
45151	Signal Theory 1	3	3
45154	Contextual Studies	3	3

Spring semester

45153	Analogue Electronics	6	6
45252	Power Apparatus and Systems	6	6
45155	Project A	3	3

Stage 5

Autumn semester

45152	Signal Theory 2	3	3
45163	Real-time Software and Interfacing	3	3
45166	Project Management	3	3

Spring semester

<i>Subjects selected from strand</i>			
45265	Numerical Methods	3	3

Stage 6

Autumn semester

<i>Subjects selected from strand</i>			
45274	Physical Design and Production	3	3
	Social Science elective	3	3

Spring semester

<i>Electives</i>			
45176	Systems Engineering	4	3
	Project B	3	3
45182	Thesis 1	3	3

Stage 7

Autumn semester

<i>Subjects selected from strand</i>			
45183	Thesis 2	12	6

¹ Industrial Experience, 45997 (Sandwich) and 45999 (Part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

² 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 (EE04)

SANDWICH ATTENDANCE PATTERN

Academic requirements¹

CP HPW

Stage 1

35101	Mathematics 1	6	6
68031	Engineering Physics 1	6	6
45115	Engineering Practice ²	3	3
35111	Discrete Mathematics	3	3
45113	Digital Techniques	3	3
45116	Electrical Engineering 1	3	3

Stage 2

68032	Engineering Physics 2	3	3
45125	Engineering Discovery ²	3	3
35102	Mathematics 2	6	6
45123	Software Development 1	6	3
45124	Electrical Engineering 2	6	6

Stage 3

45143	Computer Hardware	3	3
45133	Software Development 2	3	3
45135	Engineering Communication	3	3
33310	Engineering Mathematics 3	6	6
45134	Network Theory	6	6
67023	Materials Technology	3	3

Stage 4

45144	Electronic Devices and Circuits	6	6
45145	Engineering Statistics	3	3
45163	Real-time Software and Interfacing	3	3
45141	Continuous and Discrete Systems	6	6
45342	Electromechanical Systems	3	3
	Elective	3	3

Stage 5

45353	Operating Systems	6	6
45151	Signal Theory 1	3	3
45364	Digital Systems	3	3
45153	Analogue Electronics	6	6
45155	Project A	3	3
45363	Software Engineering	3	3

Stage 6			
45154	Contextual Studies	3	3
45152	Signal Theory 2	3	3
45166	Project Management	3	3
45372	Computer Systems Analysis	3	3
45266	Mathematical Modelling	3	3
31141	Database Structures and Management	3	3
	Social Science elective	3	3

Stage 7			
45661	Communications Networks	3	3
45182	Thesis 1	3	3
45176	Systems Engineering	3	3
45562	Data Acquisition and Distribution Systems	6	6
	Electives	9	9

Stage 8			
45382	Computer Systems Design	3	3
31926	Paradigms of Intelligence	4	3
45183	Thesis 2	12	6
45387	Project B (CSE)	3	3
	Elective	3	3

PART-TIME ATTENDANCE PATTERN

Academic requirements¹

CP HPW

Stage 1			
<i>Autumn semester</i>			
35101	Mathematics 1	6	6
68031	Engineering Physics 1	6	6
45115	Engineering Practice ²	3	3
<i>Spring semester</i>			
35111	Discrete Mathematics	3	3
45113	Digital Techniques	3	3
45116	Electrical Engineering 1	3	3
68032	Engineering Physics 2	3	3
45125	Engineering Discovery ²	3	3

Stage 2			
<i>Autumn semester</i>			
35102	Mathematics 2	6	6
45123	Software Development 1	6	3
<i>Spring semester</i>			
45124	Electrical Engineering 2	6	6
45143	Computer Hardware	3	3
45133	Software Development 2	3	3

45135	Engineering Communication	3	3
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Stage 3

<i>Autumn semester</i>			
33310	Engineering Mathematics 3	6	6
45134	Network Theory	6	6
67023	Materials Technology	3	3

<i>Spring semester</i>			
45144	Electronic Devices and Circuits	6	6
45145	Engineering Statistics	3	3
45163	Real-time Software and Interfacing	3	3

Stage 4

<i>Autumn semester</i>			
45141	Continuous and Discrete Systems	6	6
45342	Electromechanical Systems	3	3
45353	Operating Systems	6	6

<i>Spring semester</i>			
45151	Signal Theory 1	3	3
45364	Digital Systems	3	3
45153	Analogue Electronics	6	6
45155	Project A	3	3

Stage 5

<i>Autumn semester</i>			
45152	Signal Theory 2	3	3
45154	Contextual Studies	3	3
45363	Software Engineering	3	3
45166	Project Management	3	3

<i>Spring semester</i>			
31141	Database Structures and Management	3	3
45372	Computer Systems Analysis	3	4
	Electives	6	6

Stage 6

<i>Autumn semester</i>			
45661	Communication Networks	3	3
45562	Data Acquisition and Distribution Systems	6	6
45266	Mathematical Modelling	3	3

Spring semester

45182	Thesis 1	3	3
45176	Systems Engineering	4	3
45387	Project B (CSE)	3	3

Stage 7

45382	Computer Systems Design	3	3
45183	Thesis 2	12	6

¹ Industrial Experience, 45997 (Sandwich) and 45999 (Part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

² 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 (EE06)

SANDWICH ATTENDANCE PATTERN

Academic requirements¹

CP HPW

Stage 1

35101	Mathematics 1	6	6
35111	Discrete Mathematics	3	3
68031	Engineering Physics 1	6	6
45113	Digital Techniques	3	3
45116	Electrical Engineering 1	3	3
45115	Engineering Practice ²	3	3

Stage 2

35102	Mathematics 2	6	6
45123	Software Development 1	6	3
68032	Engineering Physics 2	3	3
45124	Electrical Engineering 2	6	6
45125	Engineering Discovery ²	3	3

Stage 3

33310	Engineering Mathematics 3	6	6
45133	Software Development 2	3	3
45143	Computer Hardware	3	3
67023	Materials Technology	3	3
45134	Network Theory	6	6
45135	Engineering Communication	3	3

Stage 4

45145	Engineering Statistics	3	3
55080	Information Issues in Telecommunications	6	3
45363	Software Engineering	3	3
45163	Real-time Software and Interfacing	3	3
45144	Electronics Devices and Circuits	6	6
45141	Continuous and Discrete Systems	6	6

Stage 5

45353	Operating Systems	6	6
45364	Digital Systems	3	3
45155	Project A	3	3
45363	Software Engineering	3	3
45152	Signal Theory 1	3	3
45266	Mathematical Modelling Social Science elective	3	3

Stage 6

45661	Communication Networks	3	3
31141	Database Structures and Management	3	3
45152	Signal Theory 2	3	3
45242	Electromagnetics	3	3
45166	Project Management	3	3
27001	Commercial Issues in Telecommunications	6	3
	Social Science elective	3	3

Stage 7

45668	Teletraffic Engineering	3	3
45667	Broadband Telecommunications Networks	3	3
45182	Thesis 1	3	3
45264	Fields and Waves	3	3
45662	Signal Processing	3	3
45663	Digital Transmission	3	3
79371	Legal Issues in Telecommunications	6	3

Stage 8

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

¹ Industrial Experience, 45997 (Sandwich) and 45999 (Part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

² 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.

Electives

The Social Sciences 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 schools should first seek approval from the School of Electrical Engineering.

School of Electrical Engineering offers 45780 Engineering Research: The Cutting Edge in Stages 7/8 for all strands. For more details please see the School entry.

Postgraduate subjects which may be available as electives in 1996:

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.17 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 section of this handbook.

Staff and location of facilities

The School of Electrical Engineering is located in the Tower Building (Building 1), City campus, Broadway and occupies Levels 18 to 25 together with specialist laboratories on Levels 3 and 9. The School Office is on Level 24.

The names, office locations, and professional interests of academic and selected support staff are given below. The University's telephone number is 330 1990 and staff can be reached on the extensions listed. Each staff member publishes times of availability for consultation with students. The consolidated list is on the Level 24 noticeboard. Messages for staff may be left either in person or by telephone at the School Office, ext 2433.

	Room	Ext
<i>Head of School</i>		
Professor K W Yates	2427	2436
Signal Processing, Communication System Theory, Packet Radio Communications, Spread Spectrum Communications, Synchronisation Issues in Communications		
<i>General Office</i>		
Inquiries	2424	2432
<i>Academic staff</i>		
<i>Professors of Engineering</i>		
Professor C R Drane	2221A	2390
Positioning Systems, Intelligent Vehicle Highway Systems, Software Engineering		
Professor V S Ramsden	2417C	2420
Electrical Machines, Electrical Variable Speed Drives, Rehabilitation Engineering (Aids for Disabled People), Electromagnetics		
A/Professor P Bryce	2420A	2425
Microhydroelectricity, Appropriate Technology; Technology for Developing Countries, Fibre-optic Communications, Electromagnetic Theory		

	Room	Ext
A/Professor A Ginige	2224	2393
Digital Systems, Image Processing, Medical Imaging, Image and Video Coding, Image and Video Databases, Content-based Retrieval of Multimedia Information, Hypertext and Hypermedia Systems		
A/Professor H T Nguyen	2517	2451
Robust Adaptive and Multivariable Control, Systems Instrumentation and Control, Biomedical Engineering, Neural Networks and Fuzzy Systems, Power Electronics and Machine Control, Mechatronics, Real-time Image Processing and Signal Processing		
A/Professor C E Peterson	2220A	2392
Research Policy, Computer-integrated Manufacturing, Image Analysis, Process Control, Robotics		
A/Professor S Reisenfeld	2512B	2448
Communications Systems, Satellite Communication, Information Theory, Modulation, Channel Coding, Synchronisation, Mobile Communications, Wireless Networks, Neural Networks		
A/Professor A P Seneviratne	2431	2441
Protocol Design, Software Engineering, Computer Networks, Data Communications, Operating Systems		
<i>Adjunct Associate Professor</i>		
A/Professor R Stere	2315	2401
Instrumentation and Control, Data Acquisition Systems, Electronic Measurements, Electrical Engineering Education		
<i>Other academic staff</i>		
Mr T Aubrey	2417B	2360
Antenna and Propagation, Microwave Engineering		
Mr J Boswell	2222	2382
Safe Intelligent Autonomous Robots, Safe Software		

	Room	Ext		Room	Ext
Dr J D Carmo	1921	2338	Ms V McKain	2433	2443
Electromagnetics, Numerical Methods and Optimisation, Power System Protection			Instrumentation and Control, Biomedical Engineering		
Mr N J Carmody	2221B	2391	Mr P McLean	1921	2339
Microcomputer System Design, Operating Systems, Computer Architecture, Digital Control Systems, VLSI			Power and Machines, Power System Protection, Numerical Methods, Parallel Processing, Electromagnetic Communications		
Dr J Daba	2420C	2530	Dr R Meegoda	2227	2396
Teletraffic Engineering, Telecommunication Systems, Analysis and Design, Image Processing, Radar Remote Sensing			Computer Systems Engineering, Robotics, Software Engineering, Software Quality, Multimedia, Systems Engineering		
Dr M Eckert	2420D	2428	Mr S Murray	2222	1553
Human Visual Perception, Medical Imaging, Signal Processing, Biomedical Signal Processing, Image Processing, Signal Compression			Embedded Systems, Real-time Systems, Operating Systems, Computer Systems Engineering		
Mr K K Fung	2225	2394	Dr J G Nicol	2119A	2370
Parallel Processing, Software Engineering, Computer Simulation, Microcomputer Engineering, Digital Systems			Control Theory, Optimal Control, Multivariable Control		
Mr G I Gedgovd	2420E	2429	Dr V Ramaswamy	2417A	2418
Power Systems, Computer Applications, Operations Research, Numerical Methods and Optimisation, Expert Systems			Power Electronics, Electrical Machines, Variable Speed Driver, Computer Simulation and Modelling		
Ms T Ginige	2323B	1911	Dr B S Rodanski	2420B	2426
Protocol Design, Computer Networks, Data Communications			Numerical Methods, Computer-aided Design, Device Modelling for CAD, Software Engineering		
Mr W G Hooper	2428	2438	Dr A M Sanagavarapu	2512A	2447
Power Systems, Electromagnetic Theory, Educational Psychology, Electrical Plant Design			High Frequency Electromagnetics, Wave Propagation, Microwave Processing of Materials, New Materials for Microwave Applications, Application of Microwave in Medicine, Antenna Engineering, Electromagnetic Compatibility, Mobile Communication, Computation Electromagnetics		
Mr J R M Leaney	2221A	2389	Mr C Scott	2220D	2397
Software/System Engineering, Real-time Computing, Intelligent Instrumentation, Robotics			Intelligent Transport Systems, Motor Vehicle and Robotic Navigation, Positioning Systems Software Engineering		
Mr P G Lewis	2431	2431	Mr M Sifer	2545	2460
Engineering Education, Engineering Management, Project Management			Software Engineering, CASE Tools, Visual Notations, Formal Specification and Functional Programming		
Dr D B Lowe	2226	2526			
Image Processing and Analysis, Object-oriented Software Development, Software System Specification					

	Room	Ext
Ms E A Taylor	2432	2442
Sociology and Engineering, Engineering Education, Appropriate Technology, Engineering and Society, Law and Engineering		
Dr D Webster	2520B	2453
Estimation and Detection Theory, Smart Sensors and Intelligent Transducers, Surface Acoustic Wave (SAW) Sensors, Hybrid Thick Film (HTF) Sensors and Circuits, Radar, Sonar		
Dr K Yasukawa	2200	2437
Mathematics Education, Nonlinear Systems and Control, Numeracy and Engineering		
Dr Jianguo Zhu	1823	2318
Electromagnetics, Electrical Machines and Drive Systems, Power Electronics		
<i>Industrial Training Advisers</i>		
Mr P G Lewis	2431	2431
Ms E A Taylor	2432	2472
<i>Support staff</i>		
Mrs E With	2423	2432
Student Administration		
Mr W A Symons	2210B	2379
Research Computing Centre Manager		

	Room	Ext
Mr W M Holliday	1814	2315
Engineer (P&M)		
Mr R Jarman	1927	2368
Engineer, PD		
Mr P Mallon	2210C	2380
Engineer, CSE		
Mr R Nicholson	2118	2369
Engineer, Instrumentation and Control		
Mr A C Curgenvin	2021	2364
Senior Technical Officer, Power and Machines		
Mr G Evans	2313	2398
Senior Technical Officer, Communications		
Mr P Gimes	2017	2347
Senior Technical Officer, Telecommunications		
Mr S Y Shoon	2520C	2454
Engineer		
Mr L Weber	2520D	2455
Senior Technical Officer, Instrumentation and Control		
Mr R Moore	2033	2366
Senior Technical Officer, Mechanical Workshop		

SCHOOL OF MECHANICAL ENGINEERING

The School offers Bachelor's degrees in Mechanical Engineering and Manufacturing Systems Engineering and a combined Bachelor of Engineering (in Mechanical or Manufacturing Systems Engineering) and Master of Design. The work of our graduates is important in the sustainable creation of wealth which is central to enhancing the quality of life in Australia and globally.

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 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.

The Mechanical Engineering degree was restructured in 1994 to reduce the number of separate subjects from 48 to 39. The time allocated to individual subjects was correspondingly increased. At the same time, the Manufacturing Engineering degree became Manufacturing Systems Engineering, to be progressively introduced as the 1995 student intake moves through the program.

Bachelor of Engineering in Mechanical Engineering (EM03)

SANDWICH ATTENDANCE PATTERN

Academic requirements¹

	CP	HPW
Stage 1		
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
Stage 2		
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
Stage 3		
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
Stage 4		
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 ²	6	4.5
	4	3

Stage 8		
46034 Project B	6	4.5
46992 Professional Practice Elective 2 ²	6	4.5
	4	3
Elective 3 ²	4	3
Elective 4 ²	4	3

¹ Industrial Experience, 46997 (Sandwich) and 46999 (Part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

² Electives are to be taken within the School, except with the written approval of the Head of School. 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 requirements¹

	CP	HPW
Stage 1		
<i>Autumn semester</i>		
33121 Engineering Mathematics 1A	3	3
46310 Introduction to Engineering	4	3
46311 Engineering Graphics	4	3
46810 Introduction to Computing	4	3
<i>Spring semester</i>		
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 Elective 1 ²	6	4.5
		4	3

Spring semester

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

¹ Industrial Experience, 46997 (Sandwich) and 46999 (Part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

² Electives are to be taken within the School, except with the written approval of the Head of School. 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
46342	Unitised Load Handling
46343	Appropriate Technology

- 46344 Engineering Speculation
- 46345 Industrial Design
- 46346 Bulk Materials Handling

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 1996:

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.17 of this handbook).

- 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 (EM07)

SANDWICH ATTENDANCE PATTERN¹

Academic requirements²

CP HPW

Stage 1

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

Stage 2

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

Stage 3

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

Stage 4

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

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
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	6	4.5
	Elective 1 ³	4	3
Stage 8			
46034	Project B	6	4.5
46337	Manufacturing Systems Design	4	3
46992	Professional Practice	6	4.5
	Elective 2 ³	4	3
	Elective 3 ³	5	3

¹ 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.

² Industrial Experience, 46997 (Sandwich) and 46999 (Part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

³ Electives are normally to be taken within the School, except with written approval of the Head of School. Electives are offered on demand and not all electives are offered every year. One elective must be at least 5 credit points.

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

Bachelor of Engineering/ Master of Design (EM06)

DESCRIPTION

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 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 schools. 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 330 2666.

COURSE STRUCTURE

Mechanical Engineering subjects in the combined degree:

Academic requirements¹

CP HPW

Stage 1

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

Stage 2

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

Stage 3

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

Stage 4

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

Stage 5

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

Stage 6

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 Elective 1 ²	6	4.5
		4	3

Stage 8

46992	Professional Practice Elective 2 ²	6	4.5
		4	3

¹ Industrial Experience, 46997 (Sandwich) and 46999 (Part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

² Electives are normally to be taken within the School, except with written approval of the Head of School. Electives are offered on demand and not all electives are offered every year. One elective must be at least 5 credit points.

Manufacturing Systems Engineering subjects in the combined degree:

Academic requirements¹

CP HPW

Stage 1

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

Stage 2

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

Stage 3

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

Stage 4

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 Elective 1 ²	6	4.5
		4	3

Stage 8

46337	Manufacturing Systems Design	4	3
46992	Professional Practice Elective 2 ²	6	4.5
		4	3

¹ Industrial Experience, 46997 (Sandwich) and 46999 (Part-time) to be undertaken in accordance with the Faculty's industrial experience regulations.

² Electives are normally to be taken within the School, except with written approval of the Head of School. Electives are offered on demand and not all electives are offered every year. One elective must be 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

Staff and location of facilities

The School of Mechanical Engineering is located in the Engineering Building (Building 2), City campus, Broadway. The School Office and academic staff offices are on Level 6. Laboratories and classrooms are on Levels 2, 3, 4 and 6.

The names, office locations and professional interests of academic and senior support staff are set out below. The University's telephone number is 330 1900 and staff may be reached at the extensions below. Messages may be left, either in person or by telephone, at the School Office, 330 2669.

	Room	Ext
<i>Head of School</i>		
Assoc Prof S F Johnston Design, Ergonomics, Social Context and Philosophy of Technology	612B	2668
<i>Deputy Head of School</i>		
Mr K A Stillman Control Engineering, Chemical Engineering, Real-time Computing, Simulation, Optimisation	624	2682
<i>Professor of Mechanical Engineering</i>		
Vacant		
<i>James N Kirby, Professor of Manufacturing Engineering</i>		
Prof F B Swinkels Design for Manufacturing, Materials, Computer-aided Design and Computer-aided Manufacturing	416	2588
Assoc Prof R M Spencer Production Planning and Control, Product Process Design and Development, Computer-aided Manufacture, Metrology/CMM, Robotics	606	2660
Mr T Brown Experimental and Computer-aided Stress Analysis and Design, Adhesives	604	2658
Dr Y P Bhasin Operations Management, Work Study, Planning and Control, Engineering Economics, Quality and Reliability, Manufacturing Processes	605	2659

	Room	Ext		Room	Ext
Dr G Hong Turbulence Transition, Internal Combustion Engines, Thermodynamics, Engineering Statistics	619	2677	<i>Support Staff</i> Mrs S Tanuwijaya Executive Officer	612	2671
Dr B P Huynh Computational Mechanics, Fluid Mechanics, Heat Transfer	616	2675	Mrs C Lew Administrative Assistant	612	2670
Dr A N F Mack Computing, Aerodynamics, Finite Element Methods, Computational Fluid Dynamics	626	2684	Mrs K Johnston Administrative Assistant	612	2669
Mr G M Marks Appropriate Technology, Industry Development Policy, Mechanics, Engineering Education	625	2683	Mr J J McCaffrey Engineer	323C	2558
Mrs H T McGregor Human Communication, Engineering and Social Issues, Cooperative Education, Engineering Documentation Education and Professional Development	620	2678	Mr K W Bowyer Engineer	648	2656
Mr L E Reece Turbomachinery, Computer-aided Engineering, Thermofluids, Ergonomics, Philosophy of Technology	416	2587	Mr K C Barnes Engineer	648A	2657
Dr F C O Sticher Advanced Kinematics and Dynamics, Instrumentation	623	2681	Mr A Revel Engineer	301A	2550
Mr R B Ward Engineering Management, Technical Communication, Maintenance Hazard and Risk	621	2679	Mr P H Alt Assistant Laboratory Manager	313A	2569
Mr R M Wiltshire Stress Analysis, Structural and Vehicle Dynamics, Machine Design, Computer-aided Engineering	416	2586	Mr T Bayfield Assistant Laboratory Manager	648	2691
Dr N Zhang Vibration Analysis, Machine and Rotor Dynamics	608	2662	Mr C Chapman Professional Officer	318A	2561
			Mr C E Evans Senior Technical Officer	212B	2544
			Mr J I Gibson Senior Technical Officer	212D	2543
			Mr L D'Arcy Senior Technical Officer	201	2533
			Mr R Turnell Senior Technical Officer	313A	2570
			Mr G Bayley Senior Laboratory Craftsperson	212	2545
			Mr S M Gordon Senior Laboratory Craftsperson	212	2546
			Mr J R Grove Workshop Supervisor	253B	1026
			Mr L Stonard Technical Officer	318A	2561
			Mr L Slade Senior Laboratory Craftsman	253	1026

UNDERGRADUATE SUBJECT DESCRIPTIONS

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

Within the Faculty of Engineering, the second digit indicates the school to which the subject belongs, and whether it is an undergraduate or postgraduate subject. For example:

Civil Engineering undergraduate subjects begin with '47'

Electrical Engineering undergraduate subjects begin with '45'

Mechanical Engineering undergraduate subjects begin with '46'

Bachelor of Technology subjects begin with '48'.

