93 HANDBOOK

FACULTY OF ENGINEERING

UTS
UNIVERSITY
OF TECHNOLOGY
SYDNEY

Faculty of Engineering

HANDBOOK

1993

Faculty of Engineering

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Broadway, City Campus

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Telephone: (02) 330 1990

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Broadway, City Campus
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UNIVERSITY MISSION STATEMENT

UTS provides higher education aimed at enhancing professional practice, advancing the technologies and generally contributing to the creation, application and extension of knowledge for the benefit of society. The University is concerned to improve educational provision for students from a diversity of backgrounds by valuing exemplary teaching and developing flexible study patterns. It is committed to close interaction with the professions, business, government, science and the human services in promoting scholarship, research, continuing education, consultancy and technology transfer.

Objectives

1. To ensure high standards in teaching and professional experience in all academic programs.

2. To achieve an increased level of research funding and postgraduate research students, and increased research experience of staff.

3. To develop library resources of the highest standard and appropriate to faculty and student needs.

4. To improve links with industry, the professions, and the community through the provision of consultancy and continuing education programs.

5. To develop international linkages in the application of knowledge and learning.

6. To gain and retain an equitable level of funding.

7. To increase the level of entrepreneurial activity.

8. To improve the physical, social and educational environment of students and staff.

9. To provide an efficient, effective and responsible internal management.

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, its contribution to the Australian Graduate School of Engineering and Innovation, and the professional activities of its staff. It seeks to interact continually and closely with industry and the practising profession, to contribute to professional and public policy development, to be responsive to emerging needs, and to support the well-being 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.

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.

PREFACE

This faculty handbook is intended as a reference for students currently enrolled at the University of Technology, Sydney. In addition to basic general information about the university, it contains detailed information about courses offered by the faculty. The information is correct as at October 1992. Please note that the titles of courses offered by the university have recently been revised. A full list of the university's courses, showing the name, the abbreviation and the title as indicated on the testamur, is provided in the 1993 Calendar.

More detailed information of a general nature is contained in the UAC Information Guide and in the Undergraduate and Postgraduate Studies Guides, available from the UTS Student Information Service. The faculty provides additional information about its courses, methods of assessment, book lists and other information which was not available at time of publication. Students should also make sure to read the student rules and the By-law relating to students, which contain essential information about matters such as minimum rate of progress, variation to approved programs of study, leave of absence, examinations and so on. The rules and By-law are included in the University Calendar, a companion volume to this handbook. Copies are held in the library and in the faculty offices, and are available for sale in the Co-op Bookshop.

It is university policy to provide equal opportunity for all, regardless of sex, race, marital status, physical ability, sexual preference, age, political conviction or religious belief. The university has also adopted an ethnic affairs policy to ensure that all aspects of university life are sensitive to the multicultural nature of Australian society and to cultural diversity within the university.

Freedom of information (FOI) legislation gives people the legal right to obtain access to information held by State Government agencies (universities are regarded as government agencies for this purpose), to request amendments to personal records which are inaccurate, and to appeal against any decision not to grant access or amend personal records. The university will make every attempt to meet all reasonable FOI requests.

The names and telephone numbers of people to contact for further information are given throughout this handbook. If in doubt – ask!

We wish you well in your program of study this year.

CONTENTS

GENERAL INFORMATION

ACADEMIC OFFICE

The Academic Office is responsible for administering the rules which relate specifically to the student body at UTS. The branches within the Academic Office are:

- UTS Student Information Service
- Course promotions
- Undergraduate admissions (includes external award and extension study)
- Postgraduate studies and scholarships
- Enrolments and Undergraduate studies (includes examinations, graduation, HECS and student records)
- Student systems
- Facilities Hire
- Kuring-gai Student Administration Centre

The rules may be found in the University Calendar and cover all areas of undergraduate, postgraduate and non-award (external and extension) study. Details include admission, registration and enrolment, fees and charges, identification, conduct, attendance and study requirements, postgraduate supervision, examinations, progression, appeals, exclusion, leave of absence, internal course transfer, readmission, graduation and awards.

INFORMATION

The **UTS Student Information Service** provides information and assistance regarding all administrative matters. It is the principal point of contact between students, the public and the central administration. The UTS Student Information Service is located in the foyer area of the Tower Building at 15-73 Broadway and in the foyer area at the Kuring-gai campus in Eton Road, Lindfield. The postal address for enquiries is: UTS Student Information Service, University of Technology, Sydney, PO Box 123, Broadway 2007. Telephone enquiries should be directed to (02) 330 1222 or (02) 330 5555.

Further details regarding academic and administrative matters may be obtained from the branches listed above or from the following:

UTS Undergraduate Studies Guide
UAC Information Guide
UTS Postgraduate Studies booklet
UTS Postgraduate Scholarships Guide
UTS Calendar and Faculty handbooks.

APPLICATION

Applications for most undergraduate and postgraduate courses may be obtained from the UTS Student Information Service during the main application period, August, September, and October, for admission in the following year. Closing dates and application requirements vary for UTS courses, and applicants are encouraged to make early enquiries.

In general, most undergraduate applications through the Universities Admissions Centre (UAC) close on the last working day of September. Applications for some UAC courses are accepted during October, but require payment of a late fee. Certain undergraduate courses accept applications direct to the university. Applications for these courses and most postgraduate courses close on the last working day of October.

A smaller mid-year application period occurs for some courses during April and May, with applications closing on the last working day of May.

International fee paying applicants must apply through the International Programs Office. Specific information can be found in the following pages.

Formerly enrolled UTS students seeking readmission should lodge a new application during the application period. Currently enrolled UTS students who wish to transfer to another UTS course must complete an internal transfer application, available from the UTS Student Information Service.

Full details on application requirements and closing dates for all undergraduate and postgraduate courses are available from the UTS Student Information Service.

ADMISSION

To be eligible for admission to a course at UTS, all applicants must satisfy the rules relating to undergraduate and postgraduate admission (see the Calendar), and be selected in competition with other eligible applicants for that course.

Applicants must have an adequate background in English. A minimum level such as 2-unit General English in the HSC is recommended. If the majority of an applicant's education was undertaken in a language other than English, completion of an English Test may be required.

UTS accepts the results of two tests: the Combined Universities Language Test (CULT), conducted by the Institute of Languages at the University of New South Wales, in which a minimum pass of 65% is required; and the International English Language Testing System (IELTS), conducted through the UTS International Programs Office. A minimum score of 6.5 overall, with at least 6.0 in writing, is required.

No application for admission will be considered until proficiency in English, where requested, has been demonstrated.

Admission is based on the quota of places available in each course, and the number and quality of eligible applicants applying for each course. Selection is determined through the order of merit of each applicant in competition with other eligible applicants.

Special admission schemes are available for Aboriginal and Torres Strait Islander applicants (SCATS) and those applicants with high academic potential whose education has been disadvantaged by circumstances beyond their control (inpUTS). Information concerning these schemes is given below.

Further details regarding all aspects of admission may be obtained from the UTS Student Information Service.

ENROLMENT

New students receive offers of enrolment by mail. Each successful applicant must enrol as indicated in the information enclosed with the offer or that offer will lapse. Other information enclosed covers dates for enrolment, student service fees and course fees, the Higher Education Contribution Scheme (HECS), admission with advanced standing or with subject exemption, and information on deferment.

Continuing students are required to re-enrol annually. Information regarding re-enrolment is sent with each continuing student's Spring semester results, usually by late December. Information is also forwarded to students regarding their student service fees and course fees or HECS charges.

The main enrolment period each year is from mid January to late February. A smaller enrolment period in July follows any mid-year offers.

Those who cannot enrol on the specified enrolment dates may be permitted to enrol at a later date subject to payment of a late enrolment fee. These students must contact the UTS Enrolments Office to explain their situation and gain permission for a late enrolment.

The location of enrolment may vary, but the main sites are at the City (Broadway) campus and the Kuring-gai campus.

Student Service Fees

Compulsory annual fees and charges are payable to the University Union and Students' Association. The 1992 fees were $252 for new students and $232 for re-enrolling students. In 1992 this amount included a Student Accommodation Levy of $35, which has increased to $42 for 1993 and is expected to increase to $50 for 1994. All fees and charges may vary from year to year.

Higher Education Contribution Scheme (HECS) Charges

HECS was introduced in 1989 by the Commonwealth Government to collect a contribution from certain categories of higher education students towards the cost of their education.

As a part of enrolment, all students who are liable to pay the HECS charge are required to nominate their status as either an "upfront" or "deferred" payer. If nominating "upfront" payment, students are then notified by the university of the amount owing and the date by which payment is required. If a "deferred" payer, students are advised of the amount owing to the Australian Taxation Office. All amounts are determined according to the subject load which HECS eligible students are undertaking for the coming semester. Students who nominate the "upfront" option but do not make payment by the due date will have their enrolment terminated.

Course Fees

Certain categories of students are not required to pay the above HECS charges. These students, unless enrolled under an approved scholarship or HECS exempt program, will be required to pay course fees. Course fee information is available during each application period.

Admission with Advanced Standing or with Subject Exemption

Applicants who receive an offer of enrolment to UTS and have previously completed appropriate subjects of courses at recognised tertiary education institutions or Australian technical colleges may apply for subject exemptions in their offered UTS course.

An exemption application form with instructions is forwarded to all new students with their offer letter. Admission with advanced standing or with subject exemption may be approved by a faculty subject to rules 2.29.1 to 2.29.5.

Deferment

All new undergraduate students will receive a deferment application form with their offer letter. With the exception of three courses (Bachelor of Accounting, Bachelor of Information Technology and Bachelor of Manufacturing Management) offers of admission to all other undergraduate courses can be deferred on request. Deferred enrolment will be approved for up to one year; however, a deferred place will lapse if the student enrols in an undergraduate or postgraduate degree, diploma or associate diploma course during the period of approved deferment.

All students must re-apply as directed upon completion of their approved deferment period.

Deferment of enrolment in postgraduate courses at UTS is not permitted.

Full details regarding student fees, HECS charges, course fees, admission with advanced standing or with subject exemption, and deferment may be obtained from the UTS Student Information Service.

ACADEMIC ATTENDANCE AND PROGRESSION

Course and Subject Variation

Students wishing to add or delete subjects must apply on the appropriate form as obtained from Faculty or School offices or the UTS Student Information Service. Specific dates apply (see *Principal Dates* below) and students are reminded that HECS or postgraduate course fees still apply after the HECS Census dates of 31 March and 31 August.

Academic transcripts will indicate a fail against subjects where students have not withdrawn by the due date.

Examinations and Results

Formal examinations are held at the end of each semester. Preliminary timetables for examinations will be displayed on noticeboards near Faculty and School offices and in the foyer areas of the Tower Building at Broadway and Kuring-gai campus. Such timetables are on display for two weeks from calendar week 19 for the Autumn semester and calendar week 40 for the Spring semester.

Students who identify concerns with these preliminary timetables must write to the Academic Registrar immediately. Final timetables showing dates, times and location will be displayed in the areas indicated above for two weeks prior to the commencement of the examination period.

Students will be notified by mail of their semester results in mid July and late December each year. Results will also be displayed on noticeboards in the areas indicated above.

Formal enquiries or concerns regarding results must be expressed in writing to the Academic Registrar. Initial enquiries may be made in person at the UTS Student Information Service on the City (Broadway) or Kuring-gai campuses. No information will be given by telephone.

All students are advised to read carefully rules 2.15 to 2.24 to understand the regulations concerning examinations.

Assessment Review and Appeals

Where students are not satisfied with their assessment, they may lodge an appeal of assessment at the UTS Student Information Service. In cases of appeal, a Student Assessment Appeals Committee of the relevant Faculty Board considers the appeal following the criteria and procedures approved by Academic Board.

Full details of appeals against assessment may be found under rule 2.26.

Progression, Probation and Exclusion

Full details regarding student progression, probation and exclusion are provided in rules 3.1.13 to 3.1.19.

Readmission after Exclusion – Undergraduate

A student can re-apply to the course from which he or she was excluded following the specified period of exclusion. Readmission is not automatic and the student must compete with other eligible applicants for that course during the given admission period. Where readmission to the previous course is achieved, the student will be reinstated in the progression category which applied prior to exclusion.

Where a former student's first application for readmission to the course from which he/she was excluded is refused, an appeal may be lodged with the Academic Registrar. Full details are forwarded to such students following lodgement of their application for readmission. Each submitted appeal against refused readmission is forwarded to the relevant Dean for reconsideration. Where such a reconsideration is recommended for dismissal by the Dean, the appeal is forwarded to the Appeals Committee of Academic Board for final decision.

Where the Dean or the Appeals Committee upholds the appeal, the student will be reinstated in the progression category which applied prior to exclusion.

Further details may be obtained from the Undergraduate Admissions Branch.

Discontinuation of Registration – Postgraduate

Students at the Graduate Diploma, Masters or Doctoral level may have their registration discontinued if they fail to complete all prescribed work within a given period of time or if the specific Faculty Board is dissatisfied with the student's progress.

Full details regarding this and the subsequent appeal regulations may be found under rules 3.2, 3.3, 3.4 and 3.5.

Readmission after Discontinuation of Registration – Postgraduate

A student can re-apply to the course from which her or his registration was discontinued following the specified period of exclusion. Readmission is not automatic and the student must compete with other eligible applicants for that course during the given admission period. Where readmission is successful a maximum number of semesters for completion shall be nominated by the university.

Rules for postgraduate students regarding appeal against refused readmission after a period of discontinued registration vary. Full details may be found rules 3.2, 3.3, 3.4 and 3.5.

Further details may be obtained from the Postgraduate Studies Branch.

AWARDS AND GRADUATION

All students who believe they will qualify for an award of the university at the end of their current semester must complete an *Application for Award* form, available from the UTS Student Information Service. A specific lodgement date applies and students are encouraged to make early enquiries at the UTS Student Information Service.

Graduation ceremonies are conducted during a specific period in April - May and September - October each year. Information regarding graduation will be forwarded to eligible students following receipt of the above application form.

Academic dress can be hired from the university. The faculty colour for the Faculty of Engineering is Scarlet, PMS 186.

ACADEMIC MISCONDUCT

The University has strict rules relating to the conduct of students. Examples of academic misconduct are cheating in examinations, and the use of plagiarism, which is an attempt to present another person's work as your own by not acknowledging the source. "Work" includes written materials such as books, journals and magazine articles or other papers, and also includes films and computer programs. The two most common types of plagiarism are from published materials and other students' work.

Published materials

In general, whenever you use anything from someone else's work, whether it is an idea, an opinion or the results of a study or review, you should use a standard system of referencing. Examples of plagiarism may include a sentence or two, or a table or a diagram that have been taken from a book or article without acknowledgment.

There have been cases when an entire paper consisted of material copied from a book, with only a few sentences added by the student. Both these examples are plagiarism. The first, however, may be treated as a simple failure to cite the references, while the second is more likely to be seen in the same way as cheating in an examination.

Most assignments are likely to require the use of the works of other people. To avoid plagiarism, you should keep a detailed record of where various ideas and findings came from, and to make sure that these sources are always clearly indicated in your work. At the tertiary level of education, assignments should not consist simply of bits and pieces copied from books and articles.

Other students' work

It is not unusual for students to pass round relevant articles and to discuss their ideas before writing an assignment. However, unless the assignment is clearly to be done on a group basis, students should write their own paper. Examples of this type of plagiarism include the inclusion of identical or very similar sentences, paragraphs or sections. When two students submit the same or similar papers, both are likely to be penalised.

Penalties

Alleged cheating or plagiarism during formal examinations is investigated by an examinations conduct committee, which may recommend to the Vice-Chancellor an appropriate penalty from the range of penalties which apply to breaches of discipline under the university By-law. Any instance of plagiarism associated with informal examinations or any other form of assessment is also treated as a breach of discipline, and is subject to the same range of penalties. The relevant provision is in Chapter 8, Division 2 of the By-law; and the relevant rules are 2.17, 2.23 and 2.24 of the student rules. The By-law and rules are set out in full in the University Calendar.

SPECIAL ASSISTANCE ADMISSION SCHEMES

inpUTS

The inpUTS Special Admission Scheme is designed to assist certain applicants to gain entry to UTS undergraduate courses. A reserve quota is established for most undergraduate courses for applicants with high academic potential whose education has been disadvantaged over a long time by circumstances beyond their control.