Bachelor of Engineering/Bachelor of Arts in International Studies subjects begin with '485'.

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.

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

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.

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.

24221

PRINCIPLES OF MARKETING

BT
4cp; 3hpw
subject coordinator: Ms R McGuiggan
School of Marketing

Provides students with an understanding of basic marketing theory and its application in manufacturing and general management; develops an understanding of the processes of market research and product development, pricing strategies, advertising, promotion and sales and distribution of goods and services to all sectors of the economy. Emphasis is placed on the decision-making strategies required in manufacturing environments.

Assessment: assignments 70 per cent, final examination 30 per cent

25310

FINANCIAL MANAGEMENT FOR MANUFACTURING ENGINEERING

BT
4cp; 3hpw
subject coordinator: R Traylor
School of Finance and Economics

Introduces the students to the terminology and basic concepts of economic and financial analysis and the application of financial management principles to manufacturing engineering. The course covers an introduction to economics,

supply and demand, revenue-cost relationships, time-value analysis, capital budgeting, project analysis, break-even analysis, effects income tax, depreciation, replacement studies; general accounting principals; financial ratios, annual reports and capital financing.

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 1

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 1A

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 1B

CE/SE/CEE

3cp; 3hpw

*prerequisite: 33121 Engineering Mathematics 1A
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 1
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; underdetermined 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: graphs, paths, trees. Set operations. Indexing and recurrence relations. Propositional and predicate calculus. Groups and monoids. Automata. Permutations, combinations, partitions, counting and allocation problems.

Assessment: class tests and assignments 40 per cent, final examination 60 per cent

44997**INDUSTRIAL EXPERIENCE
(SANDWICH)**

BE/BA

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: Mr P G Lewis, 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 communications 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 1**

EE/CSE/ET

3cp; 3hpw

*corequisite: 35101 Mathematics 1**subject coordinator: Mr W G Hooper*

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 1**

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 it 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 5000 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, for 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 5000 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 coordinator: Mr G I Gedgovd

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 coordinator: Ms E Taylor

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 loci, 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 I;

45113 Digital Techniques

subject coordinator: Mr K K Fung

Introduces microprocessor and microcomputer 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 K Yasukawa*

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**prerequisite: 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: Prof W Yates*

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 I; 45153 Analogue Electronics**subject coordinator: Ms V McKain*

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 requires 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 N J Carmody*

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 micro-computer 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 School Office, or 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: Mr P Mclean

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

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, multi-processor 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, 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 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: 4 assignments 100 per cent.

45382**COMPUTER SYSTEMS DESIGN**

CSE

3cp; 3hpw

prerequisite: 45372 Computer Systems Analysis
subject coordinator: Prof C R Drane

Teaches the student to specify and design complex technical computer systems. The student should be able to identify several solutions and then assess these solutions on functional, performance, interface, reliability, maintainability, safety and social acceptability 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.

The students will be formed into teams. Each team will be given the task of specifying, designing and implementing an

industrial monitoring and control system. Aspects of the design process will be elucidated by a series of lectures.

45387

PROJECT B (COMPUTER SYSTEMS ENGINEERING)

EE/CSE

3cp; 3hpw

prerequisites: 45372 *Computer Systems Analysis*; 45176 *Systems Engineering (recommended)*
corequisite: 45382 *Computer Systems Design*
subject coordinator: Prof C R Drane

Teaches the student to specify and design complex technical computer systems. The student should be able to identify several solutions and then assess these solutions on functional, performance, interface, reliability, maintainability, safety and social acceptability 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. This subject is part of the preparation of students for the individual project which forms the basis of the subjects 45182 and 45183 (Thesis 1 and Thesis 2).

45461

POWER CIRCUIT THEORY

EE

3cp; 3hpw

prerequisites: 45252 *Power Apparatus and Systems*; 45265 *Numerical Methods*
subject coordinator: Mr P McLean

Provides students from all strands with a basic knowledge of modern power system theory. It deals with three-phase transmission lines, transformers, symmetrical components and simple switching and electromechanical transients. The lecture material is reinforced with laboratory and computing assignments.

Assessment: problems 25 per cent, experiments 15 per cent, assignment 15 per cent, examination 45 per cent

45462

POWER ELECTRONICS

EE

3cp; 3hpw

prerequisites: 45153 *Analogue Electronics*; 45252 *Power Apparatus and Systems*
subject coordinator: Dr V E Ramaswamy

The course covers power semiconductor devices such as thyristors, GTOs power transistors, MOSFETs and standard power electronics circuits for AC/DC conversion using these devices. Device characteristics, firing and protection schemes are discussed. Circuit operation and analysis control techniques, and harmonic considerations are emphasised.

Assessment: assignments 25 per cent, two examinations 75 per cent

45472

PROJECT B (POWER AND MACHINES)

EE

3cp; 3hpw

prerequisites: at least one of 45461 *Power Circuit Theory*; 45462 *Power Electronics*; 45482 *Power Equipment Design*; 45483 *Power Systems Analysis and Protection*
subject coordinator: Dr V E Ramaswamy

Develops skills in the specification, engineering design, project planning, team work, practical implementation and testing of a typical hardware and software system or subsystem, on time and in compliance with given specifications.

A number of project topics will be offered for the students' teams to choose from. Students may also propose projects. The topics offered will be based on, or will require knowledge relevant to, the early special subjects in the Power and Machines strand (Power Circuit Theory, Power Electronics, Power Equipment Design, Dynamics of Electrical Machines). As for other strands, projects will be group projects for typically three to four students. Projects will be suitable for partitioning. They will be supported by laboratory resources and possibly research grants.

All academic staff members in the Power and Machines group may submit and supervise topics.

45481**DYNAMICS OF ELECTRICAL MACHINES**

EE

3cp; 3hpw

prerequisites: 45252 Power Apparatus and Systems; 45265 Numerical Methods
subject coordinator: Dr V E Ramaswamy

Deals with the transient behaviour of electric machines. The aims are to show how a motor can be modelled for operation under dynamic conditions and to illustrate how these models can be applied.

Assessment: laboratory 15 per cent, assignments 25 per cent, two examinations 60 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

45483**POWER SYSTEMS ANALYSIS AND PROTECTION**

EE

6cp; 6hpw

prerequisite: 45461 Power Circuit Theory
subject coordinator: Mr P McLean

Intended for students specialising in electric power engineering. The main topics studied are: modelling and measurement of parameters of transformers, lines, cables and rotating machines, steady-state and transient analysis of the

system; protection schemes and safety considerations. A substantial proportion of the time is devoted to project work involving digital computing and micro-processor-based relays.

Assessment: assignments 50 per cent, problems 20 per cent, experiments 10 per cent, final examination 20 per cent

45484**ELECTRICAL VARIABLE SPEED DRIVES**

EE

3cp; 3hpw

prerequisites: 45462 Power Electronics; 45481 Dynamics of Electrical Machines
subject coordinator: Prof V S Ramsden

The field of electrical variable speed drives is based on some fundamental principles implemented through rapidly changing technology. Students learn the underlying principles and gain practical experience with state-of-the-art technology. Laboratory work, demonstration, library research, group projects are supplemented by some specialist lectures. System effects such as supply harmonics, motor derating, acoustic noise, r.f. interference are discussed as well as different drive types and system models.

Assessment: laboratory reports 15 per cent, assignments 35 per cent, examination 50 per cent

45561**DIGITAL SYSTEMS DESIGN**

EE/CSE

3cp; 3hpw

prerequisite: 45163 Real-time Software and Interfacing
subject coordinator: A/Prof A Ginige

This subject introduces technology, architectures methodologies and tools for specification, design and implementation of medium scale digital systems. Micro-processor-based implementation methods are emphasised in this course.

Assessment: laboratory 5 per cent, assignments 45 per cent, examination 50 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; optoelectronic 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 a 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

45577**PROJECT B (INSTRUMENTATION AND CONTROL)**

EE

3cp; 3hpw

*corequisites: 45581 Analogue and Digital Control;**45562 Data Acquisition and Distribution Systems**subject coordinator: A/Prof R Stere*

Develops skills in the specification, engineering design, project planning, team work, practical implementation and testing of a typical hardware and software Instrumentation of Control system or substation, in time and in compliance with given specifications.

A number of project topics will be offered for the student teams to choose. The topics will be closely associated with the subjects

Data Acquisition and Distribution Systems, Analogue and Digital Control and Multivariable and Adaptive Control. Topics on applied instrumentation and control systems for power and machines, biomedical engineering, image processing, vision system and robotics will also be offered. The completed, working system will be presented and demonstrated in a seminar. A detailed project report will be submitted by the design team.

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 H T 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.

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.

45661**COMMUNICATIONS NETWORKS**

EE/ET

3cp; 3hpw

corequisite: 45665 *Data Communications*
subject coordinator: A/Prof A P Seneviratne

Begins with an introduction to local and metropolitan area networks. Their medium access mechanisms, and the logical link control covered by the IEEE 802 standards will be examined in detail. Then the higher level protocols of the ISO reference model: transport, session, presentation and application layers, will be examined. Special emphasis will be placed on the application layer standard covering CASEs and SASEs. Finally the concepts of wide area networking will be introduced by examining circuit-switching techniques. Common channel signalling, the ISDN and B-ISDN protocol architectures will be studied in detail.

Assessment: assignment 15 per cent, laboratory 25 per cent, final examination 60 per cent

45662**SIGNAL PROCESSING**

EE/CSE/ET

3cp; 3hpw

*prerequisite: 45152 Signal Theory 2**subject coordinator: Dr M Eckert*

Covers the theoretical basis of signal processing algorithms used in signal processing and the practical implementation of these algorithms using DSP micro-processors. Time and frequency domain processing, filter design, spectral analysis, speech processing and the FFT. There is a laboratory component using the TMS320C25 or TMS320C30.

Assessment: assignment 10 per cent, quiz 40 per cent, final examination 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

45664**COMMUNICATIONS ENGINEERING**

EE

3cp; 3hpw

*prerequisites: 45152 Signal Theory 2; 45153**Analogue Electronics; 45264 Fields and Waves**subject coordinator: Prof W Yates*

Considers the major high frequency elements of communication systems from an engineering viewpoint. Basic principles of operation and design are presented, together with the practical implications of non-ideal behaviour (such as transmission

line attenuation and dispersion, noise and nonlinearities in active circuits). The subject includes a laboratory component requiring use of design tools and modern test equipment.

Topics include: introduction and revision of transmission lines and scattering parameters; passive devices – hybrids, couplers, filters and diplexers; small-signal, high frequency amplifier design – realisation of circuit models, lumped element noise models, s-parameter design, noise reduction in microwave amplifiers; large signal effects in amplifiers – intermodulation; RF oscillators; frequency synthesis; frequency conversion – mixers and detectors; antennas – fundamental concepts, linear elements, antenna measurements, linear antenna arrays, mutual impedances, parasitic elements, aperture antennas, reflector antennas.

Assessment: assignments 20 per cent, design study 25 per cent, mid-semester quiz 15 per cent, final examination 40 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

45678**PROJECT B
(TELECOMMUNICATIONS)**

EE

3cp; 3hpw

prerequisite/corequisite: either 45662 Signal Processing or 45665 Data Communications
subject coordinator: Ms T Ginige

The projects will involve the design and development of a product and will be carried out by a team of no more than four students and no less than two students. Each team will be assigned academic staff member(s) who will act as the Client, the Company Director and Technical Adviser.

The Client will be available for consultation in the first two weeks, and will be available only on two or three other occasions for the duration of the project. The Director/Technical Adviser will be available at regular intervals, but only at specified times such as during a design group meeting.

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.

45780**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.

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 the School of 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; 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 pages 18 and 19 of this book.

46033

PROJECT A

MEE/MSE

part-time and sandwich

4cp; 3hpw

corequisite: 46632 Engineering Management

subject coordinator: A/Prof S F Johnston

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: A/Prof S F Johnston

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
subject coordinator: Mr L E Reece

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 limitation 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 1

MEE/MSE

6cp; 4.5hpw

subject coordinator: Mr G M Marks

An introduction to the principles of Newtonian mechanics, applied to planar motion. The behaviours 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

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 F C O Sticher

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. 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

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 F C O Sticher

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

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 1

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 1

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 Draftin

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: 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 nonlinearity, 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: Ms 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: Ms 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 2D drafting and 3D wire frame, surface and solids modelling. These modelling techniques are then applied to determine 2D sectional properties and 3D 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 A J Burfitt

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 A J Burfitt

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

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.

Assignments 60 per cent, final examination 40 per cent

46341

MACHINE DESIGN

MEE

4cp; 3hpw

prerequisites: 46331 Design 1; 46121 Mechanics of Machines; 46230 Solid Mechanics 2; 46130 Dynamics of Mechanical Systems

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

46342

UNITISED LOAD HANDLING

MEE/MSE

4cp; 3hpw

corequisite: 46332 Design 2 or 46835 Operations Research

subject coordinator: Mr A J Burfitt

Gives an overview of the techniques available for the transport and storage of goods and materials handled in the form of unitised loads, and to enable students to select appropriate approaches and specify equipment requirements. Aspects of unitised materials handling to be dealt with include cost statistics; belt conveyors, bulk handling; fork lifts, intermodal transport; inventory and scheduling; pipeline conveying, freight pipelining; bulk liquid pipelining; road/rail/air transport. Site visits and practical examples and exercises are included. The subject has been designed to complement 46346 Bulk Materials Handling.

Assessment: quizzes 30 per cent, assignments/visit reports 40 per cent, projects 30 per cent

46343

APPROPRIATE TECHNOLOGY

MEE/MSE

4cp; 3hpw

corequisite: 46632 Engineering Management

subject coordinator: Mr G M Marks

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 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

46346**BULK MATERIALS HANDLING**

MEE/MSE

4cp; 3hpw

corequisite: 46332 Design 2
subject coordinator: Mr A J Burfitt

Gives an overview of the techniques available for the transport and storage of particular 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 has been designed to complement 46342 Unitised Load Handling.

Assessment: quizzes 30 per cent, assignments/visit reports 40 per cent, projects 30 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 L E Reece*

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 B P Huynh*

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 1; 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: Mr L E Reece*

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. This subject introduces students to the basic principles of thermodynamics, including the First and Second Laws of Thermodynamics. Steam plants, process steam and compressors are also considered.

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 L E Reece*

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

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 coordinators: Dr A N F Mack, Mr L E Reece

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 G Hong

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: Mr L E Reece*

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 1**

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)*

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*

Modern process and manufacturing control technology includes the application of discrete logic control as well as classical analog 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 Programmable 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 analog 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 multivariable 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: Ms 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.

It 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 discussions 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: Ms 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 is management of change and personal 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 Y P Bhasin

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

The subject is subdivided into three sequential sections, each leading into the next: (i) traditional manufacturing and production processes, (ii) fundamentals of robots and Computer Numerical Control

(CNC) and (iii) 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: Dr Y P Bhasin

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, 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: Dr Y P Bhasin

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: Dr Y P Bhasin

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: Dr Y P Bhasin

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*

Expands the student's ability to use the computer as an aid in the practice of engineering, 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*

Introduces a selection of commonly used statistical and numerical tools and their underlying theory. 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 ANOVAR, 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, to give a seminar to the class, outlining this experience in the light of the course objectives, and to 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 L Ring

Different subjects of 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 W Peters

The objectives are to improve staff/student interaction and understanding and to provide close contact with at least one member of School 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

subject coordinator: Mr W Peters

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 1A

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 1A the student should have a practical understanding of: the execution of the following surveys in the field and appreciation of the accuracy's achievable by: (a) levelling, (b) distance measurement by tape or wire and (c) traversing; and execution of the following computations and appreciation of the accuracy's required in computation: (a) level reduction, (b) distance reduction, (c) 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

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 think, identify and translate three-dimensional objects onto a two-dimensional frame.

47127**MECHANICS OF SOLIDS 1**

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 1B**

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, mechanics of deformable solids and enhancing 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: Mr E Jankulovski

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: Mr P C Liu*

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 1**

CE/SE/CEE

3cp; 3hpw

*prerequisite: 47127 Mechanics of Solids 1**corequisite: 47137 Mechanics of Solids 2**subject coordinator: Prof K A Faulkes*

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 SAA 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 1**

CE/SE/CEE

3cp; 3hpw

*prerequisite: 47131 Structural Mechanics**subject coordinator: Dr S Parsanejad*

This subject teaches students methods, amenable to hand calculations, for analysis of indeterminate structures, influence coefficient and the applicability of influence lines to 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: Dr 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 on selected environmental science topics; 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 I

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 M Patarapanich

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 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: Prof K A Faulkes

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 nonlinearities 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 Hazleton

Provides civil engineering students with a basic knowledge about water quality, the types of water pollution and objectives, processes and technology of waste water 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 waste water 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 this data and what inferences can be drawn from this 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 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: Dr S Beecham

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
subject coordinator: Dr J Ivering

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 1

CE/SE/CEE

3cp; 3hpw

prerequisites: 47137 *Mechanics of Solids 2;*

47141 *Structural Analysis I*

subject coordinator: Mr P Liu

The objective is for students to acquire competence in design of structural steel elements in accordance with the Australian Standard AS4100-1900 and to form a sound base 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*

subject coordinator: Dr S Vigneswaran

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 L 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 1**

CE/SE

4cp; 3hpw

*prerequisites: 47161 Steel Design 1; 47141**Structural Analysis 1; 47137 Mechanics of Solids 2**subject coordinator: Dr S Parsanejad*

The objective is for students to 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 attaining coherence amongst the 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: A/Prof G O'Loughlin*

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, 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 either used 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, earthquake, 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

prerequisite: 47150 Concrete Design 2; 47141 Structural Analysis 1

subject coordinator: Prof K A 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: Dr J Ivering

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. Provides students with information necessary for the design and application of structural models; 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 to tall buildings and brings about coherence amongst the previously learnt knowledge.

Assessment: project 30 per cent, assignments 20 per cent, 2 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: A/Prof B Samali

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 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: assignments (3) 30 per cent, group project and presentation 40 per cent, quizzes (2) 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 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: assignments (3) 30 per cent, major report and presentation 40 per cent, quizzes (2) 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, assignments (4) 20 per cent, laboratory (2) 20 per cent

47465

ENVIRONMENTAL HYDRAULICS

CEE/CE

3cp; 3hpw

prerequisite: 47145 Hydraulics
corequisite: 47155 Hydrology
subject coordinator: Dr M Patarapanich

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, assignments (4) 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 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 Ring

This is the Professional Experience subject for Civil, Structural, 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 in this handbook under the heading 'Industrial Experience Requirements'.

48010**INTRODUCTION TO MANUFACTURING**

BT

4cp; 3hpw

subject coordinator: Ms C P Killen

Provides students with a broad perspective on Australian manufacturing and its role in the world, to help students make the transition to professional studies in a university setting.

A brief history and analysis of manufacturing are presented in an economic and political context. Students explore the scope of manufacturing in Australia through interviews, site visits, and literature research.

Assessment: assignments 100 per cent

48011**COMPUTING FOR MANUFACTURING AND MANAGEMENT**

BT

4cp; 4hpw

subject coordinator: Ms C P Killen

Aims to familiarise students with the use of the basic software and hardware of computers, especially personal computers, and to start to develop in students an appreciation of the wide uses made of computers by

engineers. This is the first subject in the Computing, CADD, CAM, CIM strand of subjects, and as such, lays the foundations for this important sequence.

The computer is introduced as an aid to communication and a means to solve engineering problems. The main emphasis is on personal computers and popular applications. The topics covered include the operating system, word processing, spreadsheets, databases, simple graphics and elementary programming.