Applications must be received by 30 September each year in order for a working party of the Equity and Access Committee of Academic Board to assess eligibility for admission. Applications are forwarded to ACT and NSW high schools and TAFE colleges during July and are available from the UTS Student Information Service from August each year.

The scheme is aimed at those persons who have not had the opportunity to attempt tertiary studies. It is open to all applicants who satisfy the university rules as described under 3.1.1 to 3.1.12.

SCATS

Under the direction of Jumbunna Aboriginal Education Centre at UTS a special admission scheme (SCATS), incorporating a supplementary course leading to degree studies, is available for Aboriginal and Torres Strait Islander applicants. All Aborigines and Torres Strait Islanders who are considering tertiary education are encouraged to apply. Jumbunna assesses all applications to determine if supplementary studies are required.

SKATE (Street Kids Access Tertiary Education)

The target group for the SKATE program is disadvantaged young people with a high potential for a life of abuse, violence, crime and self-destruction, who wish to change their lifestyle and regain access to education. Entry criteria: those who are aged between 16 and 25 years; have little or no family support; have not completed secondary school; and have had experience of or been involved in homelessness, unemployment, drug/alcohol abuse, property offences or violence.

The program follows Board of Secondary Education NSW content and is backed by an extensive bio-social support system.

Tertiary entry status is not automatic and students apply as category B students. No formal arrangements for acceptance of graduates exists with other institutions; however, personal initiatives with support of the SKATE program director have achieved successful entries. For further information contact the Director on 330 5337.

INSEARCH LANGUAGE CENTRE

Insearch Language Centre, University of Technology, Sydney is an ELICOS (English Language Intensive Course for Overseas Students) and Asian Languages Centre operating in its premises on Levels 2 and 3, Prince Centre, 8 Quay Street, Ultimo. ILC also has a second campus at 187-189 Thomas Street (opposite the Prince Centre), ILC was established in October 1987 and since that time there has been a phenomenal growth in student numbers and courses on offer in both the ELICOS and Asian Languages Departments. In the ELICOS department ILC offers courses in General English, English for Academic Purposes (EAP), English for International Business (EIB), English for Matriculation and Foundation Studies (EFS), English for Test Preparation - IELTS, Tertiary Orientation Program (TOP), Evening English and Holiday English.

The ELICOS Department also offers teacher training courses leading to the Cambridge University/Royal Society of Arts Certificate or Diploma in Teaching English as a Foreign Language to Adults.

The Asian Languages department offers individual and group tuition as well as corporate development programs in Japanese, Korean, Thai, Indonesian, Mandarin, Cantonese and Vietnamese.

Courses are offered in the above languages for beginners through to advanced level students.

In the Japanese language area the ILC also offers HSC coaching, Japanese for teachers, advanced conversation and reading -- which helps to prepare students for the *Japanese Proficiency Test* and teacher training.

The European Languages Department offers individual and group tuition in French, Italian and Spanish.

For more information contact: Insearch Language Centre, Level 3, Prince Centre, 8 Quay Street, Sydney NSW 2000 Australia, telephone (02) 281 4544, fax (02) 281 4675.

EXCHANGE PROGRAMS

The university, through individual faculties, has an extensive exchange program arrangement which include the following institutions:

Wirtschaftsuniversitat, Vienna, Austria
University of Waterloo, Canada
Aarhus School of Business, Denmark
Insa de Lyon, France
Fachhochschule, Wiesbaden, Germany
Technical University of Budapest, Hungary
Tilburg University, The Netherlands
Dr Soetomo Press Institute, Indonesia
Yonsei University, Seoul, Korea
South China Institute of Technology, Guangzhou, People's Republic of China
Tilburg University, The Netherlands
Oregon State University, USA

In the United Kingdom: University of Brighton, De Montfort University, University of Humberside, University of Portsmouth and Saint Martin's School of Art

In Thailand: Pranakorn Teachers' College, Chiang Mai University, Mahidol University, and King Mongkut's Institute of Technology, Thonburi

Interested persons should make initial enquiries through the International Programs Office or faculty offices.

INTERNATIONAL STUDENTS PROGRAM

Fee-paying international students are encouraged to apply for admission to selected undergraduate and postgraduate courses on a fee-paying basis.

Application for Admission

Application will be assessed on the basis of academic results in high school, post-secondary studies or university.

International students who are studying for an Australian Year 12 examination (either in Australia or overseas) should apply to UTS through the Universities Admissions Centre.

International students who are studying for a Bachelor degree at an Australian university and wish to transfer to UTS should also apply through the Universities Admissions Centre.

All other international students (undergraduate and postgraduate) should apply direct to the International Programs Office.

Note: Australian citizens or those who have permanent residency status should contact the University's Student Information Service.

Documentation

The following comments must be included with an application:

- an original (or properly certified* copy) of the applicant's **official** transcript or results sheet
- an original (or properly certified* copy) of the applicant's **official** school leaving diploma or certificate
- a certified* official translation of any document not in English
- a certified* copy of any scholarship.

*Note: a properly certified copy means a copy certified by either the issuing institution or a statutory body (e.g. Public Notary). Copies certified by a Justice of the Peace or a lawyer are not acceptable.

The applicant should include any relevant letters of support from his or her employers.

English Language

All international students are required to provide evidence of English language proficiency. UTS prefers students to have a satisfactory score on the IELTS test (6.5 overall with a minimum of 6.0 in writing). Details and application forms for the IELTS test are available from the International Programs Office.

Course Fees 1993

Fees for selected courses offered to fee-paying students range from $A10,000 to $A16,500 per annum, depending on the course. Fees are normally paid on a six-monthly basis.

Financial Assistance

UTS is unable at this time to offer any scholarships or financial assistance to international students.

The Australian Government offers some scholarships under the John Crawford Scholarship Scheme (JCSS) and the Overseas Postgraduate Scholarship Program (OPRS). Details and application forms for JCSS are available only at Australian Embassies and Australian Education Centres overseas. Details and application forms for OPRS are available from the International Programs Office.

Student Visas

Following offer of a place at UTS and payment of first semester fees, International Programs will provide an acceptance advice form which is required when applying for a student visa. Visitors to Australia on a visitors' visa are unable to change their visa status whilst in Australia but must leave the country and apply for a student visa from outside Australia.

Additional Information

For further information and application forms for undergraduate or postgraduate courses please contact the International Program office, Level 5, Tower Building, Broadway.

Postal address: University of Technology, Sydney, International Programs, PO Box 123, Broadway NSW 2007, Australia, telephone (61 2) 330 1531, fax (61 2) 330 1530.

ASSISTANCE SCHEMES

AUSTUDY

AUSTUDY provides income support to financially disadvantaged students over 16 years of age undertaking approved courses of study in higher education institutions. Maximum benefit rates are age-related and aligned with those for relevant Social Security payments (Job Search and Newstart Allowances). Benefits are paid to 16-17 year old students with higher rates for those 18 years old and

over, and those aged over 21 years in special categories. This assistance is provided subject to parental and personal income and assets tests for dependent students or personal and spouse income tests for independent students. AUSTUDY is also subject to academic progress rules.

Following consideration of the review of AUSTUDY commissioned by DEET, fundamental changes are to be made to the program.

A supplementary scheme will be introduced from 1 January 1993, to provide flexibility for tertiary students to tailor assistance to their individual needs.

Under the proposed arrangements, tertiary students eligible for AUSTUDY and ABSTUDY will have the option of "trading-in" part of their grant assistance for a repayable income supplement of twice the amount, up to a maximum of $4000 per annum. A similar repayable income supplement of up $2000 will also be available to tertiary students whose parental income, while excluding them from receiving grants through the parental income test, is less than $50,000 a year, provided other eligibility criteria are met.

How to apply: the Student Welfare Officer located in the Student Services Unit at Broadway and Kuring-gai campuses will be able to supply all forms and will help with other problems or queries that may arise when filling in forms. To make an appointment telephone 330 1177 or 330 5342 for any assistance.

ABSTUDY

ABSTUDY assists Aboriginal and Torres Strait Islander students by providing income support and other assistance tailored to their needs. The basic rates of assistance are similar to AUSTUDY, with additional assistance available to part-time students, pensioners and those over 21 years of age. Aboriginal tertiary students will also be eligible for the voluntary "loan" scheme. ABSTUDY payments are not subject to assets tests. The staff in the Aboriginal Education office, Jumbunna, will be happy to help with any queries. Telephone 330 1905 and ask for the Student Services Officer.

Postgraduate Assistance

The Commonwealth Government offers each year a limited number of awards for full-time postgraduate study at Australian higher education institutions.

Australian Postgraduate Course Awards at the University of Technology, Sydney are available to students undertaking a Masters Degree by coursework. A good academic record is essential and preference is given to those with relevant employment experience. Applications close at the end of October 1992.

Australian Postgraduate Research Awards are tenable for full-time postgraduate research leading to the degree of Master or Doctor of Philosophy at UTS. Applications close at the end of October of the year prior to the year of study.

The awards are available to Australian citizens and those who have been granted permanent resident status and lived in Australia continuously for the last 12 months. Applicants should have completed a four-year undergraduate degree with at least Second Class Honours, Division One, or equivalent.

Application forms may be obtained from the UTS Student Information Service or the Postgraduate Studies and Scholarships Office, Level 5, Tower Building.

University Research Scholarships

These Scholarships, including the R L Werner Postgraduate Scholarship and University of Technology, Sydney Doctoral Scholarship, are normally available to an applicant of the highest academic calibre for full-time research at UTS.

Applications must be made on the prescribed form and close with the Academic Registrar at the end of October of the year prior to which applicants intend to commence candidature.

Further information and conditions of award may be obtained from the Postgraduate Studies and Scholarships Office, Level 5, Tower Building.

Commonwealth Scholarship and Fellowship Plan Awards

The awards are intended for postgraduate study or research and are tenable in the United Kingdom, Canada, Hong Kong, India, Jamaica, Malaysia, Malta, Nigeria, Sri Lanka, Trinidad and Tobago.

Applications from UTS graduates must be made on the prescribed form, and close with the Academic Registrar in early October of the year to which applicants intend to study overseas.

Further information may be obtained from the Postgraduate Studies and Scholarships Office, Level 5, Tower Building.

STUDENT OMBUDSMAN

Enrolled or registered students with a complaint against decisions of university staff may seek assistance from the Student Ombudsman. The position of the Student Ombudsman was created by the University Council of the old UTS in 1989 for a trial period of one year, and the scheme has now been extended to all campuses.

The university policy on the role of the Student Ombudsman is published in the Calendar.

The Student Ombudsman's office is located in Room 402, Building 2 on the City campus at Broadway, telephone 330 2575/76.

All matters are treated with the strictest confidence.

LEARNING CENTRES

Jumbunna Aboriginal Education Centre

Located on the City campus at Broadway, Jumbunna Aboriginal Education Centre was established in 1987 with only two indigenous students. Today it has more than 250 Aboriginal and Torres Strait Islander students and a staff of 10.

The Centre was conceived to afford indigenous Australians the opportunity to gain access to tertiary studies through the provision of academic and cultural support programs. The name *Jumbunna* comes from the Aboriginal word meaning a *meeting place.*

Jumbunna Centre is predominantly staffed by black Australians and offers a range of award courses, many unique to UTS. Owing to its programs, its support system and its caring environment, Jumbunna Centre has fast gained a reputation among the indigenous community as being a most desirable place to study. Jumbunna's courses include: adult education, tourism and leisure, business studies, social sciences, design, life sciences and nursing, law, media studies, architecture and building.

For further information contact the Jumbunna Centre on 330 1902.

ELSSA Centre

ELSSA, the English Language and Study Skills Assistance Centre, provides free English language and study skills courses for students enrolled at UTS and university staff. These include communication electives for award to degrees, intensive vacation courses and weekly workshop courses. The Centre runs courses on essay writing, report writing, advanced grammar, critical thinking, discussion skills, seminar presentation, effective reading, pronunciation and writing at postgraduate level.

Students may make an appointment for an individual consultation with a lecturer at the Centre to discuss difficulties with academic work. The Centre also has books and tapes for self-study. Brochures with further details of ELSSA programs are available at school offices and at the Centre.

For further information and appointments, telephone 330 2327, fax 330 2321, Level 18, Tower Building, Broadway.

Student Learning Centre

The major role of the Student Learning Centre is to assist students to realise their academic potential for tertiary studies. The Centre fosters the development of student learning and encourages student autonomy through access to the Centre's resources. It provides individual and group tuition to students from various faculties of the university in areas of language and study skills such as time management, writing essays, ESL, presenting seminars, taking part in tutorials, examination preparation, and in mathematics, statistics, and problem-solving strategies. Bridging and preparatory programs are held during the year. Qualified and experienced staff members are committed to an ethic of service in helping students succeed at the highest level.

Students may visit the Centre on their own initiative or on a voluntary basis when referred by academic staff. The Centre is located in rooms 2.520-2.522 above the main Library on the Kuring-gai campus. Telephone 330 5160 (Language and Study Skills), and 330 5186 (Mathematics).

SERVICES

THE UNIVERSITY LIBRARY

The University Library houses more than half a million books, journals and audiovisual items and provides services to staff and students through five campus libraries.

Balmain Campus – Design Library
The Design Library is managed as a joint library service with the Sydney College of the Arts, and houses materials relating to visual arts and design. It is located on the corner of Mansfield and Batty Streets, Rozelle.

City Campus – Markets Library at Haymarket
The Markets Library collects materials in a wide range of subject areas including architecture, building, business, computing science, education, engineering, humanities, law, mathematics, physical sciences, social sciences. It is located in the Haymarket area on the corner of Quay Street and Ultimo Road.

Kuring-gai Campus – George Muir Library
The George Muir Library is located at the Kuring-gai campus in Eton Road, Lindfield. The library's collection is broad: major subject areas include business, education, leisure, information and communication studies and nursing. The library also has a curriculum collection associated with education studies.

St Leonards Campus – College of Law Library
This library provides services for staff and students undertaking courses in practical legal training and is located at 2 Chandos Street, St Leonards.

St Leonards Campus – Gore Hill Library
This library collects materials in the areas of life sciences and nursing. It is located on the corner of the Pacific Highway and Westbourne Street, Gore Hill.

The library's collection is recorded in the UNILINC catalogue which is available as an up-to-date on-line catalogue, and as a compact disc catalogue with enhanced search features. The catalogue can be accessed in each of the libraries as well as in offices and laboratories throughout the university. Access to library information and other bibliographic and numeric databases is extended nationally and internationally through high speed communications networks such as AARNet (the *Australian Academic and Research Network*). Access within Australia is extended through participation in ABN (the *Australian Bibliographic Network*) and the Linked Library System which links the university libraries in New South Wales and the ACT.

The library has a firm commitment to provide the best possible information service and has established a team of Faculty and School Liaison Librarians who, in partnership with academic staff, assist users in achieving their objectives in education and information. The Liaison Librarians for the Faculty of Engineering are

Mary Carter (School of Electrical Engineering)
Anne Newton (School of Civil Engineering, School of Mechanical Engineering).

Services provided include loans, reservations, intercampus document delivery, interlibrary loans from Australian and international sources, reciprocal borrowing with other institutions, user education, and on-line, compact disc and print-based information retrieval services.

Service guides can be obtained from the libraries. Opening hours are posted in the libraries.

INSTRUCTIONAL TECHNOLOGY SERVICES

In 1992 a new unit, Instructional Technology Services (ITS), was created. Initially this unit will concentrate on establishing a high standard of classroom audiovisual services across the university's campuses. It is also intended that it will deliver a high quality technical and maintenance service, as well as a production capacity.

Services currently available include provision of a one-stop booking service, enhanced presentation lecture theatres, reticulated video services, a trolley service for audiovisual equipment, videotape duplication services and a mediawatch service for current affairs programs.

At present ITS has offices at the Kuring-gai campus and in the Bon Marche Building, City campus. Administratively, the Service is controlled by the University Librarian.

COMPUTING SERVICES

The Computing and Communications Services Division provides a comprehensive range of facilities and services to meet the major computing requirements of academic and administrative areas of the university.

Equipment
The academic facilities consist of four large Sun SPARCserver computers and an Amdahl 5860 mainframe computer. These systems provides the academic community with a wide range of programming languages and application packages. They run the UNIX operating system, and can be accessed by users from public PC and Macintosh laboratories operated by the Division.