Assessment: assignments 40 per cent, examination 60 per cent

48020

COMMUNICATION IN MANUFACTURING AND MANAGEMENT

BT

4cp; 3hpw

subject coordinator: Ms C P Killen

Covers the various aspects of the communication process in a manufacturing engineering context. Students participate in workshop sessions to develop written and oral skills. Basic communication theory is used as a foundation for practical work in research techniques, designing and producing letters, reports, discussion papers and other simple engineering documents. Oral skills are developed through conferences, seminars, interviews, meetings, debates and small group discussions.

Assessment: assignments 100 per cent

48021

NUMERICAL METHODS

BT

4cp; 4hpw

prerequisite: 48011 *Computing for Manufacturing and Management*

subject coordinator: Mr L Reece

Builds on the students' knowledge of mathematics in the following areas and covers the basic numerical techniques used in subsequent subjects. This subject will cover the following topics: linear algebra, vectors, statistics, curve fitting. Basic numerical methods will be introduced. The main computational resources used will be scientific calculators and PC spreadsheets.

Assessment: assignments 40 per cent, final examination 60 per cent

48022

MATERIALS FOR MANUFACTURING

BT

4cp; 3hpw

prerequisite: 65026 *Chemistry*

subject coordinator: Mr D Eager

Builds on the knowledge of materials and materials testing from the Associate Diploma. It provides students with an understanding of the use of materials in manufacturing. 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. Factory visits will be an important part of the subject.

Assessment: assignments 20 per cent, laboratory and visit reports 20 per cent, examination 60 per cent

48030

THE INDUSTRIAL ENVIRONMENT

BT

4cp; 3hpw

prerequisite: 48020 *Communication in Manufacturing and Management*

subject coordinator: Mr L Reece

Concentrates on people-related aspects of management in manufacturing. The psychology and sociology of small group behaviour will be an important theme as many companies organise local sections of their plant staff around small groups.

The subject deals with the Australian manufacturing sector, covering the following topics: the history, evolution, national and international context and significance of manufacturing, employment analysis, relevant government policies, industrial relations, occupational health and safety, the implications of moving towards ecologically sustainable development.

Assessment: assignments 70 per cent, final examination 30 per cent

4803 I**COMPUTER-AIDED DRAWING AND DESIGN**

BT

4cp; 4hpw

*prerequisite: 4802 I Numerical Methods**subject coordinator: Ms C P Killen*

Develops an understanding of computer-aided drafting and design technology, including relevant computer algorithms and geometry modellers, and develops skills in appropriate areas of application such as geometric tolerancing, 2D sectional properties and 3D mass properties.

Students are introduced to the use of computers in 2D drafting and 3D wireframe, surface and solids modelling. These modelling techniques are then applied to determine 2D section properties and 3D mass properties. The drafting and modelling techniques are further used in Computer-aided Manufacturing and Design for Manufacturing subjects.

Assessment: assignments 25 per cent, projects 50 per cent, examination 25 per cent

4804 O**MANAGEMENT FOR MANUFACTURING**

BT

4cp; 3hpw

*prerequisites: 4802 O Communication in Manufacturing and Management; 4803 O The Industrial Environment**corequisite: 2422 I Principles of Marketing**subject coordinator: Mr D Eager*

The aim is to integrate management activities in the Australian manufacturing environment and prepare the student for management situations.

The overriding feature of the subject is management decision making by use of examples in the fundamental functions of management: planning, organising, leading and controlling applied to manufacturing. Examples will include inventory management.

Assessment: assignments 60 per cent, participation 10 per cent, examination 30 per cent

4804 I**COMPUTER-AIDED MANUFACTURING**

BT

4cp; 4hpw

*prerequisite: 4803 I Computer-aided Drawing and Design**subject coordinator: Prof F B Swinkels*

Develops an understanding of computer-aided manufacturing technology in the areas of coordinate measurement, sheet metal application, 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 creation, nesting of flat patterns and punchpress operation; NC programming for point-to-point machining, planar milling and surface milling; and data communication and transfer for various CAM processes.

Assessment: assignments 25 per cent, projects 50 per cent, examination 25 per cent

4805 O**ENGINEERING DOCUMENTATION**

BT

3cp; 3hpw

subject coordinator: Mrs HT McGregor

Further develops students' communication skills by investigating the role of information as a corporate resource. 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.

The subject covers the various aspects of the documentation process in a manufacturing context. Students participate in workshop sessions to develop written, oral and graphic skills required to produce efficient and effective documents. Basic communication theory is used as a foundation for practical work in designing and producing a variety of corporate documents using different media including text, graphics, computer systems and multimedia.

Assessment: assignments 100 per cent

48051

METROLOGY AND INSPECTION

BT

3cp; 3hpw

prerequisite: 48040 Management for Manufacturing

subject coordinator: Mr J Dartnall

Builds on students' basic knowledge of measurement and gives detailed exposure to using a wide range of measuring instruments.

The subject will cover principles of mechanical measurement, optical and pneumatic comparators; slip gauges, line and end standards; angular measurement; measurement of straightness, flatness and alignment; screw thread measurement; measurement of surface texture; machine tool testing; coordinate measuring machines; and other measuring systems.

Assessment: assignments 20 per cent, laboratory 40 per cent, examination 40 per cent

48052

PROFESSIONAL REVIEW

BT

3cp; 2hpw

prerequisite: 48040 Management for Manufacturing

subject coordinator: Mr J Dartnall

Focuses the students on their past work experience and requires them to plan their professional development for the five years after their graduation.

The subject includes the following topics: recording and reporting on their industrial experience, drawing up a five-year learning contract, recording and reporting on their employing company's structure, the main activities of the company, its strategic objectives, its policies on training and R&D and its policies on occupational health and safety.

Assessment: assignments 80 per cent, seminar 20 per cent

48053

TECHNOLOGICAL CHANGE AND STRATEGIC PLANNING

BT

3cp; 2hpw

prerequisite: 48040 Management for Manufacturing

subject coordinator: Mr J Dartnall

Aims to give students insight into company strategic planning policies and an understanding and appreciation of technological change, especially with respect to the Australian manufacturing industries.

The subject deals with the Australian manufacturing sector, covering the following topics: a brief overview of technological change from Sung China to the 20th century, Kondratieff cycles, invention and innovation, research, design and development, energy and other resources, trading blocks, multinational companies, strategic planning, government policies on education, research and industrial development.

Assessment: assignments 70 per cent, final examination 30 per cent

48060

QUALITY FOR MANUFACTURING

BT

3cp; 3hpw

prerequisite: 48051 Metrology and Inspection

subject coordinator: Mr J Dartnall

Provides basic knowledge of Quality Assurance. On completion of this course, the student will be able to understand the concept and principles of quality control techniques and implement the systems to improve the quality of any process. The subject will cover quality organisation, process control, process capability, cusum charts, standards for acceptance sampling, incoming material control, quality circles, inspection strategies, reliability systems and reliability testing.

Assessment: assignments 30 per cent, examination 70 per cent

48061**DESIGN FOR MANUFACTURE**

BT

3cp; 3hpw

*prerequisite: 48041 Computer-aided Manufacturing**subject coordinator: A/Prof R M Spencer*

The subject will attempt to bring together techniques and concepts developed in earlier subjects and provide a framework in which modern process design of manufacturing systems takes place to produce low cost quality products.

The design process is evaluated in areas such as: material selection in design, process selection in design, concurrent engineering, design by features, group technology, and variational geometry/parametric modelling.

Assessment: assignments 25 per cent, projects 25 per cent, examination 50 per cent

48062**TEROTECHNOLOGY (MAINTENANCE MANAGEMENT)**

BT

3cp; 2hpw

*prerequisites: 48040 Management for Manufacturing; 48050 Engineering Documentation; 48051 Metrology and Inspection**subject coordinator: Mr D Eager*

Provides the student with basic knowledge of the management of maintenance in manufacturing industry, by 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.

The subject includes brief revision of the financial considerations of asset management, such as Nett Present Value and Depreciation, the economics of repair versus replacement, and how maintenance relates to an enterprise as a whole. Under a range of appropriate conditions it covers items such as the effect of design on maintainability, the relationship between plant availability for production and maintenance, maintenance strategies and their dependence on situations, maintenance planning, condition monitoring, failure analysis, loss control, and the

organisation, operation and costing of a maintenance department.

Assessment: assignments 60 per cent, participation 10 per cent, examination 30 per cent

48501**INTERNATIONAL PRACTICE OF ENGINEERING 1**

BE/BA

8cp

*prerequisites: 99014 Language and Culture 4; 99015 Contemporary Society 1**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**

BE/BA

24cp

*prerequisite: 48501 International Practice of Engineering 1**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**

BE/BA

3cp; 2hpw

*prerequisite: 48502 International Practice of Engineering 2**coordinator: Ms H 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

BE/BA

3cp; 2hpw

prerequisite: 48502 International Practice of Engineering 2

coordinator: Ms H 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

BE/BA

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 IIS programs.

Assessment: project report 100 per cent

51131

COMMUNICATIONS 1

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 1

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

52101**HISTORY OF IDEAS***EE/CSE**3cp; 3hpw*

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

59325**SCIENCE TECHNOLOGY AND HUMAN VALUES***EE/CSE/ET**8cp; 3hpw*

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***BE/BA**8cp; 3-4hpw**coordinated by the UTS Institute for International Studies*

The importance of the comparative analysis of social change has been emphasized since the late 1980s with the end of the Cold War and the rapid social, economic and political changes that have taken place in Eastern Europe, East and South-East Asia. There have been various claims that the homogenising influences of capitalism and democracy have triumphed, amid a renewed emphasis on cultural determinism and a questioning of the eurocentricity of the social sciences. Through an examination of key elements of modernisation and globalisation, this subject provides an overview of the social changes in Western Europe, Latin America, East Asia and South-East Asia, and deals with academic discussions on the processes of social change.

65023**ENGINEERING CHEMISTRY***CEE/CE/SE and MEE/MSE**6cp; 6hpw*

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 the use of appropriate anti-corrosion techniques is discussed 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 1

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 relationship 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

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 1 (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, class tests (2) 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 1A; 47117 Statics**subject coordinator: A/Prof P F Logan*

Forms the essential foundation for the civil 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 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 1
(ELECTRICAL)**

EE/CSE/ET

6cp; 6hpw

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)

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 I (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.

68035**COMMUNICATIONS PHYSICS**

EE

3cp; 3hpw

prerequisites: 45144 Electronic Devices and Circuits; 45145 Engineering Statistics; 45264 Fields and Waves

corequisite: 45152 Signal Theory 2

Basic aspects of electromagnetic wave propagation and attenuation in specific media. Real boundary problems, distributed source and multiwavelength effects; involving interference, diffraction, reflection, and image formation and processing. Waveguides and optical fibres. Sources and detectors of radiation. Electro-optic, acousto-optic and integrated optoelectronics.

Assessment: assignments 15 per cent, laboratory work 25 per cent, quiz 15 per cent, examination 45 per cent

68036**ANALOG ELECTRONICS AND PHOTONICS**

ET

6cp; 6hpw

prerequisite: 45124 Electrical Engineering 2

Develops a strong practical understanding and technical and design insights through laboratory experience, of modern solid state analog electronics with emphasis on

operational amplifiers, instrumentation amplifiers, noise and circuits used in photonics applications, especially those relevant to optical communications systems.

Assessment: laboratory work 25 per cent, laboratory assessments and assignments 20 per cent, mid-semester examination 10 per cent, final examination 45 per cent

79370**LAW AND CONTRACTS FOR MANUFACTURING**

BT

3cp; 2hpw

prerequisites: 48030 The Industrial Environment; 48040 Management for Manufacturing; 48050 Engineering Documentation

corequisite: 48053 Technological Change and Strategic Planning

subject coordinator: Mr M Adams (Faculty of Law)

Provides students with basic knowledge of management in the commercial engineering environment, prepares students for the procedures and processes of operating and negotiating contractual matters as a client, consultant, or contractor.

Assessment: assignments 60 per cent, participation 10 per cent, examination 30 per cent

79371**LEGAL ISSUES IN TELECOMMUNICATIONS**

ET

6cp; 3hpw

prerequisite: 45661 Communication Networks

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 is 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 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 bio-geochemical 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: assignments (3) 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**

BE/BA

8cp; 6hpw

*prerequisites: 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

BE/BA

8cp; 3-4hpw

coordinated by the UTS Institute for International Studies

A detailed and specific introduction that attempts to identify not only the structures of politics, society and the 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 West Europe

UNDERGRADUATE SUBJECT NAMES IN ALPHABETICAL ORDER

Aboriginal Social and Political History	54230	Computer-aided Manufacturing	46336
Advanced Engineering Computing	46840	Computer-aided Manufacturing	48041
Advanced Fluid Dynamics	46442	Computing 2	46811
Advances in Pollution Control	47162	Computing 3	46821
Analog Electronics and Photonics	68036	Computing for Manufacturing and Management	48011
Analogue and Digital Control	45581	Concrete Design 1	47140
Analogue Electronics	45153	Concrete Design 2	47150
Applied Dynamics	46141	Concrete Design 3	47160
Appropriate Technology	46343	Concrete Design 4	47270
Approximate Methods in Structural Analysis	47267	Concrete Technology	47154
Australian Engineering on the International Scene	48504	Construction	47149
Bridge Design	47275	Construction Contracts	47179
Broadband Telecommunications Networks	45667	Construction Management (Elective)	47307
Built Environment, The	47450	Construction Materials	47134
Bulk Materials Handling	46346	Contemporary Society 2	976xxx
Chemistry	65026	Contextual Studies	45154
Combustion and Air Pollution	46441	Continuous and Discrete Systems	45141
Communication in Manufacturing and Management	48020	Control Engineering 1	46531
Communications 1	51131	Control Engineering 2	46541
Communications 2	51161	Corrosion Technology for Engineers	65071
Communications Engineering	45664	Data Acquisition and Distribution Systems	45562
Communications Networks	45661	Database Structures and Management	31141
Communications Physics	68035	Design 1	46331
Communications Systems	45681	Design 2	46332
Computer Applications	47112	Design for Manufacture	48061
Computer Hardware	45143	Design for Manufacturing	46335
Computer Programming	47113	Design Project	47285
Computer Systems Analysis	45372	Digital Systems	45364
Computer Systems Design	45382	Digital Systems Design	45561
Computer-aided Design of Electronic Circuits	45582	Digital Techniques	45113
Computer-aided Drafting (CAD)	46321	Digital Transmission	45663
Computer-aided Drawing and Design	48031	Discrete Mathematics	35111
		Domestic Building Design and Construction	47237

Dynamics of Electrical Machines	45481	Engineering Statistics	45145
Dynamics of Mechanical Systems	46130	Environmental Engineering	47142
Dynamics of Structures	47268	Environmental Hydraulics	47465
Einstein's Universe	46143	Environmental Microbiology for Engineers	91651
Electrical Engineering 1	45116	Environmental Science for Engineers	91379
Electrical Engineering 1 (Mechanical)	68012	Ergonomics	46040
Electrical Engineering 2	45124	Fields and Waves	45264
Electrical Engineering 2 (Mechanical)	45931	Financial Management for Manufacturing Engineering	25310
Electrical Power Generation	68034	Finite Element Analysis	47265
Electrical Variable Speed Drives	45484	Finite Element Applications	46241
Electromagnetics	45242	Fluid Machines	46445
Electromechanical Systems	45342	Fluid Mechanics	46420
Electronic Devices and Circuits	45144	Fluid Mechanics	47135
Engineering and Society	46630	Fluid Mechanics for Manufacturing	46435
Engineering Chemistry	65023	Geology for Engineers	66032
Engineering Communication	45135	Geomechanics (Elective)	47306
Engineering Communication	46620	Geotechnical Engineering	47166
Engineering Discovery	45125	Graphics	47120
Engineering Documentation	48050	Ground Modification	47176
Engineering Economics	46642	Heat Transfer	46431
Engineering Graphics	46311	High-rise Buildings (Elective)	47288
Engineering Management	46632	History of Ideas	52101
Engineering Mathematics 1	33120	Hydraulics	47145
Engineering Mathematics 1A	33121	Hydrology	47155
Engineering Mathematics 1B	33122	Industrial Design	46345
Engineering Mathematics 2	33220	Industrial Environment, The	48030
Engineering Mathematics 2A	33221	Industrial Experience (Part-time)	45999
Engineering Mathematics 3 (Electrical)	33310	Industrial Experience (Sandwich)	44997
Engineering Physics (Civil)	68021	Industrial Experience (Sandwich)	45997
Engineering Physics (Civil) (Part-time)	68022	International Practice of Engineering 1	48501
Engineering Physics (Mechanical)	68011	International Practice of Engineering 2	48502
Engineering Physics 1 (Electrical)	68031	International Studies: Language and Culture 1	97xxxx
Engineering Physics 2 (Electrical)	68032	International Studies: Language and Culture 2	97xxxx
Engineering Physics 3 (Electrical)	68033	International Studies: Language and Culture 3	97xxxx
Engineering Practice	45115		
Engineering Research: The Cutting Edge	45780		
Engineering Speculation	46344		

120 UNDERGRADUATE SUBJECT NAMES IN ALPHABETICAL ORDER

International Studies: Language and Culture 4	97xxxx	Mechanics 2	46122
Introducing Aboriginal Cultures and Philosophies	015115	Mechanics for Manufacturing	46125
Introduction to Civil Engineering	47110	Mechanics of Machines	46121
Introduction to Computing	46810	Mechanics of Solids 1	47127
Introduction to Engineering	46310	Mechanics of Solids 2	47137
Introduction to Environmental Biology	91650	Metals Technology	47164
Introduction to Environmental Economics and Law	47449	Metrology and Inspection	48051
Introduction to Manufacturing	48010	Metrology and Instrumentation	46535
Introduction to Manufacturing Systems	46312	Modernisation and Globalisation	59341
Introduction to Neuro Fuzzy Systems	45585	Network Theory	45134
Kinematics and Dynamics of Machines	46140	Numerical Methods	45265
Land Conservation	47476	Numerical Methods	48021
Land Development (Elective)	47303	Numerical Methods in Engineering	47133
Law and Contracts for Manufacturing	79370	Operating Systems	45353
Legal Issues in Telecommunications	79371	Operations Research	46835
Loading on Building Structures	47277	Paradigms of Intelligence	31926
Machine Design	46341	Physical Design and Production	45274
Management for Engineers	47189	Pollution Control and Management	47452
Management for Manufacturing	48040	Power Apparatus and Systems	45252
Manufacturing Processes	46715	Power Circuit Theory	45461
Manufacturing Systems	46725	Power Cycles	46444
Manufacturing Systems Design	46337	Power Electronics	45462
Manufacturing Systems Planning	46726	Power Equipment Design	45482
Manufacturing Systems: Quality	46735	Power Systems Analysis and Protection	45483
Materials Engineering 1	67021	Principles of Marketing	24221
Materials Engineering 2	67061	Principles of VLSI Design	45584
Materials for Manufacturing	48022	Probability and Statistics	47153
Materials Processing	46710	Production and Cost Control	46742
Materials Science for Engineers	67022	Professional Experience (Part-time)	46999
Materials Technology	67023	Professional Experience (Part-time)	47999
Mathematical Modelling	45266	Professional Experience (Sandwich)	46997
Mathematics 1	35101	Professional Experience (Sandwich)	47997
Mathematics 2	35102	Professional Practice	46992
Measurement and Instrumentation	46530	Professional Review	48052
Mechanics 1	46110	Programmable Controllers and Applications	46540
		Project	47002
		Project	47003
		Project	47004
		Project	47006

Project	47009	Statics	47117
Project	47012	Steel Design 1	47161
Project	47015	Steel Structures and Concept Design 1	47171
Project	48505	Steel Structures and Concept Design 2	47281
Project A	45155	Structural Analysis 1	47141
Project A	46033	Structural Analysis 2	47151
Project B	46034	Structural Mechanics	47131
Project B (Computer Systems Engineering)	45387	Structural Stability	47278
Project B (Instrumentation and Control)	45577	Structural Testing	47287
Project B (Power and Machines)	45472	Structures	46340
Project B (Telecommunications)	45678	Surveying 1A	47118
Project Economics	47178	Surveying 1B	47128
Project Management	45166	Surveying 2	47168
Project Planning	47159	Systems Engineering	45176
Public Health Engineering	47152	Technological Change and Strategic Planning	48053
Quality and Reliability	46740	Teletraffic Engineering	45668
Quality for Manufacturing	48060	Terotechnology	46640
Railway Engineering (Elective)	47301	Terotechnology (Maintenance Management)	48062
Real-time Software and Interfacing	45163	Thermodynamics	46421
Refrigeration and Airconditioning	46443	Thermodynamics for Manufacturing	46436
Review of Overseas Experience	48503	Thermofluids	46430
Risk and Reliability Analysis (Elective)	47305	Thermofluids for Manufacturing	46437
Road Engineering	47167	Thesis 1	45182
Robotics	46142	Thesis 2	45183
Robotics and Flexible Manufacturing	46701	Timber Design	47144
Science Technology and Human Values	59325	Transportation Engineering	47177
Signal Processing	45662	Unitised Load Handling	46342
Signal Theory 1	45151	Waste Minimisation	47482
Signal Theory 2	45152	Water Resources Engineering	47175
Software Development 1	45123	Water Supply and Sewerage (Elective)	47312
Software Development 2	45133	Welding (Elective)	47302
Software Engineering	45363		
Soil Engineering	47156		
Soil Mechanics	47146		
Solid Mechanics 1	46220		
Solid Mechanics 2	46230		
Solid Mechanics 3	46240		

THE GRADUATE SCHOOL OF ENGINEERING

POSTGRADUATE PROGRAMS

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 managing coursework and research degrees within the Faculty, and for maintaining UTS Engineering as an international node offering quality graduate education to engineers and other professionals.