A Prime 9955-II computer, running the PRIMOS operating system, which has provided academic facilities on the Kuring-gai campus, has been replaced by a Sun SPARCserver 630 system on the Broadway campus.

Other central academic computing facilities consist of 12 PC laboratories, four Macintosh laboratories and three terminal rooms. It is also planned to install two Sun workstation laboratories for use in 1993.

A Data General MV20000, a Sun 4/470 and a Sequent S2000/200 systems support administrative data processing, while a Data General MV15000 services office automation and systems development work.

All computer systems are connected to the university's Local Area Network (UTSnet), which covers the City, Kuring-gai, Balmain and St Leonards campuses. Connected to the network are personal computers and terminals located in the public laboratories and terminal rooms, as well as various School minicomputers.

Location of Facilities
Located on Level 9 of Building 1 at Broadway are the Sun, Amdahl, Sequent and Data General systems, as well as Computing and Communications Services Division staff offices.

Public laboratories and terminal rooms are located on the following campuses:

City Campus
Building 1
Room 1017 - 15 x Macintosh SE
Room 1313A - 20 x PC XT

Building 2
Room 421 - 25 x PC XT
Building 4
Room 104 - 20 x PC 486SX
Room 438 - 20 x Terminal
Room 440 - 20 x Terminal
Room 444 - 20 x PC XT
Building 5
Room A209- 15 x PC XT
Room A210 - 20 x PC XT
Bon Marche
Room 439 - 20 x Macintosh LCII

Balmain Campus
Balmain North Basement - 20 x Macintosh LC
Block A

St Leonards Campus
Dunbar Building
Room 507 - 20 x Macintosh LC
Room 511 - 16 x PC XT

Kuring-gai Campus
Stage 2
Room 461 - 20 x Terminal
Room 524 - 20 x PC 386SX
Stage 3
Room 338 - 20 x PC 386SX
Room 339 - 20 x PC XT
Room 340 - 18 x PC XT
Room 341 - 20 x PC 386SX
General enquiries should be directed to the Response Centre, Room 913, evel 9, Building 1, City campus (telephone 330 2111).

Services

Services provided by the Computing and Communications Services Division include:

- academic and administrative computer processing
- consulting on programming languages, application packages and system usage
- consulting on use of microcomputer hardware and software
- installation, maintenance and support of data communications equipment, terminals and microcomputers
- connection to the University's Local Area Network
- connection to the University's Voice Communications (Telephone) Network
- design, development and support of administrative data processing systems
- operation of a help desk for user enquiries and problems
- production of newsletters and technical documentation
- operation of a retail Microcomputer Shop

Microcomputer Shop

The Computing and Communications Services Division operates a Microcomputer Shop. This shop is a self-supporting, non-profit retail outlet that aims to provide the university and its staff and students with microcomputers and microcomputer software at the lowest possible prices. Purchases from the shop are restricted to university schools/units and to registered students and staff.

The shop stocks hardware and software from the following vendors:

Apple	Microsoft
Ashton-Tate	Mitsui
Borland	Netcomm
Claris	Novell
Data Flow	SourceWare
Hyundai	Star
InfoMagic	Tech Pacific
IBM	Techflow
Ipex	WordPerfect
Lotus	

Other services include Macintosh rentals.

The shop is located on Level 27, Room 2713 of Building 1 at Broadway, telephone 330 2474. Trading hours for the shop are 9am to 5pm Monday to Friday.

UTS UNION

UTS Union is the community centre for the university. It provides food and drink services, lounges and recreational areas, comprehensive social and cultural programs, sports facilities and programs, stationery shops, newsagency and car park. The union also provides student accommodation, runs the University Careers and Appointments Service, provides a legal service with a full-time solicitor, and operates a large ski lodge at Jindabyne.

MANAGEMENT

The union is controlled by a Board of 15 persons consisting of eight students, three staff representatives, three Council appointees and one Alumni nominee. Annual elections are usually held in September and all students and staff are eligible to stand for a position on the Board. The union employs a staff of about 150, headed by the Secretary/Manager.

MEMBERSHIP

All registered students and university staff are members of the union.

FEES

All students pay an annual fee to the union and new students pay a joining fee as well. Staff fees are paid by the university.

Fee Exemptions

Students who have paid seven annual fees to the union are entitled to exemption from further fees. For further information, please contact the Union Office (not the university).

ENQUIRIES

For general information, contact the Union Receptionist in the Broadway Union Centre or Union Centre at Kuring-gai campus. For information about membership, fees or management, contact the Union Office on Level 6 of the Tower building. For all sporting enquiries, contact the Sports Office in the Union Sports Centre at Broadway.

Telephone Numbers

The telephone number for the Union Receptionist, Union Office and all other branches of the union at Broadway is 330 1444. The union's telephone number at Haymarket is 330 1444. The union's telephone number at Haymarket is 330 3369, Gore Hill is 330 4048, at the Faculty of Nursing 330 4375 and at Kuring-gai 330 5011.

CATERING SERVICES

The union operates food services on all campuses except Balmain, where the service is provided by the Sydney College of the Arts Students' Association.

Licensed bars are provided at Broadway, Haymarket and Kuring-gai.

Functions Catering Service

The Functions Catering Service can cater for lunches, buffets, dances dinners, weddings, etc. Most of these are held in the Gallery Function Centre on Level 6 of the Tower building or at Kuring-gai. Ask about the special discount rates which apply for student and other union groups.

UNION SHOPS

There are union shops at Broadway, Haymarket, Balmain and Gore Hill with a wide range of items to meet course requirements, including calculators, stationery and technical drawing equipment. The Union Shop at Broadway also carries a range of university sweaters, pennants and memorabilia.

ACTIVITIES

The Union Activities Department arranges the social and cultural programs at UTS. These include dances, concerts, films, barbecues, creative leisure courses, art exhibitions, plays and lunchtime speakers. Faculty clubs and societies and hobby and social clubs (the Activities Clubs) receive financial and other support from the Activities Department. The Activities Officers are located in the Bornholt Room in the Broadway Union Centre. The Activities Officer at Kuring-gai is located in the Union Centre, telephone 330 5013.

PUBLICATIONS

The union produces a monthly magazine *Plexus*, the weekly *Union News* and a diary which is given to all students and staff at the beginning of the year and many other publications.

SPORT

Facilities

The Union Sports Centre at Broadway contains five squash courts (with special discount rates for union members) gymnasium, weights room, men's and women's saunas, change rooms with lockers and showers, sports office, sports clinic and sports shop. There is also an open air basketball/volleyball court on the roof of the squash courts. The Sports Centre is located on the lower ground floor of Building 4, extending into the quadrangle.

The union runs squash courts at Kuring-gai and can also arrange the hire of tennis courts. The Sports Department at Kuring-gai can be contacted on 330 5012.

Fitness Classes and Programs

The union runs daily fitness classes at Broadway and Kuring-gai. Contact the Sports Office for further information.

Intervarsities and Interfaculty

The union sponsors teams to state and national intervarsity meetings. As well, numerous interfaculty competitions are organised within the university throughout the year.

Clubs

There are many sporting clubs affiliated with the union. They receive financial support from the union and new members are most welcome.

Kookaburra Lodge

Kookaburra Lodge, which is owned and operated by the union, is located in Jindabyne at the foot of the Snowy Mountains, The Lodge, which overlooks the lake, is fully renovated and offers 30 rooms (some with en suites), heated pool, comfortable dining room and large recreation room. The union offers numerous weekend and mid-week trips during the ski season, with prices for members well below commercial rates.

In the off season, bed and breakfast is available from as little as $20 per night, so Kookaburra Lodge is also an excellent base for those interested in bush-walking and non-winter activities in the Snowy Mountains.

All bookings are made through the Broadway Sports Office, phone 330 2444.

UTS Haberfield Rowing Club
Formed after a merger between Haberfield Rowing Club and the union, the UTS Haberfield Rowing Club caters for beginners through to elite rowers.

The club is located in Dobroyd Parade, Haberfield, less than15 minutes by car from the City campus.

For further information, phone the club on 797 9523.

STUDENT ACCOMMODATION

The union has its own student residence, the *Imperial,* at 54-58 City Road, Chippendale. Just 10 minutes walk from the City Campus, Broadway, the *Imperial* offers high quality, low cost accommodation in single and double rooms. Preference is given to first and second year students from outside the metropolitan area. For further information, contact the Union Housing Office at Broadway, on 330 1509.

CAREERS AND APPOINTMENTS SERVICE

The UTS Careers and Appointments Service is a division of the union and provides the following services:

- A directory of employers seeking full-time, part-time and casual staff.
- Advice on employment skills such as interview techniques, personal presentation and resume writing.
- A register of students seeking employment, linked to a mailing and telephone contact service.
- A career counselling service aimed at assisting students and graduates in clarifying and focusing their career objectives.
- Ongoing campus interview programs which introduce final year students to a range of leading employers.

The Careers and Appointments Service is located on Level 5 of the Tower Building at Broadway, telephone 330 1500, and at Kuring-gai in the Union Centre, telephone 330 5016. To take full advantage of the services offered, all students are urged to register with the Careers and Appointments Service at the earliest opportunity. NOTE: It is a requirement of all engineering undergraduate programs that students must obtain relevant engineering work experience during their course. Engineering undergraduates must refer to the Industrial Experience Requirements and the advice about Industrial Liaison in the undergraduate section of this handbook.

LEGAL SERVICE

The union employs a full-time solicitor who provides a range of legal services, in most cases free of charge, to members.

Free advice and assistance in any matter is available, especially those involving criminal charges, motor vehicle claims, family law, tenancy disputes, consumer and debt claims and welfare matters.

Representation in Local Courts is normally available free of charge to full-time students and students on low incomes.

Members can discuss any problems at the Solicitor's Office on level 5 of the Tower Building, telephone 330 1511, where all enquiries are dealt with in the strictest confidence. The solicitor is available at Kuring-gai campus one day a week, telephone 330 5017.

WORK EXPERIENCE INSURANCE

At UTS students who participate in approved work experience programs are insured by the university for "workcare" benefits (other than weekly payments) arising out of work related injuries sustained anywhere in Australia. The scheme is administered by UTS Union on behalf of the university. To obtain a letter of confirmation, or for further information, or to make a claim, contact the Union Office on Level 6 of the Tower Building, telephone 330 1642.

CHILD CARE

UTS Child Care Inc. is an incorporated Association which coordinates the operation of all child care services at UTS. The Board of UTSCC Inc. comprises representatives of the University, the union, the Students' Association and parent users of the centres. The Board plans new child care facilities for UTS, and aims at providing a variety of services at each campus. It also sets operational policies to ensure that child care services are of high quality and meet the needs of members of the university community.

Each child care centre is managed by a Director who reports to a Management Committee, the majority of whose members are elected parent representatives. All parents are invited to become involved in the management of the centres.

Operating costs for the various children's services are provided by State and Federal Funding: 8%, UTS sources (Union/SA/University): 10% and parent fees: 73%.

Under the Federal Government Fee Relief Scheme, families earning under $440 per week pay minimum fees. Parents earning between $440-$1150 (approx)

per week receive some fee relief benefit according to a sliding scale. Those with incomes greater than $1150 per week pay full fees.

Access to child care facilities is open to all staff and students under "Priority of Access" guidelines. Priority is given to working and studying parents. There are waiting lists at each centre which take into account various factors including family circumstance, length of time on the waiting list and the family's need for care, in establishing priority of access to the centres. Waiting time varies depending on the family circumstances, the child's age, and the type of care required. There is little or no wait for night care or for vacation care.

Kuring-gai Kuring-gai Campus Child Care Centre is situated next to the oval on campus, and provides 45 day care places for babies to five year olds, from 8am until 6pm for 50 weeks each year. There are also 10 evening care places for babies to 10 year olds, until 10pm Monday - Friday during semester periods only. Enrolment is available on a full-time, regular part-time, evening only, semester only, or emergency basis. Some occasional care may be available during the December-February period. Occasional weekend care can be provided (by prior arrangement) when the university hosts conferences and seminars. Vacation care for school aged children is available during school holiday period. Telephone 330 5105 for information.

Balmain UTS supports Allen Street Glebe Child Care Centre which is attached to Sydney College of the Arts (Sydney University). Enrolment is available on a full-time or part-time basis daily.

City Campus Magic Pudding Child Care Centre is behind Building 1 on the Broadway campus, and provides 40 day care places for babies to five year olds, from 8am until 6.30pm for 51 weeks each year. There are also 15 evening care places for babies to 10 year olds, until 10pm Monday-Friday during semester periods only. Enrolment is available on a full-time, regular part-time, evening only, semester only, or emergency basis. Some occasional care may be available during the December-February period. Occasional weekend care can be provided (by prior arrangement) when the university hosts conferences and seminars. Vacation care for school aged children is available during the Christmas and July school holiday periods.

Telephone 330 1456 for information.

St Leonards St Leonards Campus Child Care Centre is situated just off the Pacific Highway opposite the Dunbar Building at Gore Hill. It provides 25 day care places for babies to five year olds, from 8am until 6pm for 48 weeks each year. Enrolment is available on a full-time, regular part-time, semester only, or emergency basis. Some occasional care may be available during non-semester periods. Telephone 330 4023 for information.

STUDENT SERVICES

Student Services staff are employed by the university to cater for students' health, counselling, and welfare needs. Staff also assist in the development of study skills and provision for students with disabilities. All interviews are strictly confidential.

Welfare

Welfare Officers offer assistance with personal financial matters. Central to their work is administration of the Student Loan Fund, financial counselling and advising on AUSTUDY claims and appeals.

Health

The Health Service has two locations: level 3A of the Tower Building at Broadway and level 5 of Kuring-gai campus. The practice offers a free service to students with an emphasis on health education and promotion.

Counselling

Counsellors are available on all campuses. The service is full-time at City and Kuring-gai and part-time at Balmain and St Leonards campuses. The counsellors are experienced in dealing with all kinds of personal difficulties and can advise on administrative matters in relation to the university, such as appeals against exclusion.

International Student Counsellor

The International Student Counsellor can help students from overseas and from non-English speaking backgrounds with personal, practical and administrative problems while studying at UTS.

Learning Skills

The Learning Skills Counsellor helps students to understand how best they can learn. Advice is given on time management, writing assignments, reading effectively and preparing for exams. As well as individual consultations, workshops are held during both semesters.

Special Needs Coordinator

The Special Needs Coordinator works with other university staff to ensure appropriate support is available for students with disabilities and students admitted through the inpUTS Special Admission Scheme. Students with physical, sensory and learning disabilities are encouraged to contact the Coordinator. The Coordinator can also provide

information and advice to prospective students who have disabilities.

To contact Student Services:

Broadway. Level 3A Tower Building, telephone 330 1177, fax 330 1172, TTY 330 1166
Health Service Appointments: 330 1166

Balmain. Student Centre, appointments 330 1177.

Kuring-gai. Level 5, telephone 330 5342, fax 330 5537.

St Leonards. appointments 330 5342.

STUDENTS' ASSOCIATION

The Students' Association (SA) is the elected representative body of students at the UTS: it is an organisation run by students for students. All students become members of the Students' Association upon enrolment. It is the only body in the university which can legitimately claim to truly represent the concerns, issues and problems students face on a day-to-day basis whilst at this university. All students have the right to stand for election of the Students' Association and to vote in the annual elections. There are 23 general representatives on the Council that makes policy for the Students' Association. It also has specialised portfolios and office bearers to deal with a range of issues: the environment, women, students with special needs, gay and lesbian rights, overseas students and postgraduates.

The Students' Association maintains close links with student organisations from other universities. Its political role is to defend and extend educational standards and conditions for students both within the university and the tertiary sector as a whole. Campus committees deal with campus-specific issues. This has proved to be the most effective and equitable means of ensuring that all students from all campuses are adequately represented in the make-up of the Students' Association. At this level, campus conveners carry out the directions of campus committees, which are also elected annually.

In general the Students' Association plays a representative and advocacy role on behalf of students. It acts as the voice of the student body. As part of this function it produces a fortnightly newspaper,*Vertigo*, and a weekly radio show on 2SER *Student Voice*. It liaises closely with the University Union, which provides services to students (e.g. the cafeteria, reading and leisure areas) and the Student Services Unit, which is funded by the niversity to provide welfare advice and counselling, loan assistance and medical services. The Students' Association also employs specialised education staff to assist in enquiries about AUSTUDY, HECS, appeals against exclusion and assessment grades and any other problems that students encounter at UTS. The Students' Association has lots to offer all students and welcomes student involvement.