The Graduate School supports research conducted throughout the Faculty; specifically, through its management of post-graduate research, promotional activities, encouragement of individual researchers and research teams, facilitation of interdisciplinary research, and sponsorship of visits to UTS Engineering by internationally renowned experts.

The GSE produces a number of publications, including the *Graduate Studies* booklet, *Research Directory*, and a range of course information sheets and program Brochures. These publications expand on the information in this handbook.

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 (Tower Building) 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) 330 2606
Facsimile: (+ 61 2) 330 2549**

The names and office locations of senior academic and support staff are listed below. The School Office is generally open between 9.00 a.m. and 6.00 p.m., Monday to Friday, and at other advertised times during enrolment periods. Voice-mail contact may be made at any time.

	Room	Ext
<i>Head of School</i>		
Professor Rod Belcher	2-7078	330 2423
e-mail: rod.b@ee.uts.edu.au		
<i>Associate Head of School (Coursework)</i>		
A/Prof Bob Spencer	2-7070	2548
e-mail: r.spencer@uts.edu.au		
<i>Associate Head of School (Research)</i>		
A/Prof Bijan Samali	2-7079	2023
e-mail: b.samali@uts.edu.au		
<i>Manager, Administration</i>		
Ms YaLin Hua	2-7080	2734
e-mail: yalin.hua@uts.edu.au		
<i>Graduate Studies Officer</i>		
Ms Beate Buckenmaier	2-7083	2606
e-mail: b.buckenmaier@uts.edu.au		
<i>Executive Assistant</i>		
Ms Robyn Saunders	2-7076	2022

Postgraduate studies in Engineering, by research or coursework, are coordinated by GSE program directors. In 1996, it is expected that programs will be available in each of the fields listed below. Further advice can be obtained from the appropriate director.

Program / Director in 1996	Building/Room	Ext
<i>Control Engineering</i>		
Mr Kel Stillman	2-612C	330 2667
A/Prof Hung Nguyen	1-2517	2451
<i>Energy Planning and Policy</i>		
Dr Deepak Sharma	2-7088	2422
<i>Engineering Management</i>		
A/Prof Jim Parkin	2-7087	2638
<i>Environmental Engineering and Management</i>		
A/Prof Vigi Vigneswaran	2-523	2641
<i>Groundwater Management</i>		
Prof Michael Knight	1-1715	2692
<i>Information Systems Engineering</i>		
A/Prof Athula Ginige	1-2224	2393
<i>Local Government Engineering</i>		
Mr Ken Halstead	2-522	2640
<i>Local Government Management</i>		
A/Prof Kevin Sproats	1-1714	2643
<i>Manufacturing Engineering</i>		
A/Prof Bob Spencer	2-606	2660
<i>Professional Practice</i>		
A/Prof Stephen Johnston	2-612B	2668
<i>Software Engineering</i>		
Mr John Leaney	1-2221A	2389
<i>Structural Engineering</i>		
Prof Steve Bakoss	2-528	2629
A/Prof Bijan Samali	2-573	2632
<i>Systems Engineering</i>		
Prof Rod Belcher	2-7078	2423
<i>Telecommunications Engineering</i>		
A/Prof Aruna Seneviratne	1-2429	2441
<i>Water Engineering</i>		
A/Prof Geoff O'Loughlin	2-511C	2644
<i>Other programs</i>		
<i>Interdisciplinary</i>		
Prof Rod Belcher	2-7078	2423
A/Prof Stephen Johnston	2-612B	2668
<i>Non Specialist Professional Development</i>		
Dr Hung Chung (Civil)	2-519	2637
A/Prof Bob Spencer (Mechanical)	2-7070	2548
Dr Venkat Ramaswamy (Electrical)	1-2417A	2418

RESEARCH AREAS AND ASSOCIATED CENTRES

The Faculty of Engineering at UTS has three long-established teaching schools in addition to the Graduate School of Engineering. Most of the Faculty's research is based in its teaching schools. Each of these schools operates 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 interests and opportunities in the three teaching schools are summarised briefly below:

School of 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, finite element analysis and computer applications, concrete technology, regional planning, road and transportation engineering, stormwater management, structural dynamics and earthquake engineering.

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

School of 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 (rather than to the fields of application represented by the other three schools); those that are cross-disciplinary in nature but with an essential engineering involvement, for example, in engineering innovation, environmental engineering, biomedical engineering, energy planning and policy, risk analysis and management, systems engineering, sustainable design, regional development technology, engineering communication and 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.

Thus, research programs for graduate students are available in a wide range of fields relating to the teaching schools and in other inter- or intra-faculty fields through the Graduate School of Engineering.

In addition, 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, communication, professional and business ethics, manufacturing, project financing, risk management, integrated marketing, contract management, engineering economics, legal and government interfaces.

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

AGSEI programs are taken on a full-fee basis. 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:

Dr Alec Cameron
Program Manager
AGSEI Ltd, Australian
Technology Park
Cornwallis St, Eveleigh
(PO Box 1686, Strawberry Hills,
NSW 2012)
Telephone: (+ 61 2) 209 4111
Facsimile: (+ 61 2) 319 3088

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 1/1715, Building 1,
City campus
Telephone: (+ 61 2) 330 1984
Facsimile: (+ 61 2) 330 1985

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 1/1714, Building 1,
City campus
Telephone: (+ 61 2) 330 2643
Facsimile: (+ 61 2) 330 2274

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 1/2517, Building 1,
City campus
Telephone: (+ 61 2) 330 2451
Facsimile: (+ 61 2) 330 2435

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:

Associate Professor John Bell
Centre Director
Room 1-1210, Building 1,
City campus
Telephone: (+ 61 2) 330 2213
Facsimile: (+61 2) 330 2219

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:

Professor Michael Knight
Centre Director
Room 1/1715, Building 1,
City campus
Telephone: (+ 61 2) 330 1984
Facsimile: (+ 61 2) 330 1985

The Sydney Microwave Design Resources Centre was established in 1988 as a joint initiative of UTS and the University of Sydney, through their respective Schools of Electrical Engineering, 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 cross-disciplinary investigations and research (for example, in microwave processing, materials characterisation and customised process applicators), in addition to its programs across the two universities in microwave communications, electromagnetic interference and antennas.

Inquiries should be directed to:

Professor Rod Belcher
Graduate School of Engineering
Building 2, City campus, Broadway
Telephone: (+ 61 2) 330 2423
Facsimile: (+ 61 2) 330 2549

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.

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

Closing dates

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 awards

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, Tower building, 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, Tower Building, Broadway
 Telephone: (+ 61 2) 330 1990

Postal address:

PO Box 123
 Broadway NSW 2007

The closing dates for receipt of on-time applications in 1996 are:

For Spring semester 1996 (selected coursework degrees only): **31 MAY 1996**

For Autumn semester 1997 (for all coursework degrees): **25 OCTOBER 1996.**

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 1996. 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, Tower Building at the City campus in person, or by telephoning (+ 61 2) 330 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)
 P O 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 1996 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 applied by the appropriate closing dates will have been advised of the outcome of their applications by mail in late December 1995/January 1996.

CHARGES AND FEES

Student service charges

All students are required to pay compulsory student charges at enrolment. In 1995, these charges were as follows:

Students' Association	\$A 43.00
UTS Union (general fee)	\$A 173.00
UTS Union (entrance fee) (non-refundable)	\$A 20.00
Student Accommodation Levy	\$A 51.00
Student identification card charge (non-refundable)	\$A 6.00

TOTAL **\$A 293.00¹**

¹ Compulsory student charges are subject to revision for 1996, 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) 330 1145.

Course fees

In addition to the above charges, most Australian-resident students are required to contribute towards the cost of their

postgraduate education, either through the Higher Education Contribution Scheme (HECS) or through the payment of postgraduate course fees. Currently, some students studying for higher degrees by research are exempt from these requirements.

Students admitted to the Graduate School of Engineering in 1996 will be required to pay course fees, according to a schedule now available. The schedule will be provided on inquiry to the Graduate School of Engineering, the Kuring-gai Student Centre or from the UTS Information Service, Level 4, Tower Building, 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 1995 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.

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 1996. 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 Faculty of Engineering – Graduate Programs by Coursework, Application for Exemption from Postgraduate Fees, Autumn semester 1996, complete the form, and submit it with your application for admission. The form is available from the UTS Information Service at Broadway, the Kuring-gai Student Centre, or the Graduate Studies Officer, 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 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.

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.

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 1996 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) 330 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 (Tower Building) 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 (Tower Building) on (+ 61 2) 330 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 1996, some subjects may also be offered in a Summer semester (December 1995 – February 1996).

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.

Block-release students from country areas who are enrolling in the Graduate Certificate in Environmental Engineering and Management, Graduate Diploma in Local

Government Engineering, or Master of Local Government Management, may complete formal enrolment procedures by mail.

For those who do not apply in the normal admission period, enrolment for Doctoral and Master's by thesis degrees is arranged through the Office of the University Graduate School, Level 5, Building 1 (Tower Building), 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 at 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.

Subjects offered in a block-release mode require attendance at the University for a block of full-time study (usually 2-3 days) on a small number of occasions (usually three) during the semester. The interval between blocks allows time for self-directed study and application work.

Each subject, including research and project subjects not requiring regular class attendance, has a credit-point rating denoting its academic value towards the award.

Duration of courses

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

Rules governing the courses

Students are subject to the Rules prescribed in the undergraduate and post-graduate student handbooks for the course in which they are enrolled, and to the Rules of the University, published in the *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 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.

Students enrolled for a Research degree who receive two unsatisfactory progress reports from their supervisors, or a PhD student who fails to satisfy the requirements of the Doctoral Assessment after twelve months of candidature, 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 published in the *UTS Calendar* (see Rule 2.28 of the 1996 *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 cp (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 Director 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, through programs in each School in the Faculty.

Doctor of Philosophy (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.

Admission requirements

To qualify for admission to PhD candidature, applicants should hold a Bachelor of Engineering degree with First Class Honours¹, 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 *Calendar*.

Applicants for admission to graduate programs in Engineering should have a minimum of two years' experience in employment related to the course or program they wish to undertake.

¹ In these respects Faculty of Engineering requirements exceed the minimum requirements of the University.

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 on enrolment for full-time candidates and 18 months for part-time candidates.

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

The objectives of the assessment are to ensure that: the candidate has gained the prerequisite knowledge and skills to allow successful and timely completion of the proposed research program; the candidate's progress is consistent with

completion of the research program in the prescribed time and demonstrates potential to complete the work to Doctoral standard; candidates who, for any reason, are not equipped with requisites necessary to bring the proposed research program to a successful completion or have not demonstrated sufficient aptitude, are made aware of this assessment before they invest further time and money; where it is proposed (at the candidate's instigation) that the nature or scope of the research program be changed significantly, there is continued commitment by the School and Faculty for provision of adequate human and physical resources, including proper supervision.

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

Most intending PhD candidates will be able to classify their area of research interest as falling primarily within one of the Faculty's teaching schools (see under heading Teaching Schools and Centres of the Faculty), and they should contact the relevant school directly to discuss their application.

Inquiries

Initial inquiries may be made with the Graduate Studies Officer. Academic inquiries, such as the selection of an appropriate research topic, should be directed to the relevant Schools:

Civil Engineering:

Dr Simon Beecham
School of Civil Engineering
Building 2 Level 5 Room 507,
Telephone: (+61 2) 330 2623 (voicemail)
Fax: (+ 61 2) 330 2633

Electrical Engineering:

Dr David Webster
School of Electrical Engineering
Building 1 Level 25 Room 2520B,
Telephone: (+ 61 2) 330 2453 (voicemail)
Fax: (+ 61 2) 330 2435

Mechanical Engineering:

Mr Lance Reece
School of Mechanical Engineering
Building 2 Level 4 Room 416,
Telephone: (+ 61 2) 330 2587 (voicemail)
Fax: (+ 61 2) 330 2585

Graduate School of Engineering:

Professor Rod Belcher
Head of School
Building 2 Level 7 Room 7078,
Telephone: (+ 61 2) 330 2423 (voicemail)
Fax: (+ 61 2) 330 2549

Inquires about interdisciplinary topics should be directed in the first instance to the Graduate School of Engineering.

Master of Engineering (by thesis) (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.

Admission requirements

To qualify for admission to candidature for Master's degree (by thesis), applicants must hold a Bachelor of Engineering degree from UTS or the former NSWIT, or another qualification deemed to be equivalent. In special circumstances, engineers who do not possess a degree or equivalent may be admitted to the program if they can provide evidence of general and professional qualifications which will satisfy the Academic Board that they possess the educational preparation and capacity to pursue graduate studies.

Applicants who do not meet the requirements for admission to candidature for Master's degree (by thesis) may be admitted as Master's qualifying students, for the purpose of preparing for full

candidature. Further details are given in the Rules relating to Master's degree (by thesis) students, set out in full in the undergraduate and postgraduate student handbooks.

Duration and candidature

Candidature may be on a full-time or part-time basis. The work may be carried out either using Faculty facilities, or in an industrial location. For full-time candidates, the program is normally of at least four semesters' duration from the time of registration as a Master's degree candidate. For part-time candidates, duration is normally at least six semesters. Candidates who are specially qualified in the relevant discipline may be allowed to complete the program in less than the minimum time.

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

Australian-resident part-time candidates commencing a Master's (by thesis) course at UTS are liable to pay HECS. Australian-resident full-time candidates are expected to be exempt in 1996.

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 Schools (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 Graduate School of Engineering (GSE), on a Faculty-wide basis, leading to the general awards of Master of Engineering (by coursework), Master of Technology, Master of Engineering Practice, Graduate Diploma in Engineering, and Graduate Certificate in Engineering.

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

Master of Engineering (by coursework) (EP81)

Aims of the course

The course provides opportunity at Master's level for professionally qualified engineers, including recent graduates, to extend in depth and breadth the knowledge and skills gained from their undergraduate studies.

Each program must be designed to enhance technological knowledge pertaining to one or more fields of engineering. The completion of subjects and project work at advanced level is central to this requirement.

The course offers program flexibility combined with opportunities for articulation from a sub-Master's (i.e. Graduate Certificate or Graduate Diploma) to a Master's level award.

Admission requirements

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

- (a) be a graduate in Engineering of the University of Technology, Sydney or the New South Wales Institute of Technology; or
- (b) 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.¹

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.

¹ 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

Duration

Nominally 1.25 years (or 2.5 semesters) full time or 2-3 years part time. Full-time programs may be completed in 12 months by studying during the summer months (December to February).

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

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 project¹, 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.

¹ 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:

1. 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.
2. Postgraduate subjects offered by the Faculty of Engineering of the University of Sydney, the University of New South Wales and the University of Western Sydney, or other universities by arrangement, may be credited towards the degree to a maximum value of 24 credit points.

Program and subject availability

The Faculty offers program 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 teaching schools (i.e. Civil, Electrical and Mechanical Engineering) 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 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 those described in the University's Code of Practice for Master's Research Students and Supervisors, 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) 330 2606, and is included with application forms and with offers of admission.

Master of Technology (EP71)

Aims of the course

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

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

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

Admission requirements

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

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

- (c) hold a Bachelor's or Honours degree or equivalent from another higher education institution, deemed to be equivalent to (a) or (b), and shall have a minimum of three years' practical experience, at a level commensurate with the above qualifications, in capacities that have involved close contact with engineering.

Applicants who have completed a first degree requiring less than 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.

Duration

Nominally 1.25 years (or 2.5 semesters) full time or 2-3 years part time. Full-time programs may normally be completed in 12 months by studying during the summer months (December to February).

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

Attendance

Attendance may be on a full-time or part-time basis. Candidates in concurrent employment will wish to attend on a part-time basis which the Faculty will accommodate through a combination of evening, block release, weekend and 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 project¹, totalling 60 credit points.

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

Subjects selected shall be drawn from those offered by the Faculty of Engineering of UTS, other faculties of UTS, other faculties of engineering (including the University of Sydney, the University of New South Wales and the University of Western Sydney), and other institutions approved by the Academic Board. Not less than 50 per cent of total credit points must be completed through subjects offered, and a capstone project supervised by, the Faculty of Engineering at UTS. The capstone project must be supervised by a principal supervisor who is a member or adjunct member of academic staff of the Faculty of Engineering of UTS.

Subjects shall generally be from among those designated as postgraduate and shall include, as a minimum, postgraduate subjects totalling 48 credit points. Undergraduate subjects may be included only where they were not included in the course leading to a candidate's primary qualification and where they can be shown to represent material relevant to career development.

Credit

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

The credit-point weighting for the capstone project will lie within the range 18-24 credit points.

¹ 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.

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 teaching schools (Civil, Electrical and Mechanical Engineering) 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.

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 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 those described in the University's Code of Practice for Master's Research Students and Supervisors, 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, and is included with application forms and with offers of admission.

Master of Engineering Practice (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:

be a graduate in Engineering of the University of Technology, Sydney or the New South Wales Institute of Technology; or

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, typically 24 credit points.

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

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

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

Subjects shall generally be from among those designated as postgraduate. Undergraduate subjects may be included only where they were not included in the course leading to a candidate's primary qualification and where they can be shown to represent material relevant to career development. Undergraduate subjects may not in any event total more than 12 credit points.

Credit

The following provisions are additional to the University's normal advanced standing provisions.

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

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

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

- (a) AGSEI has current recognition by the Academic Board of UTS as a suitable provider (such recognition is current in 1996); and
- (b) 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 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 may include an applications project for which additional credit may be appropriate.

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

Prior to undertaking the major project, each candidate will be required to submit a comprehensive project definition, as a basis from which the objectives and scope of the

work will be agreed together with the credit-point value to be given to the project.

Assessment

The award of the degree will be ungraded.

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

In new subjects developed for the Master of Engineering Practice course, assessment will accord with the range of standard UTS practice but will allow for employer moderation where a component of the assessed work has been undertaken in an employment situation. In these circumstances, assessment practices consistent with self-directed experiential learning will be adopted.

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

Candidates will be required to prepare and submit an individual written report for their major project, and to present and defend its findings in a seminar, preferably involving employer participation.

In subjects offered by other institutions, the assessment practices will be as established by those institutions. In deciding whether to approve a subject offered by another institution for credit towards the degree, the Faculty Board in Engineering will have regard to the method of assessment.

Supervision of major 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 MEP.

As noted, the major project must be supervised by a Principal Supervisor who is a member or adjunct member of staff of the Faculty of Engineering of UTS.

Industry-based projects are encouraged, and will require formal co-supervisory arrangements.

Fees

Fees apply to this course. A schedule of approved fees is available on inquiry to the Graduate Studies Officer, and is included with application forms and with offers of admission.

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

Graduate Diploma in Engineering (EP61)

Graduate Certificate in Engineering (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.

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' employment in an area 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.

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.

Attendance

This will depend on the subjects chosen and on the number of subjects taken in each semester. For full-time attendance, most programs will be available predominantly in the day-time. For part-time attendance it will usually be possible to design suitable programs from subjects available predominantly in the evenings. Some subjects may be offered in block-release or weekend mode.

Course structure

Students design their own program to suit individual needs. Program details are determined prior to enrolment, in consultation with, and with the approval of, an academic adviser appointed by the Head of the Graduate School. There is opportunity to choose from the broad range of graduate and undergraduate subjects offered by the University's nine faculties and by the Institute for International Studies, 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 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 45cp under Graduate Diploma enrolment and wished to credit this towards a 60cp Master's degree, would still have to undertake a full 18-24cp project even if all 45cp of subjects were valid under the Master's requirement.

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) 330 2606, and is included with application forms and with offers of admission.

Inquiries

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

Civil Engineering:

Dr H W Chung
School of Civil Engineering
Building 2 Level 5 Room 591
Telephone: (+ 61 2) 330 2637
Fax: (+ 61 2) 330 2633

Electrical Engineering:

Dr V Ramaswamy
School of Electrical Engineering
Building 1 Level 24 Room 2417A
Telephone: (+ 61 2) 330 2418
Fax: (+ 61 2) 330 2435

Mechanical Engineering:

Associate Professor R M Spencer
School of Mechanical Engineering
Building 2 Level 6 Room 606
Telephone: (+ 61 2) 330 2660 (voicemail)
Fax: (+ 61 2) 330 2655

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 1996 program concentrations are described below.

Information on other specialist research areas can be obtained from individual members of academic staff (see section Postgraduate Teaching Staff) or their respective teaching schools.

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 of the 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 1996. 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 each of the Faculty's teaching schools 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 1996 program concentrations have been designated as foundation subjects, and are listed below. Further information

can be found by referring to the section Postgraduate Subject Descriptions, 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, bio-medical 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 the Schools of 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 Kel Stillman
Co-Director
Control Engineering Graduate program
Telephone: (+ 61 2) 330 2667
Fax: (+ 61 2) 330 2655

A/Prof Hung Nguyen
Co-Director
Control Engineering Graduate program
Telephone: (+ 61 2) 330 2451
Fax: (+ 61 2) 330 2435

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 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, USA and Asia, and energy and environmental experts from Australian and international organisations.