Locations and Services

City campus 330 1155
The main office of the Students' Association is located on the City campus, Broadway on Level 3A of the Tower Building (near the bar and cafeteria) and offers the following services:

- General student representatives
- Elected office bearers
  - Women's officers
  - Overseas students' officers
  - Special needs officers
  - Gay and lesbian officers
  - Environment officer
  - Postgraduate officer
- Specialist education, research and welfare staff
- General student enquiries
- Academic coaching service
- Photocopying
- Funding of PERC Clubs

Haymarket Resource Centre
This is located in Room B110 and its services include:

- Computer, fax
- Photocopying
- Secondhand books

Design School Student Centre 330 2958
This is located on the Balmain campus, Mansfield Street, Balmain and is open Tuesday to Friday and offers:

- Photocopying
- Computer facilities

Gore Hill Resource Centre 330 4040
This is located in Room 1/18 in the Dunbar Building and its services include:

- Photocopying
- Secondhand books
- Computer facilities

Kuring-gai Campus 330 5237
Located next to State Bank, the services offered include:

- General and campus representatives
- Specialist education, research and welfare staff
- General student enquiries

RADIO STATION 2SER-FM

In conjunction with Macquarie University, UTS operates Sydney Educational Broadcasting Ltd (2SER-FM), Sydney's first mass coverage educational radio station thus expanding the institution's role in education to a wide community audience. The station, on air 24 hours a day, broadcasts a variety of spoken word educational programs covering arts and sciences. In addition to a small core of paid staff, some 400 volunteers, including UTS staff and students, are involved in programming the station.

THE CO-OP BOOKSHOP

The Bookshop is located next to the Tower Building on Broadway. While committed to supplying textbooks for all timetabled courses it also attempts to cater to the needs of the university community for general books, stationery, calculators and computer books and software.

Through its extensive computer system linking over 40 branches in Australia, the bookshop can often get hold of hard-to-get titles. Students and staff are welcome to place special orders, and charge accounts are available for approved customers.

At the start of each semester the bookshop runs temporary branches at the City campus, Haymarket (Room C117) and Gore Hill. The Kuring-gai campus is also serviced by a permanent Co-op Bookshop specialising in texts used on that campus.

The Broadway bookshop is open from 9am till 6pm Monday to Thursday, 9am till 5pm on Friday and 9am till 1pm on Saturday. There are normally extended hours at the beginning of each semester. The Bookshop can be contacted on 212 3078 or 330 2163.

STATE BANK

Full branches of the State Bank are situated on Level 4 of the Tower Building, Broadway, and at Kuring-gai campus. A complete range of banking services is provided. Normal banking hours apply all year at Broadway and the hours at Kuring-gai are 10am to 3pm.

The State Bank also offers complete banking services at Gore Hill, St Leonards and Haymarket, operating through the UTS Union facilities.

THE FACULTY OF ENGINEERING

The Faculty of Engineering has a strong vocational orientation. Its courses have been designed to achieve standards of education 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: that is, the belief that the development of fully professional engineers requires both academic and industrial training and that 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.

The faculty has three Schools. They offer these courses:

School of Civil Engineering

Bachelor of Engineering in Civil Engineering
Bachelor of Engineering in Structural Engineering
Master of Engineering (by thesis)
Master of Local Government (offered jointly with the Faculty of Business)
Graduate Diploma in Local Government

School of Electrical Engineering

Bachelor of Engineering in Electrical Engineering
Bachelor of Engineering in Computer Systems Engineering
Master of Engineering (Telecommunications)
Master of Engineering (by thesis)
Graduate Certificate in Software Engineering

School of Mechanical Engineering

Bachelor of Engineering in Mechanical Engineering
Bachelor of Engineering in Manufacturing Engineering
Master of Engineering (by thesis)

In addition the following programs are offered on a faculty basis:

Bachelor of Technology
Graduate Diploma in Engineering
Master of Engineering Management
Doctor of Philosophy

Other courses are offered through the National Centre for Groundwater Management (a joint enterprise of the Faculty of Science and the Faculty of Engineering), and the Centre for Local Government Education and Research.

The **Graduate School of Engineering** has been established but will be operating only in planning mode during early 1993.

COURSE CODES

EC55	PhD (Civil)
EE53	PhD (Electrical)
EM55	PhD (Mechanical)
EG55	PhD Engineering „(Groundwater Management)
EC51	ME (Thesis) Civil
EE51	ME (Thesis) Electrical
EM51	ME (Thesis) Mechanical
EG56	ME (Thesis) (Groundwater Management)
E052	Master of Engineering Management
EB52	Master of Local Government
EE54	Master of Engineering in Telecommunications Engineering
EG57	Master of Engineering in Groundwater Management
EC53	Graduate Diploma in Local Government Engineering
EC54	Graduate Diploma in Engineering (Civil)
EE52	Graduate Diploma in Engineering (Electrical)
EM51	Graduate Diploma in Engineering (Mechanical)
EG61	Graduate Diploma in Engineering (Groundwater Management)
EE03	Bachelor of Engineering in Electrical Engineering
EE04	Bachelor of Engineering in Computer Systems Engineering
EC03	Bachelor of Engineering in Civil Engineering
EC04	Bachelor of Engineering in Structural Engineering
EM03	Bachelor of Engineering in Mechanical Engineering
EM04	Bachelor of Engineering in Manufacturing Engineering
E006	Bachelor of Technology in Manufacturing Engineering

FACULTY OF ENGINEERING LOCATION

The office of the Dean of Engineering and General Faculty Office are located on Level 4 of the Engineering Building, Broadway. The Women in Engineering Office is also located on this level opposite the Faculty Office. Staff associated with these offices are

	Room	Ext
Dean of Engineering P J Parr	426B	2599
Faculty Administrator D J Carraro	426A	2594
Secretary to the Dean L F Yee	426	2596
Professor A Pattison	424A	2591
Associate Professor and Director, Management Studies in Engineering J V Parkin	520	2638
Director, Industrial Liaison J G Crowe	424B	2592
Graduate Studies Officer B Buckenmaier	433	2606
Administrative Assistant - Finance and Operations M G Rothery	429C	2600
Industrial Liaison Officers (Part-time) M R Collison P J Doyle	433	2605
Administrative Secretary L B M Smith	433	2604
Women in Engineering Coordinator M Boman	412	2602/ 2601

UNDERGRADUATE COURSES

BACHELOR OF ENGINEERING

Description

Undergraduate courses are available in Civil, Structural, Electrical, Computer Systems, Mechanical and Manufacturing 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). The attendance patterns which provide for this are sandwich or part-time. There are no full-time students.

Honours

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

Admission

(See also General Information, above, and Rules of the University Relating to Students, printed in the Calendar.)

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. Enquiries 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 1991 NSW HSC examination the required levels of TER were 76.70 for Civil/Structural Engineering, 74.60 for Electrical Engineering, 88.15 for Computer Systems Engineering, and 73.20 for Mechanical/Manufacturing Engineering. Although there are no formal subject prerequisites, UTS engineering courses are taught on the assumption the 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. Applicants holding a TAFE Associate Diploma should contact the faculty to obtain an information sheet.

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 15hrs/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 who 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.

Engineering Co-op Scholarships

In 1992 13 students were awarded Engineering Co-op Scholarships. It is expected that the same number of scholarships will be available in 1993.

Scholarships will be awarded to students who are successful at the Higher School Certificate examinations (or equivalent) and who are either Australian citizens or permanent Australian residents.

Selection is based on a combination of achievements at the trial and actual HSC examinations and personal attributes relevant to a career in professional engineering such as 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% 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 their scholarship.

Sponsors

In 1992 external sponsors of the Engineering Co-op Scholarship program were: State Rail Authority, Canon Australia Ltd, Sydney Electricity, Commonwealth Bank, Merlin Gerin (Aust) Ltd, and BP Australia Ltd. Internal sponsors were staff in each of the Schools of Civil Engineering and Mechanical Engineering.