Award options

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 Deepak Sharma
Director
Energy Planning and Policy program
Telephone: (+ 61 2) 330 2422
Fax: (+ 61 2) 330 2549

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 all teaching schools, adjunct professors, AGSEI, 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 Management Decisions (6cp)
- 49002 Project Management (6cp)
- 49003 Economics for Engineers (6cp)
- 49004 Systems Engineering and Decision Modelling (6cp)
- 49005 Technological Change (6cp)
- 49006 Risk Management in Engineering (6cp)

- 49007 Social Impacts of Engineering (6cp)
- 49008 Enterprise-focused Maintenance Engineering (6cp)
- 49044 Engineering Communication and Documentation (6cp)
- 49309 Quality Planning and Auditing (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

A/Prof Jim Parkin
 Director
 Engineering Management program
 Telephone: (+ 61 2) 330 2638
 Fax: (+ 61 2) 330 2549

ENVIRONMENTAL ENGINEERING (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 graduate program equips engineers and other professionals with understanding of ecological processes, global environmental problems, need for change and sustainable development. It develops 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

Associate Professor S Vigneswaran
Director
Graduate program in Environmental Engineering and Management
Telephone: (+ 61 2) 330 2641
Fax: (+ 61 2) 330 2633

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:

- 49126 Land Resource and Environmental Management (5cp)
- 49550 Computing for Groundwater Specialists (non credit)
- 49551 Surface Hydrology and Groundwater (5cp)
- 49554 Groundwater Computing (5cp)
- 49555 Groundwater Modelling (5cp)

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

Prof Michael Knight
 Director
 National Centre for Groundwater
 Management
 Telephone: (+ 61 2) 330 2692
 Fax: (+ 61 2) 330 1985

INFORMATION SYSTEMS ENGINEERING (INF)

With recent advances in computer and telecommunication 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 leads 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 Image Computing (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

A/Prof Athula Ginige
 Director, Information Systems Engineering
 program
 Telephone: (+ 61 2) 330 2393
 Fax: (+ 61 2) 330 2435

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 longstanding relationship with local government in NSW. Its programs reflect, in both presentation and development, an ongoing collaboration with engineers and allied professionals working in the local government sector, and a commitment to professional practice underpinned by cooperative education.

Research spans programs 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 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 foundations subjects. However, particular graduate subjects may specify undergraduate prerequisites.

Recommended graduate subjects:

- 49102 Traffic and Transportation (6cp)
- 49103 Management and Industrial Relations (6cp)
- 49104 Asset Maintenance Management (6cp)
- 49105 Water Supply and Wastewater Management (6cp)
- 49106 Road Engineering Practice (6cp)
- 49107 Storm Runoff Regulation (6cp)
- 49108 Local Government Law (6cp)

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 concentration can frequently be combined with studies in this program concentration.

Academic inquiries

Mr Ken Halstead
 Director
 Local Government Engineering Graduate program
 School of Civil Engineering
 Telephone: (+ 61 2) 330 2640
 Fax: (+ 61 2) 330 2633

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 amongst 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, 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

A/Prof Kevin Sproats
Director
UTS Centre for Local Government
Education and Research
Telephone: (+ 61 2) 330 2643
Fax: (+ 61 2) 330 2274

MANUFACTURING ENGINEERING (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:

- 46336 Computer-aided Manufacturing (4cp)
- 46337 Manufacturing Systems Design (4cp)
- 46735 Manufacturing Systems Quality (6cp)
- 46835 Operations Research (6cp)

Recommended (graduate) subjects:

- 49008 Enterprise-focused Maintenance Engineering (6cp)
- 49308 Rapid Response Engineering (6cp)
- 49309 Quality Planning and Auditing (6cp)
- 49316 Bulk Materials Handling (6cp)
- 49317 Design and Manufacture with Adhesives (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

A/Prof Bob Spencer
Director
Manufacturing Engineering and Management program
Telephone: (+ 61 2) 330 2660
Fax: (+ 61 2) 330 2655

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 group of subjects has 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.

These 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 was obtained outside Australia should also find these subjects particularly helpful in relating their experience to the Australian professional context and developing their awareness of local issues and practices.

This program 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 Europe, 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. However, particular graduate subjects may specify undergraduate prerequisites.

Recommended graduate subjects:

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

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

A/Prof Stephen Johnston
Director
Professional Practice program
Telephone: (+ 61 2) 330 2668
Fax: (+ 61 2) 330 2655

SOFTWARE ENGINEERING (SFT)

Software development is now vital to the competitiveness of many business sectors, including manufacturing, telecommunications, finance and transport, and accounts for a significant proportion of the cost of engineered goods and services. This has created a demand for real-time software engineers, expert in requirement-driven structured development, abreast of international standards and best practice, competent in appropriate high level languages for specific applications, and productive using CASE tools.

The Software Engineering program concentration provides opportunity to develop mastery of these requirements for real-time industrial applications. Study options include elective research and/or coursework programs allowing flexibility (including dual concentration programs) and workplace independence, or a 'lock step' professional development program offered jointly by UTS and Campus Thomson in Paris (known as the UTS-Thomson Software Engineering program) which provides integrated work-study experiences under formal arrangements for industrial sponsorship.

The Software Engineering program concentration spans enabling research in object-oriented techniques, applied formal methods, requirements analysis and real-time strategies applicable to telecommunications, defence, manufacturing, industrial control and other sectors of enterprise.

Faculty

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

Award options

All general courses, as well as Graduate Certificate, Graduate Diploma and Master's degree for studies in the joint UTS–Thomson Software Engineering program.

Program structure

Suitable foundation (undergraduate) subjects for general courses:

- 45133 Software Development 2 (3cp)
- 45163 Real-time Software and Interfacing (3cp)
- 45363 Software Engineering (3cp)

Recommended (graduate) subjects for general courses:

- 49211 Software Engineering Principles (6cp)
- 49212 Object-oriented Software Development (6cp)
- 49214 Unix and C (6cp)
- 49217 Software Verification and Validation (6cp)
- 49225 Software Project Management (6cp)

Note:

Subjects offered in the UTS–Thomson Software Engineering program are not able to be taken as part of a general course, although approval to take one or two subjects may be given if class arrangements permit.

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 John Leaney
Director
Software Engineering Graduate program
Telephone: (+ 61 2) 330 2389
Fax: (+ 61 2) 330 2435

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 the School of 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, and advanced computing infrastructure.

- 49130 Marine Structures (6cp)
- 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

Prof Steve Bakoss
 Director
 Structural Engineering Graduate program
 Telephone (+ 61 2) 330 2629
 Fax: (+ 61 2) 330 2633

SYSTEMS ENGINEERING (SYS)

The systems approach to the complex challenges of engineering underpins an intensifying search for responsible and effective ways of creating optimal 'technological' systems of interacting elements. Concurrently, as the need grows for deeper understanding of the generally more complex interactions between these created systems and their 'containing' or host systems—such as economic, social and environmental systems—a second front for new process models of engineering can be identified, with significant implications for current perceptions and future practice of engineering.

The cross-disciplinary systems engineering program concentration at UTS offers graduates in engineering and other disciplines opportunity to master and apply concepts and techniques of this evolving meta-discipline at many levels of professional responsibility. Building on professional practice, functional thinking and probabilistic decision making, it develops understanding of the interdependent design and management dimensions of systems engineering as a discipline tailored by its applications context, and distinguished by its requirements-driven, through-life perspective.

Research interests span the need to capture the implicit theory of the 'hard' systems approach for enhanced practice, and to develop engineering processes attuned to open-systems thinking at the interface between engineering and management.

Faculty

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

Award options

All general courses.

Program structure

Suitable foundation (undergraduate) subjects:

- 35111 Discrete Mathematics (3cp)
 45145 Engineering Statistics (3cp)
 45176 Systems Engineering (3cp)

Recommended (graduate) subjects:

- 49004 Systems Engineering and Decision Modelling (6cp)
 49006 Risk Management in Engineering (6cp)
 49008 Enterprise-focused Maintenance Engineering (6cp)
 49080 Statistical Systems Design (6cp)
 49309 Quality Planning and Auditing (6cp)
 49348 Stochastic Processes in Engineering (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:

Prof Rod Belcher
 Director
 Systems Engineering program
 Telephone: (+ 61 2) 330 2423
 Fax: (+ 61 2) 330 2549

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, telecommunication switching systems and teletraffic engineering.

Faculty

The teaching and research staff are drawn from the School of 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

A/Prof Aruna Seneviratne
Director
Telecommunications Engineering
Graduate program
Telephone: (+ 61 2) 330 2441
Fax: (+ 61 2) 330 2435

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 (5cp)
- 49555 Groundwater Modelling (5cp)

Suitable additional subjects:

Other suitable graduate subjects are offered by the Faculty of Engineering. Table 1 of the Subject selection guide indicates some of these.

Academic inquiries

A/Prof Geoff O'Loughlin
Director
Water Engineering program
Telephone: (+ 61 2) 330 2644
Fax: (+ 61 2) 330 2633

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 Table 1 (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 1996 timetable, to be finalised in December 1995, will provide details of subjects to be offered, modes of delivery (i.e. standard one-semester pattern, block release, short course etc.) and times.

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 to candidates who have taken their first degree at another university, or completed

previous studies some years ago. Information concerning foundation subjects is given elsewhere in this publication (see graduate program concentrations in section Coursework Awards – General).

1996 programs

The Faculty of Engineering has identified the following program concentrations for graduate studies in engineering in 1996:

- 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 MFG
- Systems Engineering SYS
- 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 1996; subjects to be offered in 1996 will be advised to applicants in December 1995.

Any additional subjects to be presented in 1996 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 assure 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 the Postgraduate Subject Selection Table

The 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 Postgraduate Subject Selection 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.

As previously indicated, details of foundation (undergraduate) subjects offered by the Faculty of Engineering are given in this handbook (see Graduate program concentrations).

Details of subjects offered by other Faculties at UTS, by AGSEI and by other metropolitan universities, and which may be recognised for credit, are also 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'D)

No.	Subject name	LGE	LGM	WTR	ENV	GWM	STR	TEL	SFT	INF	CTL	MFG	SYS	MGT	PRP	EPP
49132	Stability of Structures						R				E					
49133	Steel and Composite Design						R									
49134	Structural Dynamics						R				E					
49135	Wind Engineering				E		R									
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														
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	R	E	E	E	E			
49212	Object-oriented Software Development							E	R	E	E	E	E			
49214	UNIX and C	E		E		E	E	E	R	E	E	E	E			
49217	Software Verification and Validation							E	R	E	E	E	E			
49225	Software Project Management	E		E		E	E	E	R	E	E	E	E			
49230	Software Engineering Orientation ¹							E	R	E						
49232	Development of Real-time Software ¹							R								
49233	Software Engineering Process A ¹							R								
49234	Software Engineering Process B ¹							R								
49235	Software Engineering Implementation B ¹							R								
49236	Software Academic Project ¹							R								

¹ Core subjects offered in UTS-Thomson Software Engineering program

POSTGRADUATE SUBJECT SELECTION TABLE (CONT'D)

No.	Subject name	LGE	LGM	WTR	ENV	GWM	STR	TEL	SFT	INF	CTL	MFG	SYS	MGT	PRP	EPP
49241	Hypertext Technologies	E		E			E	E	E	R	E	E				
49242	Image Computing							E	E	R	E	E				
49243	Design of Hypertext Information Systems							E	E	R						
49031	Information Structures, Perceptions and User-interface Design							E	E	R						
49261	Biomedical Instrumentation							E	E	E	R					
49271	Computer Architecture							E	E		R					
49272	Adaptive and Multivariable Control								E		R	E				
49274	Advanced Robotics								E		R	E				
49275	Neural Networks and Fuzzy Logic							E	E	E	R	E				
49377	Process Control Studies			E					E		R	E				
49276	Sliding Mode Control								E		R					
49311	Advanced Heat Transfer										E					
49312	Computational Fluid Dynamics										E					
49316	Bulk Materials Handling										E	R				
49308	Rapid Response Engineering										E	R				
49317	Design and Manufacture with Adhesives						E				R					
49309	Quality Planning and Auditing	E	E	E	E			E	E		R	R	R	R	E	
49080	Statistical Systems Design							E			E	E	R			
49004	Systems Engineering and Decision Modelling	E	E	E	E	E	E	E	E	E	E	E	R	R	R	
49006	Risk Management in Engineering	E	E	E	E	E	E	E	E	E	E	E	R	R	R	
49008	Enterprise-focused Maintenance Engineering	E	E	E	E	E	E	E	E	E	E	R	R	R	R	
49381	Applications of Optimisation in Engineering										E	E	R			
49348	Stochastic Processes in Engineering										E	R				
49001	Management Decisions	E	E	E	E	E	E	E	E	E	E	E	E	R	E	E
49002	Project Management	E	E	E	E	E	E	E	E	E	E	E	E	R	E	E
49003	Economics for Engineers	E	E	E	E	E	E	E	E	E	E	E	E	R		E
49005	Technological Change		E		E					E				R		E
49007	Social Impacts of Engineering	E	E	E	E	E	E	E	E	E	E	E	E	R	E	E
49021	Evaluation of Energy Investments	E	E		E									E		C
49022	Energy Resources and Technology		E		E									E		C

POSTGRADUATE SUBJECT SELECTION TABLE (CONT'D)

No.	Subject name	LGE	LGM	WTR	ENV	GWM	STR	TEL	SFT	INF	CTL	MFG	SYS	MGT	PRP	EPP
49023	Energy and Environmental Economics	E	E		E									E		C
49024	Energy Modelling	E	E		E									E		C
49025	Methods for Energy Analysis															R
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	E	R
49010	Engineering Ethics	E	E	E	E	E	E	E	E	E	E	E	E	E	E	R
49011	International Engineering	E	E	E	E	E	E	E	E	E	E	E	E	E	E	R
49044	Engineering Communication and Documentation	E	E	E	E	E	E	E	E	E	E	E	E	E	E	R
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 49076	Special Course	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
49045	Engineering for Law ²															
49047	Finite Element Applications in Engineering						R					E	E			

² Law graduates only

Specialist coursework awards

Master of Engineering Management (EP85)

The Master of Engineering Management (MEM) program places a greater emphasis on the interface between technology and management than does the traditional MBA. Whilst the MEM program is formally administered by the Faculty of Engineering, there is close collaboration with the Faculty of Business in its presentation and development.

The MEM program provides opportunity for engineers who seek career prospects in engineering management to undertake a formal course of relevant study at the Master's degree level. The course is designed for engineers or scientists who perform, or who aspire to perform, management tasks while maintaining currency in their technical specialities.

DURATION

The course requires 72 credit points of study. 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.

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.

MEM COURSE STRUCTURE

Core

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

- 21718 Organisation Analysis and Design (6cp)
- 21813 Managing People (6cp)
- 22747 Accounting for Management Decisions (6cp)
- 49001 Management Decisions (6cp)
- 49002 Project Management (6cp)
- 49003 Economics for Engineers (6cp)
- 49004 Systems Engineering and Decision Modelling (6cp)
- 49005 Technological Change (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

Twenty four 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) 330 2606, and is included with application forms and offers of admission.

Master of Engineering in Telecommunications Engineering (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.

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, 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 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.

OVERVIEW OF THE COURSE

A candidate for the degree shall complete coursework and a research project, totalling 72 credit points.¹ This includes 30 credit points of core material, together with a research 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 Graduate School of Engineering or graduate level subjects offered by the Faculties of Mathematical and Computing Sciences or Business.

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) 330 2606.

DURATION

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

FEES

Fees apply to this course. A schedule of approved fees is available on inquiry to the Graduate Studies Officer, and is included with application forms and with offers of admission.

¹ The credit point requirements for the research project may be adjusted in 1996 to allow completion of the degree with 60 credit points.

Master of Engineering in Groundwater Management (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 multidisciplinary perspective to issues of groundwater management.

ADMISSION REQUIREMENTS

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

ATTENDANCE

The course is offered on the basis of full-time attendance extending over one calendar year.

DURATION

The course requires full-time attendance for a series of lectures and laboratory work during Autumn semester and full-time 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.

COURSE STRUCTURE

Autumn semester		CP	HPW
49550	Computing for Groundwater Specialists ¹	0	3
49551	Surface Hydrology and Groundwater	5	3
49555	Groundwater Modelling	5	3
66014	Hydrogeology	5	3
66015	Hydrogeochemistry	5	3
	Elective 1	5	3
	Elective 2	5	3
Spring semester		CP	HPW
44152	Groundwater Engineering Project	30	

ELECTIVES AVAILABLE

49554	Groundwater Computing	5	3
66016	Geophysics and Remote Sensing of Groundwater Resources	5	3
66017	Geopollution Management	5	3
66018	Groundwater Geophysics	5	3
66025	Contaminated Site Management	5	3
	An approved subject offered elsewhere	5	3

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

INQUIRIES

Inquiries should be made to:
Professor Michael Knight
Director, National Centre for
Groundwater Management
Room 1/1715
Telephone: (+ 61 2) 330 2692
Fax: (+ 61 2) 330 1985

Master of Local Government Management (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-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)
or
Research Stream (1 subject) (6cp)

Semester 4

- 21729 Human Resource Management (Public) (6cp)
Project or Elective (1 subject) (6cp)
or
Research Stream (1 subject) (6cp)

Semester 5

- Project or Elective (2 subjects) (12cp)
or
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. No credit will be allowed for short courses completed prior to enrolment.

ADVANCED STANDING

Subject to 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) 330 2606, and is included with application forms and with offers of admission.

Graduate Diploma in Engineering in Groundwater Management (E061)

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

ADMISSION REQUIREMENTS

Applicants should possess a degree in engineering from UTS or hold equivalent qualifications. Applicants with other qualifications relevant to groundwater resource development may be accepted for admission, subject to approval by the Faculty Board.

ATTENDANCE

The course is offered on a full-time attendance pattern although students may extend their enrolment over more than one year.

DURATION

The course requires full-time attendance. It has a pattern similar to the Master of Engineering in Groundwater Management. However, the project work of the Spring semester is shorter and must be completed by the end of the teaching semester.

COURSE STRUCTURE

Autumn semester		CP	HPW
49550	Computing for Groundwater Specialists ¹	0	3
49551	Surface Hydrology and Groundwater	5	3
49555	Groundwater Modelling	5	3
66014	Hydrogeology	5	3
66015	Hydrogeochemistry	5	3
	Elective 1	5	3
	Elective 2	5	3
Spring semester			
44153	Groundwater Engineering Project	15	

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

ELECTIVES

As for Master of Engineering in Groundwater Management course.

INQUIRIES

Inquiries should be made to:
 Professor Michael Knight
 Director, National Centre for Groundwater Management
 Room 1/1715
 Telephone: (+ 61 2) 330 2692;
 Fax: (+ 61 2) 330 1985

Graduate Diploma in Local Government Engineering (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 AND ATTENDANCE PATTERNS

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.

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.

ADMISSION REQUIREMENTS

Professional engineers applying 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 another agency 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 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, and have considerable experience at a senior technical or managerial level.

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

COURSE STRUCTURE

		CP	HPW
49103	Management and Industrial Relations	6	3
49104	Asset Maintenance Management	6	3
49105	Water Supply and Wastewater Management	6	3
49106	Road Engineering Practice	6	3
49108	Local Government Law	6	3
49121	Environmental Assessment and Planning	6	3

ELECTIVES

		CP	HPW
49102	Traffic and Transportation	6	3
49107	Storm Runoff Regulation	6	3

Two additional electives will be on offer from other Graduate School programs for block-release attendance.

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, or other universities.

FEES

Fees apply to this course. A schedule of approved fees is available on inquiry to the Graduate Studies Officer, on (+ 61 2) 330 2606, and is included with application forms and with offers of admission.

Graduate Certificate in Environmental Engineering and Management (EP54)

Environmental engineering and management is high on the political agenda. It also has a high professional priority. The Code of Ethics of the Institution of Engineers, Australia reminds its members that their responsibility '... for the welfare, health and safety of the community shall at all times come before their responsibility to the profession, to sectional or private interest or to other engineers'. This responsibility applies equally to scientists, town planners and other professionals working in this field. They have a compelling duty to ensure that the adverse effects of development on the total environment are minimised.

This course of four subjects deals with the broad aspects of environmental management relevant to practising professionals in engineering, science, planning, architecture, law, surveying, health and building. Completing the course will develop a background and competence in environmental management.

More specifically, it will develop an awareness of 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 professional skills to work as part of an integrated team responsible for environment planning and management.

DURATION AND ATTENDANCE PATTERNS

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.

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.

ADMISSION REQUIREMENTS

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

Provisional admission for graduates from disciplines other than those above will be available provided their education contained an adequate introduction to mathematics and physical sciences. Each application in these categories will be used as a selection criterion if acceptable applications outnumber available places.

ARTICULATION WITH MASTER'S PROGRAM

Work undertaken under this Graduate Certificate enrolment may be credited towards a Master's degree provided the requirements of the Master's degree are met in full, in terms of subject coverage and project weighting. However, completion of the requirements for the Graduate Certificate in Environmental Engineering and Management does not guarantee admission to Master's candidature.

COURSE STRUCTURE

Semester 1

-
- | | |
|-------|--|
| 49121 | Environmental Assessment and Planning (6cp) |
| 49122 | Environmental Engineering and Management Practices (6cp) |

Semester 2

-
- | | |
|-------|-------------------------------------|
| 49123 | Industrial Waste Minimisation (6cp) |
| 49124 | Water Quality Management (6cp) |

FEES

Fees apply to this course. A schedule of approved fees is available on inquiry to the Graduate Studies Officer, on (+ 61 2) 330 2606, and is included with application forms and with offers of admission.

INQUIRIES

Initial inquiries should be made to the Graduate Studies Officer on (+ 61 2) 330 2606. Academic inquiries should be directed to Schools as follows:

School of Civil Engineering

A/Prof S Vigneswaran
Room 2/523, Telephone: (+ 61 2) 330 2641
A/Prof G G O'Loughlin
Room 2/511C, Telephone: (+ 61 2) 330 2630

School of Physical Sciences

Dr M Dawson
Room 4/105, Telephone: (+ 61 2) 330 1717

School of Design

Dr J Broadbent
Room 6/610, Telephone: (+ 61 2) 330 8986

School of Biological and Biomedical Sciences

A/Prof K Brown
Room GH 1.16, Telephone: (+ 61 2) 330 4042

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.

POSTGRADUATE SUBJECT DESCRIPTIONS

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

Subjects are listed in alphabetical order in the next section.

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

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 – FT)

41778

ME THESIS (ELECTRICAL – PT)

41987

PHD THESIS (ELECTRICAL – PT)

41988

PHD THESIS (ELECTRICAL – FT)

42777

ME THESIS (MECHANICAL – FT)

42778

ME THESIS (MECHANICAL – FT)

42987

PHD THESIS (MECHANICAL – PT)

42988

PHD THESIS (MECHANICAL – FT)

43777

ME THESIS (CIVIL – FT)

43778

ME THESIS (CIVIL – PT)

43987

PHD THESIS (CIVIL – PT)

43988

PHD THESIS (CIVIL – FT)

44777

ME THESIS (GROUNDWATER MGT – FT)

44778

ME THESIS (GROUNDWATER MGT – PT)

44987

PHD THESIS (GROUNDWATER
MGT – PT)

44988

PHD THESIS (GROUNDWATER
MGT – FT)

49777

ME THESIS (ENG – FT)

49778

ME THESIS (ENG – PT)

49987

PHD THESIS (ENG – PT)

49988

PHD THESIS (ENG – FT)

**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.

44152

GROUNDWATER ENGINEERING
PROJECT (FT)

44156

GROUNDWATER ENGINEERING
PROJECT (PT)

*Availability: ME(GWM) only
30cp*

44153

GROUNDWATER ENGINEERING
PROJECT (FT)

44157

GROUNDWATER ENGINEERING
PROJECT (PT)

*Availability: GDE(GWM) only
15cp*

coordinator: Prof M J Knight

National Centre for Groundwater Management

49001

MANAGEMENT DECISIONS

Availability: all courses (core for MEM)

6cp; 3hpw

prerequisite: a completed first or higher degree in Engineering or a cognate discipline

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: 2 assignments 20 per cent each, 2 quizzes 30 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

coordinator: Mr P Lewis

School of Electrical 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 perspectives of all parties, including principals, contractors and subcontractors will be considered.

Assessment: assignments 30 per cent, reading list evaluations 30 per cent, project 40 per cent

49003**ECONOMICS FOR ENGINEERS**

Availability: all courses (core for MEM)

6cp; block release or 3hpw

prerequisite: a completed first or higher degree in Engineering or a cognate discipline

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: 4 assignments 30 per cent, 2 seminars 30 per cent, final examination 40 per cent

49004**SYSTEMS ENGINEERING AND DECISION MODELLING**

Availability: all courses (core for MEM)

6cp; 3hpw

prerequisite: 49001 Management Decisions or equivalent in addition to a completed first degree in Engineering or a cognate discipline

corequisite: 49002 Project Management

coordinator: Prof W R Belcher

Graduate School of Engineering

The underlying process of problem solving through engineering projects is interpreted as a unifying theme in current professional practice. The tools and methodologies of this systems engineering process are examined from an engineering management viewpoint.

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

coordinator: Dr R Ward

School of 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

coordinator: A/Prof B Samali

Graduate School of 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

49007

SOCIAL IMPACTS OF ENGINEERING

Availability: all courses

6cp; 3hpw

prerequisite: a completed first or higher degree in Engineering or a cognate discipline

coordinator: A/Prof J Parkin

Graduate School of Engineering

The subject develops awareness of the impacts of technological development, environmental modification and planned intervention on human communities.

Topics include social theories of technology, the growth of the engineering world view, the social impacts of technological change, the social and technical construction of risk, Third World industrialisation, technology and oppression, social impact assessment, and the integration of social, environmental and technical values in planning.

Assessment: quiz 30 per cent, assignments 70 per cent

49008

ENTERPRISE-FOCUSED MAINTENANCE ENGINEERING

Availability: all courses

6cp; 3hpw or block release

prerequisite: 45176 Systems Engineering or equivalent

corequisite: 49004 Systems Engineering and Decision Modelling

coordinator: Prof W R Belcher

Graduate School of Engineering

This subject develops, through an interdisciplinary systems approach focused by enterprise imperatives, capability to plan and achieve through-life support of engineering assets. Understanding of analytical approaches is developed and their application – under business philosophies of total quality and improved productivity – is illustrated and fostered through case studies and project work.

Assessment: assignments 30 per cent, quiz 20 per cent, project 50 per cent

49009

ENGINEERING IN AUSTRALIAN SOCIETY

Availability: all courses

6cp; 3hpw

coordinator: A/Prof Stephen Johnston

School of 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

coordinator: A/Prof Stephen Johnston

School of 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

*coordinator: A/Prof Stephen Johnston
School of 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 (rec)

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; multiattribute 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, participation 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

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

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; inter-temporal 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)

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, participation 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

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)

coordinator: Dr D Sharma

Graduate School of Engineering

Topics include: 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, participation 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

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

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)

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

coordinator: A/Prof A Ginige

School of 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 50 per cent, final examination 50 per cent

49032**SUSTAINABLE TECHNOLOGICAL DEVELOPMENT**

Availability: all courses

6cp; 3hpw or block release

coordinator: A/Prof P Bryce

School of 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 participation 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

coordinators: Dr Guang Hong, Mr John McCaffrey,

School of 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 thermodynamic theory and practice involved, and ability in designing and evaluating advanced power cycles.

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

49040**GRADUATE SEMINAR**

*Availability: all coursework award courses
3cp; 3 hour sessions at intervals over two or more semesters*

*prerequisite: a completed first or higher degree in Engineering or a cognate discipline
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 is criterion referenced and ungraded, and requires the submission of written materials, seminars relating to the candidate's concurrent research, or project work.

49041**ENGINEERING RESEARCH METHODOLOGY**

*Availability: all coursework
6cp; 3hpw*

*prerequisites: enrolment in a UTS research or coursework program at Master's or Doctoral level
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 is criterion referenced and ungraded, and based on assignments requiring preparation of a research critique, a research plan, a discussion group assignment and a seminar presentation.

49044**ENGINEERING COMMUNICATION AND DOCUMENTATION**

*Availability: all courses
6cp; 3hpw or blocks*

*prerequisite: a completed first or higher degree in Engineering or a cognate discipline
coordinator: Mrs H McGregor
School of 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

*prerequisites: postgraduate enrolment in a Faculty of Law research or coursework program
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)

coordinators: Mr R Wiltshire, Dr A Saleh

School of Mechanical Engineering, School of 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

49052-76

GRADUATE PROJECT¹

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
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 opportunity for the

integration and application of advanced skills and knowledge gained in part through other subjects taken during the course. The depth and extent of the project varies with credit point requirements. These are set on the basis of an agreed project plan submitted by the student to the supervisor, and approved by the Head of the Graduate School of Engineering. The project may involve the development of new technology (hardware and/or software), the application of technology, research addressing a significant technical or engineering management issue, or in special circumstances, a critical review in the area of the student's concentration, describing key contributions in the field covered by the project work undertaken, results achieved and a discussion of their significance and implications.

Assessment is based on the preparation of a written report and a seminar presentation.

¹ 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)

49080**STATISTICAL SYSTEMS DESIGN**

Availability: all courses

6cp; 3hpw

prerequisite: 45145 Engineering Statistics or equivalent

coordinator: Prof W R Belcher

Graduate School of Engineering

Students develop an understanding of the analytic process of large-scale systems design and the concepts involved in a top-down, requirements-driven design process, and the statistical nature of systems as multielement entities.

Assessment: three assignments 20 per cent each; final exam 40 per cent

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

coordinator: A/Prof R M Spencer

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 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 36 hrs

prerequisite: a completed first or higher degree in Engineering or a cognate discipline

coordinator: Mr P Kenny

School of 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 AUSTRoads.

The subject provides the basic principles of transportation planning and traffic engineering. The influence of environmental and political aspects will be analysed as well as technical aspects.

Assessment: project 40 per cent, examination 60 per cent

49103**MANAGEMENT AND INDUSTRIAL RELATIONS**

Availability: all courses (core for GD(LGE))

6cp; block release totalling 36 hrs

prerequisite: a completed first or higher degree in Engineering or a cognate discipline.

coordinator: Mr C Holmes

School of 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.

Its subjects include Management Concepts, Principles and Systems, Management Process, Organisational Behaviour,

Functional Management, Managing Effectiveness.

Assessment: major assignment 50 per cent of class mark, examination 40 per cent, class work 10 per cent

49104

ASSET MAINTENANCE MANAGEMENT

Availability: all courses (core for GD(LGE))

6cp; block release totalling 36 hrs

prerequisite: a completed first or higher degree in Engineering or a cognate discipline

coordinator: Mr W Neville

School of 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 the planning, design, maintenance, and monitoring concepts and methods, with a view to optimising life cycle cost/benefits; develop knowledge of the methods for assessing and controlling potential losses and risks; and understand how these aims interact with and support the requirements of the management, logistics, reporting and accounting guidelines.

Subjects include legislative and other requirements, Basic Maintenance Strategies, Maintenance Support Strategies, Risk Assessment and Control, Maintenance Management Systems.

Assessment: project 40 per cent, examination 60 per cent

49105

WATER SUPPLY AND WASTEWATER MANAGEMENT

Availability: all courses (core for GD(LGE))

6cp; block release totalling 36 hrs

prerequisite: a completed first or higher degree in Engineering or a cognate discipline

coordinator: A/Prof S Vigneswaran

School of Civil Engineering

The objective of this subject is to concentrate on the design, operation and maintenance of municipal wastewater treatment plants, sewage systems and water supply systems. At the completion of this subject the student will understand drinking water and sewage treatment plants,

sewerage systems and water reticulation systems in terms of purpose, basic design concepts, operation and maintenance, identifying and quantifying major problems, operating these systems to avoid or overcome problems.

Subject content includes statutory requirements, constituents and quality of wastewaters, description, operation and control of treatment processes, performance monitoring, sewerage and water reticulation systems, trouble-shooting and problem solving.

Assessment: two assignments 30 per cent, mid-semester 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 36 hrs

prerequisite: a completed first or higher degree in Engineering or a cognate discipline

coordinator: Mr P Kenny

School of 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 36 hrs
prerequisite: nil, though some previous experience in hydraulics and hydrology is assumed.
coordinator: A/Prof G G O'Loughlin
School of Civil Engineering*

This subject aims to: refresh students in basic principles and methods of hydraulics and hydrology; familiarise them with methods of urban drainage set out in recent manuals, with an emphasis on flood protection and integration with stormwater quality enhancement; and provide an overview of rural design flood estimation, erosion protection, flood mitigation and coastal engineering.

Assessment: five assignments 50 per cent, final examination 50 per cent

49108

LOCAL GOVERNMENT LAW

*Availability: all courses (core for GD(LGE))
6cp; block release totalling 36 hrs
prerequisite: a completed first or higher degree in Engineering or a cognate discipline
coordinator: Mr K Halstead
School of 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
coordinator: Dr M Patarapanich
School of 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 3 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
coordinator: A/Prof G G O'Loughlin
School of 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 1½ days with optional tutorials
prerequisites: 47155 Hydrology; 47152 Public Health Engineering or equivalent
coordinator: A/Prof G G O'Loughlin
School of 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 30 hrs
prerequisites: completion of at least one undergraduate subject in statistics. Some prior knowledge of hydrology is assumed, but may have been gained through either employment or formal education
coordinator: Mr Jim Irish
School of Civil Engineering*

This subject provides students with experience in a field of hydrology with the confidence to use a range of statistical tools and with knowledge of statistical methods which can be usefully employed in hydrological practice. Such methods are

presently employed in Australia in only a limited way for design flood estimation. Examples will be drawn from surface water hydrology, including problems relating to reservoir yield, design flood estimation and continuous modelling of water resources systems.

Assessment: three assignments each 20 per cent, 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
coordinator: A/Prof S Vigneswaran, School of 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
coordinators: A/Prof S Vigneswaran, School of 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), biodiversity; importance of sustainable

development; overview of major environmental problems, their effect and remedies; air pollution, noise pollution, water pollution, soil pollution, solid and hazardous wastes; 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.

coordinators: A/Prof S Vigneswaran, School of 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

*coordinator: A/Prof G G O'Loughlin
School of 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 of 2 days

prerequisite: a completed first degree in engineering or cognate discipline (natural resources, agriculture, science, law) and two years of related work experience

*coordinator: Mr J Irish
School of 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, is developed.

Topics include: semantics of risk and hazard; risk as a social construct; principles of risk management; steps in risk engineering; risk perception, risk communication, and acceptability of risks; statutory provisions in NSW relating to environmental risks; legal principles relating to environmental risks (liability etc.); checklists and scoping for impact assessment and auditing; risks to health and to ecosystems; comparing risks; quantified and qualitative risk assessment methods; discussion of some specific environmental hazards in the context of risk amelioration; risk assessment in

emergencies; financial tools in the management of environmental risks; environmental auditing procedures.

Assessment: three assignments 20 per cent each, examination 40 per cent

49126

LAND RESOURCE AND ENVIRONMENTAL MANAGEMENT

Availability: all courses

6cp; 3hpw or block release

prerequisite: 47142 Environmental Engineering or equivalent

coordinator: Dr P Hazelton, School of 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

49130

MARINE STRUCTURES

Availability: all courses

6cp; 3hpw

prerequisite: 49111 Coastal Engineering or equivalent

coordinators: Dr M Patarapanich, Dr J Ivering School of Civil Engineering

This subject develops engineering capability relevant to the analysis, design and protection of various types of marine structures. Topics covered include: classifications of coastal, maritime and offshore structures; site investigations; port planning; harbours and navigation channels; wave penetration into harbours; rubble mound and vertical wall breakwaters; wharves, piers and bulkheads; dolphins and moorings; bulk cargoes and container terminals; marinas; port operation and services; dredging and reclamation; shore protection structures; river entrance

training jetties; offshore structures; submarine pipelines; ocean outfalls; corrosion in marine environment.

Assessment: assignments/design project 75 per cent, and quiz 25 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

coordinator: Dr J Ivering School of 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, 2 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

coordinator: Dr A Saleh

School of 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

coordinator: Dr S Parsanejad

School of 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, 2 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

coordinator: A/Prof B Samali

School of 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; 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 (including a project) 50 per cent, two quizzes 50 per cent

49135**WIND ENGINEERING**

Availability: all courses

6cp; 3hpw or block release

prerequisites: 47133 Numerical Methods; 47277 Loading on Building Structures or equivalents

coordinator: A/Prof B Samali

School of 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, chimney stacks and bridges in accordance with strength, stability and serviceability limit states design criteria. On completion the student should understand the nature of wind loads acting on buildings due to along and cross-wind actions, and be able to prevent aerodynamic instabilities, such as flutter, galloping, torsional divergence and others by proper design. Wind tunnel testing techniques for determining wind-induced dynamic response of structures and cladding pressures are introduced, and the environmental effects of severe winds around buildings and other structures are studied in terms of human safety and comfort.

Assessment: assignments 50 per cent, two quizzes 25 per cent each

49136**APPLICATION OF TIMBER IN ENGINEERED STRUCTURES**

Availability: all courses

6cp; 3hpw

prerequisites: 47127 Mechanics of Solids; 47141 Structural Analysis or equivalents

coordinator: Prof S L Bakoss

School of 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

coordinator: Dr G L Ring

School of 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 discontinuities. 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

coordinator: A/Prof M R Hausman

School of Civil Engineering

The subject provides practical guidelines and methods of analysis for improving the engineering properties of soils and

rocks – for example, by increasing strength, reducing compressibility, controlling permeability and volume change, or reducing liquefaction potential and variability. The main topics covered are compaction, dewatering, admixtures, grouting, anchorage and soil reinforcement. In addition, the theoretical principles and preloading, electro-osmosis and soil heating and freezing are introduced.

Assessment: classwork, assignments and quizzes 50 per cent, project requiring laboratory testing programs or literature review 50 per cent

49151

ADVANCED CONCRETE TECHNOLOGY

Availability: all courses

6cp; 3 blocks of 1.5 days each

prerequisite: 47154 Concrete Technology or equivalent

coordinator: Dr R Sri Ravindrarajah

School of 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 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

coordinator: Dr R Sri Ravindrarajah,

Dr HW Chung

School of 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; 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

coordinator: Prof KW Yates

School of 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

coordinator: A/Prof A Seneviratne

School of 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

coordinator: Prof KW Yates

School of 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

coordinator: A/Prof T Buczkowska

School of 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 using a mathematical approach and/or by using simulation. Case studies included in the course provide the student with capabilities to make a choice in networking solutions based on the performance/cost analysis to meet user expectations.

Assessment: four assignments 60 per cent, final examination 40 per cent

49205

TRANSMISSION SYSTEMS

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

6cp; 3hpw

prerequisites: 49203 Telecommunications Signal Processing or equivalent

*coordinator: A/Prof S Reisenfeld
School of 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

*coordinator: Dr A Sanagavarapu
School of Electrical Engineering*

Compliance with Electromagnetic Compatibility regulation is becoming

mandatory for engineering products. This course provides an understanding of the underlying concepts for the analysis, modelling and design for achieving electromagnetic compatibility.

Assessment: continuous assessment of a variety of assignments negotiated by the student with the coordinator

49207

WAVE PROPAGATION FOR MICROWAVE AND MOBILE COMMUNICATIONS

Availability: all courses

6cp; 3hpw

prerequisite: 45264 Fields and Waves or equivalent

*coordinator: Dr A Sanagavarapu
School of 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 coordinator

49208

TELECOMMUNICATIONS MANAGEMENT

Availability: all courses

6cp; 3hpw or full-day block modes

prerequisite: 45145 Engineering Statistics or equivalent

*coordinator: A/Prof T Buczkowska
School of Electrical Engineering*

The subject provides an integrated technology management perspective on communications infrastructure and services and the changing telecommunications and information technology environment. It focuses on techniques and tools for strategic telecommunications planning, and covers the evaluation of systems and selection procedures. Software packages are used for network modelling, dimensioning and performance evaluation.

On completion, students are able to assess corporate telecommunications requirements, to collect statistical data required

for corporate telecommunications planning, to prepare a strategic telecommunications plan capitalising on technology and market trends, and to evaluate the performance and cost of the planned system.

Assessment: assignments 60 per cent, mid-semester quiz 10 per cent, final examination 30 per cent

49211
SOFTWARE ENGINEERING PRINCIPLES

Availability: all courses
6cp; block release
prerequisite: a completed first or higher degree in Engineering or a cognate discipline. Some programming experience, ideally in industry
coordinator: Mr J R M Leaney
School of Electrical Engineering

This subject provides an overview of the field of Software Engineering. A framework is developed into which more detailed material regarding specific aspects of the software engineering process, techniques, and issues can fit. This includes an introduction to such issues as 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 SOFTWARE DEVELOPMENT

Availability: all courses
6cp; block release
prerequisite: 49211 Software Engineering Principles or equivalent
coordinator: Mr J R M Leaney
School of Electrical Engineering

This subject aims to improve the student's understanding of object-oriented software development. This is a relatively new approach to software development which has significant promise for providing much 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 in practical software development. The subject covers the OO paradigm, OO analysis and design, comparison of methodologies and languages, and OO tools and environments.

Assessment: 50 per cent major development project, 50 per cent learning contract

49214
UNIX AND C

Availability: all courses
6cp; 3hpw or block release
prerequisite: 45123 Software Development I or equivalent
coordinator: Mr Mark Sifer
School of Electrical Engineering

This subject provides an introduction to both the C programming language and the Unix operating system for students with programming experience in another language. This will cover the concepts behind Unix which facilitate the close integration of processes and files, the Unix shell and some utilities. The subject assists students to become competent in constructing C programs which use a range of Unix features.

Assessment: individual assignment 20 per cent, group assignment 20 per cent, examination 60 per cent

49217
SOFTWARE VERIFICATION AND VALIDATION

Availability: all courses
6cp; 3hpw/block release
prerequisite: 49211 Software Engineering Principles or equivalent
coordinator: Mr J R M Leaney
School of 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

6cp; 3hpw/block release or part-time

prerequisite: 49211 Software Engineering

Principles or equivalent

coordinator: Mr J R M Leaney

School of 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, software project estimating. Prior knowledge of general project management is advised, but not essential. This may be obtained through other GSE subjects.

Assessment: classwork, a learning contract, a major project (80 per cent) and an examination (20 per cent)

49230

SOFTWARE ENGINEERING ORIENTATION

Availability: Joint UTS–Thomson Software Engineering program only

6cp; block release

coordinator: Mr J R M Leaney

School of Electrical Engineering

This subject provides an overview of the field of Software Engineering. The focus is strongly on the need for software engineering, the current state of the field, and the role that the SEP can play in this context. The objectives are to develop a framework into which more detailed material regarding specific aspects of the software engineering process, techniques, and issues can fit. This includes an introduction to such issues as 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. These concepts are considered in the context of the SEI work on process. The subject also develops skills on the use of appropriate software documentation tools and techniques (such as Interleaf).

Assessment: analytical written project 25 per cent, examination 25 per cent, document preparation project 25 per cent, presentation 25 per cent

49231

SOFTWARE ENGINEERING IMPLEMENTATION A

Availability: Joint UTS–Thomson Software Engineering program only

6cp; block release

coordinator: Mr J R M Leaney

School of Electrical Engineering

This subject aims to develop skills across a broad range of basic implementation issues and languages. The subject covers advanced C programming and development under a Unix environment, basic software development using the Ada language, and user-interface design (including interface specification, design and implementation). The subject has a strong emphasis on the practical application of these concepts to the development of industrial software systems.

Assessment: C software design project 30 per cent, Ada software design learning contract 40 per cent, Interface development project 30 per cent

49232

DEVELOPMENT OF REAL-TIME SOFTWARE

Availability: Joint UTS–Thomson Software Engineering program only

6cp; block release

coordinator: Mr J R M Leaney

School of Electrical Engineering

This subject aims to provide students with an understanding of issues and concepts related to the development of real-time systems. This includes both basic principles, as well as underlying issues in the development and use of environments supporting real-time software systems. The subject contains three main components. The first component focuses on

basic real-time concepts. The second component looks at computer architectures, with a strong focus on the development of device drivers, I/O, and optimisation of software in a hardware-software project. The third component considers real-time operating systems and the ways in which they support real-time applications, using VRTX to demonstrate many of the principles.

Assessment: software/hardware-based development project 50 per cent, learning contract on development project for real-time operating systems 50 per cent

49233

SOFTWARE ENGINEERING PROCESS A

*Availability: Joint UTS–Thomson Software Engineering program only
6cp; block release
coordinator: Mr J R M Leaney
School of Electrical Engineering*

This subject aims to develop specific skills related to the analysis, specification, design and testing of real-time software systems. The subject covers both software specification (using StP in the context of the Software Development Reference System) and software design (first introducing SASD and then focusing on object-oriented design of real-time systems) as well as software verification techniques. The subject aims to have a strong practical focus – covering tools and methodologies and developing skills which will be immediately relevant to the applicants and their companies. The subject contains a significant component of practical project work which is aimed at reinforcing the material covered in the subject.

Assessment: analytical written assignment 10 per cent, software design project 30 per cent, software specification learning contract 30 per cent, software verification learning contract 30 per cent

49234

SOFTWARE ENGINEERING PROCESS B

*Availability: Joint UTS–Thomson Software Engineering program only
6cp; block release
coordinator: Mr J R M Leaney
School of Electrical Engineering*

This subject aims to develop the student's ability to effectively adopt an appropriate software development process. The subject covers general project management (including such as issues as resourcing and scheduling) and 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, developing both abilities to undertake the various activities which make up the software process, as well as the production of appropriate documentation. The subject is based heavily around both group work, 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 4x15 per cent

49235

SOFTWARE ENGINEERING IMPLEMENTATION B

*Availability: Joint UTS–Thomson Software Engineering program only
6cp; block release
coordinator: Mr J R M Leaney
School of Electrical Engineering*

This subject aims to develop skills across a broad range of advanced implementation issues and languages. The subject covers object-oriented software development using the C++ language (including a coverage of the OO methodology, tools, processes and implementation issues), and continues to develop understanding of software development using the Ada language (focusing on those aspects specific to developing real-time software). The subject also covers real-time Unix systems, using POSIX to illustrate various concepts. Finally, the subject aims to develop the student's understanding of the use of real-time software engineering

in specific application domains. The subject covers databases (database models, data handling languages, database security and integrity) and telecommunications systems (transmission types and media, networks, applications). The subject shows how software engineering can be used to facilitate the development of high-quality applications in these domains.

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 ACADEMIC PROJECT

Availability: Joint UTS–Thomson Software Engineering program only
6cp; block release
coordinator: Mr J R M Leaney
School of 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 experience aspects of teamwork and its implications. The project involves working together in groups of four (in varying roles) during the complete development of a software system. The project is defined in such a way that cost is not critical but deadlines are 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
coordinator: A/Prof A Ginige
School of Electrical Engineering

This subject provides an introduction to Hypermedia. It introduces basic components and the structure of hypermedia systems (Hyper components and the Dexter Model), underlying technologies for capturing, compressing and structuring 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.

Assessment: assignments 30 per cent, mini project 40 per cent, quiz 30 per cent

49242

IMAGE COMPUTING

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
coordinator: Dr D Lowe
School of Electrical Engineering

This subject aims to introduce the students to the fundamental aspects of visual information in the context of information systems. The role of visual information is considered as well as how it is used in applications, and specific technical issues relating to the storage, transmission, access and manipulation of visual information. By the end of the subject the students will have a basic understanding of visual information processing and computer vision techniques and be able to apply these in developing systems to search for and retrieve visual data from databases. The method of teaching is oriented towards facilitating the learning process and developing skills in the area of visual information in hypermedia, rather than on transmission of information or knowledge.

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

prerequisites: 49241 Hypermedia Technologies; 49242 Image Computing; 49031 Information Structures, Perception and User-interface Design or equivalents

coordinator: Dr R Meegoda

School of Electrical Engineering

This subject provides experience in the design of hypermedia information systems, including the selection and integration of different technologies appropriate to the system requirement. Topics include the selection and integration of technologies; hypermedia standards (MHEG, HyTime, JPEG, MPEG, H.261 etc); life cycle considerations and project management in Hypermedia Systems development, and non-technical issues such as copyright and social impact.

Assessment: project 75 per cent, quiz 25 per cent

49261**BIOMEDICAL INSTRUMENTATION**

Availability: all courses

6cp; 3hpw

prerequisites: an undergraduate subject in instrumentation and control, or equivalent

coordinator: A/Prof H Nguyen

School of Electrical Engineering

This subject covers general concepts applicable to the design of all medical instrumentation systems, the measurement of biopotentials and critical-care analytes for diagnostic purposes, and the design of biomedical devices for therapeutic purposes. The subject includes three modules covering sensors and amplifiers, vital sign monitoring for diagnostic purposes, and physiological intervention/closed-loop control.

Assessment: assignments 25 per cent, project work and seminar 50 per cent (includes 20 per cent for seminar), final examination 25 per cent

49271**COMPUTER ARCHITECTURE**

Availability: all courses

6cp; 3hpw

prerequisite: 45143 Computer Hardware or equivalent

coordinator: Mr N J Carmody

School of 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

coordinator: Dr J G Nicol

School of 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 2 seminar presentations 50 per cent, 3 out of 4 assignments 50 per cent

49273**RANDOM SIGNAL THEORY**

Availability: all courses

6cp; 3hpw

prerequisite: 45145 Engineering Statistics or equivalent

coordinator: A/Prof S Reisenfeld

School of 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 provides the basic mathematical 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

coordinator: Dr R Meegoda

School of 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

prerequisites: 45583 Adaptive and Multivariable Control; 45663 Digital Transmission or equivalents

coordinator: A/Prof H Nguyen

School of 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 dynamical systems, these intelligent control systems can learn from experience with numerical and linguistic sample data.

Assessment: three assignments totalling 25 per cent, project 50 per cent and final examination 25 per cent

49276**SLIDING MODE CONTROL**

Availability: all courses

6cp; 3hpw or block release

prerequisite: 45581 Analog and Digital Control or equivalent

corequisite: 49272 Adaptive and Multivariable Control

coordinator: A/Prof HT Nguyen

School of 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 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 ENGINEERING

Availability: all courses

6cp; 3hpw

prerequisite: 46715 Manufacturing Processes or equivalent

coordinator: A/Prof R M Spencer

School of 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 AUDITING

Availability: all courses

6cp; 3 blocks each of 2 days

prerequisite: 46820 Engineering Statistics or equivalent

coordinator: Dr Y Bhasin

School of Mechanical Engineering

This subject provides an understanding of the imperatives, culture, philosophy, scope, strategies and practice applied to the development of total quality management through problem identification, costing, design, vendor supplies, customer service, institute quality auditing and the development of a quality assurance manual 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

coordinator: Dr P Huynh

School of 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

coordinator: Dr A Mack

School of 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

coordinator: Mr David 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

*coordinators: Mr R Wiltshire, Prof F Swinkels
School of 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

49348

STOCHASTIC PROCESSES IN ENGINEERING

Availability: all courses

6cp; 3hpw or block release

prerequisite: 47153 Probability and Statistics or equivalent

coordinators: Dr G Hong, School of Mechanical Engineering and A/Prof B Samali, School of Civil Engineering

This subject applies random process theory to engineering practice with emphasis on reliability analysis, prediction of statistical properties and the application of analytical results to engineering planning, design and quality control. Probability theory, random processes and relevant distributions are summarised; failure data collection and its analysis, experimental designs, and linear and nonlinear systems with stochastic predictions are investigated.

Assessment: assignments and projects 50 per cent; final examination 50 per cent

49377

PROCESS CONTROL STUDIES

Availability: all courses

6cp; 3hpw or block release

prerequisite: 46531 Control Engineering 1 or equivalent

*coordinator: Mr K Stillman
School of 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

prerequisite: 46830 Numerical Analysis or equivalent

coordinator: Mr K Stillman

School of 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 exam 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

coordinator: A/Prof J V 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 36 hours

prerequisite: 49451 Environment of Professions in Local Government or equivalent

coordinator: A/Prof J V Parkin

Graduate School of Engineering

This subject examines current environmental issues and their implication 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 36 hours

prerequisite: 21731 Resource Management or equivalent

coordinator: Mr K Halstead

School of 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 36 hours

prerequisites: 21729 Human Resource Management (Public); 49453 Infrastructure Management or equivalents

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); 3hpw

prerequisite: a completed first or higher degree in Engineering or a cognate discipline

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))

5cp; 3hpw

prerequisite: a completed first or higher degree in Engineering or a cognate discipline

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))

5cp; 3hpw

prerequisite: a completed first or higher degree in Engineering or a cognate discipline

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, mainframe, microcomputer operation systems, databases, spreadsheets, word processing, elements of geostatistics and graphical packages with applications related to groundwater processes, groundwater computing project.

Assessment: continuous assessment involving assignments and problems. Assignments and problems assessed at a more advanced level than 49550 Computing for Groundwater Specialists

49555

GROUNDWATER MODELLING

Availability: all courses (core for ME(GWM) and GDE(GWM))

5cp; 3hpw

prerequisite: a completed first or higher degree in Engineering or a cognate discipline

corequisite: 49550 Computing for Groundwater Specialists

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

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

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: MEM /MLGM core subject, MEM elective

6cp; 3hpw

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

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

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: 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

coordinator: Mr D Davis

Faculty of Business

An introduction to the management of operations. Topics: 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

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

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

Theory and research from the social sciences are used to explore human behaviour at work. Students are introduced to the basics of individual psychology which is then critically applied to the fields of motivation and job design. The work of social psychology on group

dynamics is presented and applied to the management of work groups and committees. Various theories of leadership are examined and critically assessed. The question of intergroup behaviour and conflict is discussed as are 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*

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*

This subjects views marketing as a key managerial decision-making area, in particular relating 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 Economics for Engineers
coordinator: A/Prof L Perry
Faculty of Business*

Topics: 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
5cp; 3hpw*

*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 field management.

66015

HYDROGEOCHEMISTRY

*Availability: ME(GWM) and GDE(GWM) core subject
5cp; 3hpw*

*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

5cp; 3hpw

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**GEPOLLUTION MANAGEMENT**

Availability: ME(GWM) and GDE(GWM) elective subject

5cp; 3hpw

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

5cp; 3hpw

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

5cp; 3hpw

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.

POSTGRADUATE SUBJECT NAMES IN ALPHABETICAL ORDER

Accounting for Managerial Decisions	22747	Energy and Environmental Economics	49023
Adaptive and Multivariable Control	49272	Energy Demand Analysis and Forecasting	49027
Advanced Concrete Technology	49151	Energy Modelling	49024
Advanced Geomechanics	49141	Energy Resources and Technology	49022
Advanced Ground Modification	49142	Engineering Communication and Documentation	49044
Advanced Heat Transfer	49311	Engineering Ethics	49010
Advanced Robotics	49274	Engineering for Lawyers	49045
Advanced Studies in Electromagnetic Compatibility	49206	Engineering in Australian Society	49009
Advanced Teletraffic Engineering	49204	Engineering Research Methodology	49041
Application of Timber in Engineered Structures	49136	Enterprise-focused Maintenance Engineering	49008
Applications of Optimisation in Engineering	49381	Environment of Professions in Local Government	49451
Asset Maintenance Management	49104	Environmental Assessment and Planning	49121
Biomedical Instrumentation	49261	Environmental Engineering and Management Practices	49122
Coastal Engineering	49111	Environmental Management	49452
Combined and Cogeneration Power Plants	49033	Environmental Policy for Energy Systems	49029
Communication Protocols	49202	Environmental Risk Assessment	49125
Computational Fluid Dynamics	49312	Evaluation of Energy Investments	49021
Computer Architecture	49271	Financial Management	25742
Computing for Groundwater Specialists (non credit)	49550	Finite Element Applications in Engineering	49047
Contaminated Site Management	66025	Geophysics and Remote Sensing of Groundwater Resources	66016
Damage and Repair of Concrete Structures	49152	Geopollution Management	66017
Design and Manufacture with Adhesives	49317	Graduate Project	49052-76
Design of Hypermedia Information Systems	49243	Graduate Seminar	49040
Development of Real-time Software	49232	Groundwater Computing	49554
Economics for Engineers	49003	Groundwater Engineering Project (FT)	44152
Electricity Sector Planning	49026	Groundwater Engineering Project (FT)	44153
Employment Relations	21720		

Groundwater Engineering Project (PT)	44156	Medium Span Bridges	49131
Groundwater Engineering Project (PT)	44157	Methods for Energy Analysis	49025
Groundwater Geophysics	66018	Mobile Communications	49207
Groundwater Modelling	49555	Neural Networks and Fuzzy Logic	49275
Human Resource Management (Public)	21729	Object-oriented Software Development	49212
Hydrogeochemistry	66015	Operations Management	21741
Hydrogeology	66014	Organisation Analysis and Design	21718
Hypermedia Technologies	49241	PhD Thesis (Civil – FT)	43988
Image Computing	49242	PhD Thesis (Civil – PT)	43987
Industrial Waste Minimisation	49123	PhD Thesis (Electrical – FT)	41988
Information Structures, Perception and User Interface Design	49031	PhD Thesis (Electrical – PT)	41987
Infrastructure Management	49453	PhD Thesis (Eng – FT)	49988
Integrated Services Networks	49201	PhD Thesis (Eng – PT)	49987
International Engineering	49011	PhD Thesis (Groundwater Mgt – FT)	44988
Land Resource and Environmental Management	49126	PhD Thesis (Groundwater Mgt – PT)	44987
Local Government Law	49108	PhD Thesis (Mechanical – FT)	42988
Management and Industrial Relations	49103	PhD Thesis (Mechanical – PT)	42987
Management Decisions	49001	Policy and Planning of Energy Conservation	49028
Management Skills	21779	Process Control Studies	49377
Managerial Marketing	24734	Project Management	49002
Managing Local Enterprise	49454	Public Sector Management	21728
Managing People	21813	Quality Planning and Auditing	49309
Marine Structures	49130	Random Signal Theory	49273
ME Thesis (Civil – FT)	43777	Rapid Response Engineering	49308
ME Thesis (Civil – PT)	43778	Resource Management	21731
ME Thesis (Electrical – FT)	41777	Risk Management in Engineering	49006
ME Thesis (Electrical – PT)	41778	Road Engineering Practice	49106
ME Thesis (Eng – FT)	49777	Sliding Mode Control	49276
ME Thesis (Eng – PT)	49778	Social Impacts of Engineering	49007
ME Thesis (Groundwater Mgt – FT)	44777	Software Academic Project	49236
ME Thesis (Groundwater Mgt – PT)	44778	Software Engineering Implementation A	49231
ME Thesis (Mechanical – FT)	42777	Software Engineering Implementation B	49235
ME Thesis (Mechanical – PT)	42778	Software Engineering Orientation	49230
		Software Engineering Principles	49211

210 POSTGRADUATE SUBJECT NAMES IN ALPHABETICAL ORDER

Software Engineering Process A	49233	Technological Change	49005
Software Engineering Process B	49234	Telecommunications Management	49208
Software Verification and Validation	49217	Telecommunications Signal Processing	49203
Special Course A	49082-86	Traffic and Transportation	49102
Special Course B	49092-96	Transmission Systems	49205
Stability of Structures	49132	Unix and C	49214
Statistical Hydrology	49114	Urban Stormwater Flood Management	49112
Statistical Systems Design	49080	Urban Stormwater Pollution Management	49113
Steel and Composite Design	49133	Water Quality Management	49124
Stochastic Processes in Engineering	49348	Water Supply and Wastewater Management	49105
Storm Runoff Regulation	49107	Wave Propagation for Microwave and Wind Engineering	49135
Strategic Management (Public)	21758		
Structural Dynamics	49134		
Surface Hydrology and Groundwater	49551		
Sustainable Technological Development	49032		
Systems Engineering and Decision Modelling	49004		

POSTGRADUATE TEACHING STAFF

	Rm	Ext
Graduate School of Engineering		
<i>Head of School</i>		
Professor W R Belcher	2/7078	2423
<i>Associate Head of School</i>		
A/Prof B Samali	2/7079	2023
<i>Associate Head of School</i>		
A/Prof R M Spencer	2/7070	2548
<i>Academic staff</i>		
Dr D Sharma	2/7088	2638
Energy Planning and Policy, Energy Economics, Energy Management, Decision Process Modelling, Institutional Restructuring Project, Planning and Performance		
<i>Adjunct Professor</i>		
Professor E W Aslaksen	—	2433
Systems Engineering, Professional Development		
Director of Management Studies in Engineering		
A/Prof J V Parkin	2/520	2638
School of Civil Engineering		
Building 2, Level 5		
<i>Head of School</i>		
A/Prof G G O'Loughlin	511C	2644
Water Engineering		
<i>Deputy Head of School</i>		
Mr E A Brady	511A	2627
Surveying		
<i>Professors of Civil Engineering</i>		
Emeritus Professor K A Faulkes	526	2646
Concrete Structures		
Professor S L Bakoss	528	2629
Structural Mechanics		
<i>Associate Professors</i>		
A/Prof T A Anderson	521	2639
Construction and Management		
A/Prof M R Hausmann	527	2645
Soil Engineering		
A/Prof B Samali	513	2632
Structural Dynamics, Structural Mechanics		
A/Prof S Vigneswaran	523	2641
Environmental Engineering		

	Rm	Ext
<i>Academic staff</i>		
Dr S C Beecham Water Engineering	507	2623
Dr H W Chung Construction Materials	519	2637
Mr K Crews Timber Engineering	503	2619
Mrs A P Gardner	536	2648
Mrs P Hagare Environmental Engineering	520	1952
Mr K Halstead Local Government Engineering	522	2640
Dr P A Hazelton Environmental Engineering	512	2661
Dr J W Ivering Civil Engineering Design	529	2647
Dr M R Karim Structural Mechanics	505	2621
Mr P J Kenny Road Engineering	502	2618
Dr K L Lai Structural Mechanics, Design and Construction	510	2626
Mr P C Liu Civil Engineering Design	508	2624
Dr S Parsanejad Design of Steel Structures, Structural Analysis	504	2620
Dr M Patarapanich Water Engineering	524	2642
Dr R Sri Ravindrarajah Concrete Technology	509	2625
Dr G L Ring Soil Engineering	506	2622
Dr A Saleh Structural Mechanics and Analysis	517	2635
Mr C Wilkinson Structural Mechanics, Fabric Structures	518	2631
<i>Honorary Associate</i>		
Mr J L Irish Water and Environmental Engineering	501	2617

	Rm	Ext
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School of Electrical Engineering

Building 1, Levels 22 to 25

*Professor of Electrical Engineering
and Head of School*

Professor K W Yates Communication System Theory, Packet Radio Communications, Signal Processing, Spread Spectrum Communications, Synchronisation Issues in Communications	2427	2436
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Deputy Head of School

Mr W G Hooper Power Systems, Electromagnetic Theory, Educational Psychology, Electrical Plant Design	2428	2438
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Professors of Electrical Engineering

Professor W R Belcher Antenna & Microwave Systems, Communication Systems, Systems Engineering	2419C	2423
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Professor C R Drane Positioning Systems, Software Engineering, Intelligent Vehicle Highway Systems	2221A	2390
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Professor V S Ramsden Electrical Machines, Electrical Variable Speed Drives, Rehabilitation Engineering (Aids for Disabled People), Electromagnetics	2417C	2420
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Associate Professors

A/Prof P Bryce Microhydroelectricity, Appropriate Technology; Technology for Developing Countries, Fibre-optic Communications, Electromagnetic Theory	2420A	2425
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A/Prof T Buczkowska Microcomputer System Design, Software Engineering, Computer Networks, Data Communications	2542	2458
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A/Prof A Ginige Digital Systems, Image Processing, Medical Imaging, Image and Video Coding, Image and Video Databases, Content Based Retrieval of Multimedia Information, Hypertext and Hypermedia Systems	2224	2393
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	Rm	Ext
A/Prof H T Nguyen Robust Adaptive and Multivariable Control, Systems Instrumentation and Control, Biomedical Engineering, Neural Networks and Fuzzy Systems, Power Electronics and Machine Control, Mechatronics, Real-time Image Processing and Signal Processing	2517	2451
A/Prof C E Peterson Research Policy, Computer Integrated Manufacturing, Image Analysis, Process Control, Robotics	2220A	2392
A/Prof S Reisenfeld Communications Systems, Satellite Communication, Information Theory, Modulation, Channel Coding, Synchronisation, Mobile Communications, Wireless Networks, Neural Networks	2512B	2448
A/Prof A P Seneviratne Protocol Design, Software Engineering, Computer Networks, Data Communications, Operating systems	2431	2441
<i>Academic Staff</i>		
Mr T Aubrey Antenna and Propagation, Microwave Engineering	2417B	2360
Mr J Boswell Safe Intelligent Autonomous Robots, Safe Software	2222	2382
Dr J D Carmo Electromagnetics, Numerical Methods and Optimisation, Power System Protection	1921	2338
Mr N J Carmody Microcomputer System Design, Operating systems, Computer Architecture, Digital control Systems, VLSI	2221B	2391
Dr J Daba Teletraffic Engineering, Telecommunication Systems, Analysis and Design, Image Processing, Radar Remote Sensing	2420C	2530
Dr M Eckert Human Visual Perception, Medical Imaging, Signal Processing, Biomedical Signal Processing, Image Processing, Signal Compression	2420D	2428
Mr K K Fung Parallel Processing, Software Engineering, Computer Simulation, Microcomputer Engineering, Digital Systems	2225	2394

	Rm	Ext
Mr G I Gedgovd Power Systems, Computer Applications, Operations Research, Numerical Methods and Optimisation, Expert Systems	2420E	2429
Ms T Ginige Protocol Design, Computer Networks, Data Communications	2323B	1911
Mr J R M Leaney Software/System Engineering, Real-time Computing, Intelligent Instrumentation, Robotics	2221A	2389
Mr P G Lewis Engineering Education, Engineering Management, Project Management	2431	2431
Dr D B Lowe Image Processing and Analysis, Object-oriented Software Development, Software System Specification	2226	2526
Ms V McKain Instrumentation and Control, Biomedical Engineering	2433	2443
Mr P McLean Power and Machines, Power System Protection, Numerical Methods, Parallel Processing, Electromagnetic Communications	1921	2339
Dr R Meegoda Computer Systems Engineering, Robotics, Software Engineering, Software Quality, Multimedia, Systems Engineering	2227	2396
Mr S Murray Embedded Systems, Real-time Systems, Operating Systems, Computer Systems Engineering	2222	1553
Dr J G Nicol Control Theory, Optimal Control, Multivariable Control	2119A	2370
Dr V Ramaswamy Power Electronics, Electrical Machines, Variable Speed Driver, Computer Simulation and Modelling	2417A	2418
Dr B S Rodanski Numerical Methods, Computer-aided Design, Device Modelling for CAD, Software Engineering	2420B	2426

	Rm	Ext
Dr A M Sanagavarapu High Frequency Electromagnetics, Wave Propagation, Microwave Processing of Materials, New Materials for Microwave Applications, Application of Microwave in Medicine, Antenna Engineering, Electromagnetic Compatibility, Mobile Communication, Computation Electromagnetics	2512A	2447
Mr C Scott Intelligent Transport Systems, Motor Vehicle and Robotic Navigation, Positioning Systems Software Engineering	2220D	2397
Mr M Sifer Software Engineering, CASE Tools, Visual Notations, Formal Specification and Functional Programming	2545	2460
Ms E A Taylor Sociology and Engineering, Engineering Education, Appropriate, Engineering and Society, Technology, Law and Engineering	2432	2442
Dr D Webster Estimation and Detection Theory, Smart Sensors and Intelligent Transducers, Surface Acoustic Wave (SAW) Sensors, Hybrid Thick Film (HTF) Sensors and Circuits, Radar, Sonar	2520B	2453
Dr K Yasukawa Mathematics Education, Nonlinear systems and Control, Numeracy and Engineering	2200	2437
Dr Jianguo Zhu Electromagnetics, Electrical Machines and Drive Systems, Power Electronics	1823	2318
<i>Adjunct Associate Professor</i>		
A/Prof R Stere Instrumentation and Control, Data Acquisition Systems, Electronic Measurements, Electrical Engineering Education	2315	2401

	Rm	Ext
School of Mechanical Engineering		
Building 2, Level 6		
<i>Head of School</i>		
A/Prof S F Johnston Design, Ergonomics, Social Context and Philosophy of Technology	612B	2668
<i>Deputy Head of School</i>		
Mr K A Stillman Control Engineering, Chemical Engineering, Real-time Computing, Simulation, Optimisation	624	2682
<i>Professor of Mechanical Engineering</i>		
Vacant		
<i>James N Kirby, Professor of Manufacturing Engineering</i>		
Prof F B Swinkels Design for Manufacturing, Materials, Computer-aided Design and Computer-aided Manufacturing	416	2588
<i>Associate Professor</i>		
A/Prof R M Spencer Production Planning and Control, Product Process Design and Development, Computer-aided Manufacture, Metrology/CMM, Robotics	606	2660
<i>Other academic staff</i>		
Dr Y P Bhasin Operations Management, Work Study, Planning and Control, Engineering Economics, Quality and Reliability, Manufacturing Processes	605	2659
Mr T Brown Experimental and Computer-aided Stress Analysis and Design, Adhesives	604	2658
Dr G Hong Turbulence Transition, Internal Combustion Engines, Thermodynamics, Engineering Statistics	619	2677
Dr B P Huynh Computational Mechanics, Fluid Mechanics, Heat Transfer	616	2675
Dr A N F Mack Computing, Aerodynamics, Finite Element Methods, Computational Fluid Dynamics	626	2684
Mr G M Marks Appropriate Technology, Industry Development Policy, Mechanics, Engineering Education	625	2683

	Rm	Ext
Mrs H T McGregor Human Communication, Engineering and Social Issues, Cooperative Education, Engineering Documentation Education and Professional Development	620	2678
Mr L E Reece Turbomachinery, Computer-aided Engineering, Thermofluids, Ergonomics, Philosophy of Technology	416	2587
Dr F C O Sticher Advanced Kinematics and Dynamics, Instrumentation	623	2681
Mr R B Ward Engineering Management, Technical Communication, Maintenance Hazard and Risk	621	2679
Mr R M Wiltshire Stress Analysis, Structural and Vehicle Dynamics, Machine Design, Computer-aided Engineering	416	2586
Dr N Zhang Vibration Analysis, Machine and Rotor Dynamics	608	2662
Mr J Dartnall	622	2541
Mr D M Eager	629	2687
National Centre for Groundwater Management		
<i>Centre Director</i>		
Prof M J Knight Groundwater contamination – waste-disposal	1/1715	1984
<i>Senior Lecturers</i>		
Dr W A Milne-Home Hydrogeology, pump test analysis, isotope applications	1/1715	1984
Mr N P Merrick Groundwater modelling and geophysics	1/1715	1984
<i>Lecturer</i>		
Dr R McLaughlan Groundwater contamination, bore corrosion and performance.	1/1715	1984
Centre for Local Government Education and Research		
<i>Centre Director</i>		
A/Prof K Sproats	1/1714	2643

SCHEDULE I.1

EXEMPTIONS/ADVANCED STANDING BASED ON COMPLETED TAFE ASSOCIATE DIPLOMAS

TAFE course: 2974 Associate Diploma of Engineering (Civil Engineering)

UTS courses: Bachelor of Engineering in Civil Engineering
 Bachelor of Engineering in Structural Engineering
 Bachelor of Engineering in Civil and Environmental Engineering

Specified Credit:

Subject Number	Name	Credit Points	Related TAFE Subject(s)
47110	Intro Civil Eng	3	6999Z Civil Eng Contextual Studies
47120	Graphics	4	2959A Drawing
47113	Computer Programming	3	2973A Computer Graphics and Applns I 2973B Computer Graphics and Applns II
47118	Surveying 1A	3	2959B Surveying I
47128	Surveying 1B	3	2960C Surveying II
51131	Communications 1	3	8979D Communication Studies 8979E Communication Workshop
47149	Construction	3	2959F Building and Engineering Construction
47154	Concrete Technology	3	2959M Concrete Technology II
47146	Soil Mechanics	4	2960B Soil Technology I

Additional Credit for holders of 2974 Associate Diploma of Engineering (Civil Engineering) with Distinction

51161	Communications 2	3	8979D Communication Studies 8979E Communication Workshop
47178	Project Economics	3	2959J Engineering Management
47135	Fluid Mechanics	4	2974B Hydraulics
47144	Timber Design	3	2960C Structures
	Project and Electives	6	

Comments:

- Based on completed Credit grade Associate Diploma with A or B level passes in individual subjects.
- Academic and industrial requirements of the BE have to be individually satisfied, and exemption from one does not imply pro rata exemption from the other.

SCHEDULE 1.2

EXEMPTIONS/ADVANCED STANDING BASED ON COMPLETED TAFE ASSOCIATE DIPLOMAS

TAFE course: 2973 Associate Diploma of Engineering (Structural Engineering)

UTS courses: Bachelor of Engineering in Civil Engineering
 Bachelor of Engineering in Structural Engineering
 Bachelor of Engineering in Civil and Environmental Engineering

Specified Credit:

Subject Number	Name	Credit Points	Related TAFE Subject(s)
47110	Intro Civil Eng	3	6999Z Civil Eng Contextual Studies
47120	Graphics	4	2959A Drawing
47113	Computer Programming	3	2973A Computer Graphics and Applns I 2973B Computer Graphics and Applns II
47118	Surveying 1A	3	2959B Surveying I
51131	Communications 1	3	8979D Communication Studies 8979E Communication Workshop
47149	Construction	3	2959F Building and Engineering Construction
47154	Concrete Technology	3	2959M Concrete Technology II
47140	Concrete Design 1	3	2959K Reinforced Concrete Drawing and Design (A level pass required)
47161	Steel Design 1	3	2959L Structural Steel Drawing and Design
47117	Statics	4	2959G Structural Principles and Drawing II
47127	Mechanics of Solids 1	4	2959G Structural Principles and Drawing II

Additional Credit for holders of 2973 Associate Diploma of Engineering (Structural Engineering) with Distinction

51161	Communications 2	3	8979D Communication Studies 8979E Communication Workshop
47237	Domestic Building Design and Construction	3	2959F Building and Engineering Construction
47128	Surveying 1B	3	2959B Surveying 1
47178	Project Economics	3	2959S Engineering Management

Comments:

- Based on completed Credit grade Associate Diploma with A or B level passes in individual subjects. If A level pass is the specific requirement, this is noted in the listing.
- Academic and industrial requirements of the BE have to be individually satisfied, and exemption from one does not imply pro rata exemption from the other.

SCHEDULE I.3

EXEMPTIONS/ADVANCED STANDING BASED ON COMPLETED TAFE ASSOCIATE DIPLOMAS

TAFE course: 2975 Associate Diploma of Engineering (Survey Drafting)

UTS course: Bachelor of Engineering in Civil Engineering

Specified Credit:

Subject Number	Name	Credit Points	Related TAFE Subject(s)
47110	Intro Civil Eng	3	6999Z Civil Eng Contextual Studies
47120	Graphics	4	2907J General Survey Drafting
47113	Computer Programming	3	2962E Computing Techniques and Graphics
47118	Surveying 1A	3	2907F Land and Engineering Surveying
51131	Communications 1	3	8979D Communication Studies 8979E Communication Workshop

Comments:

- (a) Based on completed Credit grade Associate Diploma with A or B level passes in individual subjects.
- (b) Academic and industrial requirements of the BE have to be individually satisfied, and exemption from one does not imply pro rata exemption from the other.

SCHEDULE I.4

EXEMPTIONS/ADVANCED STANDING BASED ON COMPLETED TAFE ASSOCIATE DIPLOMAS

TAFE course: 2976 Associate Diploma of Engineering (Surveying)

UTS course: Bachelor of Engineering in Civil Engineering

Specified Credit:

Subject Number	Name	Credit Points	Related TAFE Subject(s)
47110	Intro Civil Eng	3	6999Z Civil Eng Contextual Studies
47120	Graphics	4	2976C Data Presentation
47113	Computer Programming	3	2976M Advanced Computations
47118	Surveying 1A	3	2976A Surveying I
47128	Surveying 1B	3	2976F Surveying II
47168	Surveying 2	3	2976Q Advanced Surveying
51131	Communications 1	3	8979D Communication Studies 8979E Communication Workshop

Comments:

- (a) Based on completed Credit grade Associate Diploma with A or B level passes in individual subjects.
- (b) Academic and industrial requirements of the BE have to be individually satisfied, and exemption from one does not imply pro rata exemption from the other.

SCHEDULE 1.5

EXEMPTIONS/ADVANCED STANDING BASED ON COMPLETED TAFE ASSOCIATE DIPLOMAS

TAFE course: 2840 Associate Diploma of Electrical Engineering

UTS courses: Bachelor of Engineering in Electrical Engineering
 Bachelor of Engineering in Computer Systems Engineering
 Bachelor of Engineering in Telecommunications Engineering

Specified Credit:

Subject Number	Name	Credit Points	Related TAFE Subject(s)
35101	Mathematics 1	6	2840W Engineering Mathematics
45113	Digital Techniques	3	2840BG Digital Electronics 2
45116	Electrical Engineering 1	3	Credit or Distinction level Diploma
45123	Software Development 1	6	2390E Data Entry Techniques 2840AC Engineering Software I 2840CX Engineering Software II 2840AJ Computer Systems
63023	Materials Technology (Electrical)	3	1191Q Engineering Materials
45134	Network Theory	6	2840AF Circuit Analysis I 2840BA Circuit Analysis II 2840CD Circuit Analysis III 2840BP Power Circuit Principles
45135	Engineering Communications	3	2840BH Drawing Principles
45144	Electronic Devices and Ccts	6	2840AG Electronics 1A 2840AK Electronics 1B 2840BM Electronics 2A 2840BN Electronics 2B
45115	Engineering Practice	3	Credit or Distinction level Diploma
45125	Engineering Discovery	3	Credit or Distinction level Diploma

Additional credit for holders of 2840 Associate Diploma of Engineering (Electrical Engineering) with Distinction

45155	Project A	3	Distinction level Diploma
	Professional Elective	3	Distinction level Diploma

Comment:

- Based on completed Credit grade Associate Diploma with A or B passes in individual subjects.
- Academic and industrial requirements of the BE have to be individually satisfied, and exemption from one does not imply pro rata exemption from the other.

SCHEDULE 1.6

EXEMPTIONS/ADVANCED STANDING BASED ON COMPLETED TAFE ASSOCIATE DIPLOMAS

TAFE course: 7703 Associate Diploma of Engineering (Mechanical Engineering)

UTS courses: Bachelor of Engineering in Mechanical Engineering
Bachelor of Engineering in Manufacturing Systems Engineering

Specified Credit:

Subject Number	Name	Credit Points	Related TAFE Subject(s)
46311	Engineering Graphics	4	7703A Engineering Drawing
46710	Materials Processing	4	5299K Workshop A 5299L Workshop B
46620	Engineering Communication	4	6990S Industrial Communication
68012	Elect Eng 1 (Mech)	4	2890S Electrical Technology
46810	Intro to Computing	4	7703C Eng Computing 1 7703N Eng Computing 2
33121	Engineering Maths 1A	3	6992L Mathematics D

Additional credit for holders of Associate Diploma of Engineering (Mechanical Engineering) with Distinction

46310	Intro to Engineering	4
65023	Engineering Chemistry	6*
67021	Materials Engineering 1	4*
68011	Eng Physics (Mech)	4**
*	With achievement of at least 70 per cent in 2-unit HSC Chemistry	
**	With achievement of at least 70 per cent in 2-unit HSC Physics	

Comments:

- Based on completed Credit grade Associate Diploma with A or B level passes in individual subjects.
- Academic and industrial requirements of the BE have to be individually satisfied, and exemption from one does not imply pro rata exemption from the other.
- Students with a pass grade Associate Diploma are not normally admitted to the BE degree program.

SCHEDULE 1.7

EXEMPTIONS/ADVANCED STANDING BASED ON COMPLETED TAFE DIPLOMAS

TAFE course: 7705 Diploma of Engineering in Industrial Engineering

UTS courses: Bachelor of Engineering in Manufacturing Systems Engineering

Specified Credit:

Subject Number	Name	Credit Points	Related TAFE Subject(s)
46715	Manufacturing Processes	6	5299K Workshop A 5299L Workshop B
46741	Flexible Manufacturing	4	7705J Application of JIT 7705EV Flexible Manuf. Systems
46311	Engineering Graphics	4	7703A Engineering Drawing 1
46742	Production and Cost Control	4	7705F Process Planning 7705G Cost Control
46810	Intro to Computing	4	7703C Eng Computing 1 7703N Eng Computing 2
33121	Engineering Maths 1A	3	6992L Mathematics D
	Professional Elective	4	7705EL Plastics Technology

Comments:

- (a) Based on completed Credit grade Associate Diploma with A or B level passes in individual subjects.
- (b) Academic and industrial requirements of the BE have to be individually satisfied, and exemption from one does not imply pro rata exemption from the other.
- (c) Holders of Distinction level Associate Diplomas may be entitled to additional credit on application.
- (d) Students with a pass grade Associate Diploma are not normally admitted to the BE degree program.

FAULTY BOARD IN ENGINEERING

as at 30 September 1995

Ex officio members

Dean of the Faculty
Professor P J Parr

Head, School of Civil Engineering
Associate Professor G G O'Loughlin

Head, School of Mechanical Engineering
Associate Professor S F Johnston

Head, School of Electrical Engineering
Professor K W Yates

Head, Graduate School of Engineering
Professor W R Belcher

*Director, National Centre for Groundwater
Management*
Professor M J Knight

Director, Industrial Liaison
Mr J G Crowe

Professors
Professor C R Drane
Professor F B Swinkels
Professor S L Bakoss

Faculty Administrator
Ms D J Carraro

Nominated members

Nominee of the University Librarian
Ms A Newton

Nominee of the Director, CLT
Mr S Sheely

*Nominee of the Dean from the Faculty Board
in Business*
Mr K Pearson

*Nominee of the Dean from the Faculty Board
in Mathematical and Computing Sciences*
Dr G McLelland

*Nominee of the Dean from the Faculty Board
in Science*
Dr D C Green

Elected members

*Six academic staff members of the School of
Civil Engineering*

Associate Professor T A Anderson

Mr E A Brady

Dr R Sri Ravindrarajah

Dr S C Beecham

Mr P J Kenny

Dr G L Ring

*Six academic staff members of the School of
Electrical Engineering*

Mr W G Hooper

Dr B S Rodanski

Dr A M Sanagavarapu

Mr P G Lewis

Dr D Lowe

Mr S Murray

*Six academic staff members of the School of
Mechanical Engineering*

Dr Y P Bhasin

Mr A J Burfitt

Dr G Hong

Ms H McGregor

Dr A Mack

Associate Professor R M Spencer

*Six academic staff members of the
Graduate School of Engineering*

Associate Professor B Samali

Mr K A Stillman

Vacant

Vacant

Vacant

Vacant

One member of support staff from the Faculty
Mr A C Curgenvin

*One undergraduate student elected by and
from the students of the School of Civil
Engineering*

Mr G Kosovich

*One undergraduate student elected by and
from the students of the School of Electrical
Engineering*

Mr K Vijn

*One undergraduate student elected by and
from the students of the School of Mechanical
Engineering*

Mr J Cameron

*Two postgraduate students of the Faculty, one
of whom shall be elected by and from the*

students undertaking coursework degrees

Vacant

Vacant

Two postgraduate students of the Faculty, one of whom shall be elected by and from the students undertaking research degrees

Mr D Rowe

Vacant

Up to three members appointed by the Faculty Board on the recommendation of the Dean

Associate Professor C T Mathews

Associate Professor J V Parkin

Associate Professor K Sproats

COMPOSITION OF SCHOOL BOARDS

Head of School (Chair);

All permanent or fractional (but not part-time) members of academic staff;

Not less than two nor more than five members of professional, technical and administrative staff appointed by the Head of School;

A member of academic staff from each of the other two schools, nominated by the Head of School;

Two students of the School, elected by the School Assembly.

ADVISORY COMMITTEES

SCHOOL OF CIVIL ENGINEERING ADVISORY COMMITTEE

Chairperson

Mr Neil Turner
Director
Water Services Policy
Department of Land and Water
Conservation

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

UTS staff

Professor Peter Parr
Dean, Faculty of Engineering

Associate Professor Geoff O'Loughlin
Head, School of Civil Engineering

Mr Alan Brady
Deputy Head, School of Civil Engineering

Secretary

Ms Deborah Carraro, Faculty Administrator

Observer

Mr John Crowe, Director, Industrial Liaison

SCHOOL OF 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
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