Applications

Application forms will be available from Careers Advisers by August 1993 for the 1994 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 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 rules have been confirmed by the Faculty Board in Engineering and are based on the Board's policy document, *Undergraduate Industrial Experience Requirements*. The Rules 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 on 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 Rules.

   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 form 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 followed 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 advance 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 rules 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

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's requirement for membership in the grade of Professional Engineer, in addition to a recognised Degree, is a minimum of three years of post-graduation experience of an approved nature in professional engineering employment. UTS graduates, in general, are likely to be able to meet this requirement without difficulty, since the industrial experience gained during their course equips them to undertake immediate professional responsibility.

The Institution's regulations also contain provision, in special cases, for industrial experience gained prior to graduation to be counted towards eligibility for corporate membership. This is normally rated at half-value and to a maximum of 12 months' reduction of the post-graduation requirement, and it is emphasised that the experience must be of a suitable nature. The Faculty of Engineering maintains close contact with the Institution on this and other matters, and will advise students whether their proposed experience appears likely to be considered by the Institution as counting towards a reduction in the post-graduation professional experience requirement. 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.

BACHELOR OF TECHNOLOGY

The Bachelor of Technology Degree in Manufacturing Engineering is an initiative of the Faculty of Engineering at the University of Technology, Sydney. It is aimed at the skills development of middle-level engineering technologists in manufacturing industry. The course 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 manufacturing group of Associate Diploma programs. Course work will cover four main areas: Commercial skills and Management, Computing and CADCAM, Communication and Engineering Documentation and Quality Manufacturing.

The course is not designed to articulate to a Bachelor of Engineering degree, although progression to that degree is possible. It is expected that the Bachelor of Technology Degree in Manufacturing Engineering will qualify graduates for entry to the Institution of Engineers, Australia in the Engineering Technologist grade. The course will commence in Autumn Semester 1993.

Entry Qualifications

The entry requirement is a NSW TAFE Associate Diploma in Computer Integrated Manufacturing, Control, Industrial, Mechanical, Manufacturing or Production Engineering.

Applicants with an Associate Diploma in another technology area or an equivalent qualification will be considered for admission.

Industrial Experience

At least 12 months' experience in 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.

Selection

It is anticipated that 40 places will be made available in 1993. 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.

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.

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.

Attendance Pattern

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

Professional Recognition — Membership of the Institution of Engineers, Australia.

UTS intends 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 the course has undergone formal accreditation by the Institution. The Course Director will be happy to discuss this with students.

Enquiries

General inquiries can be made by phone during office hours on (02) 330 2666. Applications for admission should be made using the appropriate form which can be obtained from the UTS Information Service, 15-73 Broadway NSW 2007.

Include with your application:

a short statement of why you wish to be considered;
certified photocopies of the subject results from your previous studies and the award certificate;
a brief (one page) summary of your industrial experience; and
a letter of support from your present employer agreeing to day release.

SCHOOL OF CIVIL ENGINEERING

The School offers Bachelor degrees in Civil and Structural Engineering.

Civil engineers are key professionals involved in the design, construction and operation of the facilities and services which are not only characteristic of today's societies, but which also safeguard the quality of the physical environment for the future. Examples would be the design of a new harbour, or of a water supply system or of an integrated transport system.

Structural engineering involves the design, construction and operation of a variety of structures that may be as diverse as the fuselage of an aeroplane, a highway bridge or an off-shore platform. The structural engineer plays an important role wherever something is built which has to carry load or resist forces to perform its function.

Civil and structural engineers will find themselves searching for cost-effective, safe and environmentally appropriate solutions, and efficient construction processes which requires an understanding of a wide range of technical, economic and social issues.

Both degrees provide a thorough foundation in the physical sciences and applied engineering sciences which underpin the engineering practice subjects undertaken in 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 which are vital to professional practice, particularly as individual engineers will often be working in multi-disciplinary teams with other engineering professionals and technicians, as well as architects, economists and social planners.

Through electives and project work students can choose to undertake additional studies in areas of special interest to them.

BACHELOR OF ENGINEERING IN CIVIL ENGINEERING

Credit point values are shown in brackets.

Sandwich Attendance Pattern

Stage 1	
33121	Engineering Mathematics IA (3cp)
47110	Introduction to Civil Engineering (3cp)
47113	Computations I (4cp)
47117	Statics (4cp)
47118	Surveying IA (3cp)
63131	Engineering Physics (Civil) (6cp)

Stage 2	
33122	Engineering Mathematics IB (3cp)
47120	Graphics (3cp)
47127	Mechanics of Solids I (4cp)
47128	Surveying IB (3cp)
51131	Communications I (3cp)
62178	Engineering Chemistry (6cp)
63721	Materials Science for Engineers (3cp)

Stage 3	
33221	Engineering Mathematics IIA (3cp)
47131	Structural Mechanics (3cp)
47133	Computations II (3cp)
47134	Construction Materials (3cp)
47135	Fluid Mechanics (4cp)
47137	Mechanics of Solids II (3cp)
62388	Geology for Engineers (3cp)

Stage 4	
47140	Concrete Design I (3cp)
47141	Structural Analysis I (3cp)
47142	Environmental Engineering (3cp)
47144	Timber Design (3cp)
47145	Hydraulics (3cp)
47146	Soil Mechanics (4cp)
47149	Construction (3cp)
51161	Communications II (3cp)

Stage 5	
47153	Computations III (3cp)
47150	Concrete Design II (4cp)
47151	Structural Analysis II (4cp)
47155	Hydrology (3cp)
47152	Public Health Engineering (3cp)
47156	Soil Engineering (3cp)
47154	Concrete Technology (3cp)
47159	Project Planning (3cp)

Stage 6	
47161	Steel Design I (3cp)
47160	Concrete Design III (3cp)
47162	Advances in Pollution Control (3cp)
47163	Computations IV (3cp)
47164	Metals Technology (3cp)
47166	Geotechnical Engineering (3cp)
	or
47176	Ground Modification (3cp)
47167	Road Engineering (3cp)
47168	Surveying II (3cp)

Stage 7	
47171	Steel Structures And Concept Design I (4cp)
47175	Water Engineering (3cp)
47177	Transportation Engineering (3cp)
47178	Project Economics (3cp)
47179	Construction Contracts (3cp)
47003	Project # (3cp)
	Electives * (6cp)

Stage 8

47189 Management for Engineers (4cp)
Electives * (6cp)
Project # (12cp)

Project to be between 9 and 15 credit points over a maximum of three semesters.
* Electives to be between 9 and 15 credit points so that course requirements of 192 credit points is met.

Part-time Attendance Pattern

Stage 1

Autumn semester
33121 Engineering Mathematics IA (3cp)
47117 Statics (4cp)
47120 Graphics (3cp)
63132 Engineering Physics (part-time) (3cp)
Spring semester
33122 Engineering Mathematics IB (3cp)
47110 Introduction to Civil Engineering (3cp)
47113 Computations I (4cp)
47118 Surveying IA (3cp)
63132 Engineering Physics (part-time) (3cp)

Stage 2

Autumn semester
47127 Mechanics of Solids I (4cp)
47128 Surveying IB (3cp)
51131 Communication I (3cp)
62178 Engineering Chemistry (6cp)
Spring semester
33221 Engineering Mathematics IIA (3cp)
47131 Structural Mechanics (3cp)
47133 Computations II (3cp)
47149 Construction (3cp)

Stage 3

Autumn semester
47135 Fluid Mechanics (4cp)
47137 Mechanics of Solids II (3cp)
63721 Materials Science for Engineers (3cp)
62388 Geology for Engineers (3cp)
Spring semester
47141 Structural Analysis I (3cp)
47142 Environmental Engineering (3cp)
47146 Soil Mechanics (4cp)
47134 Construction Materials (3cp)

Stage 4

Autumn semester
47140 Concrete Design I (3cp)
47144 Timber Design (3cp)
47145 Hydraulics (3cp)
47153 Computations III (3cp)
Spring semester
47150 Concrete Design II (4cp)
47152 Public Health Engineering (3cp)
47154 Concrete Technology (3cp)
51161 Communications II (3cp)

Stage 5

Autumn semester
47151 Structural Analysis II (4cp)
47156 Soil Engineering (3cp)
47159 Project Planning (3cp)
47168 Surveying II (3cp)
Spring semester
47155 Hydrology (3cp)
47161 Steel Design I (3cp)
47163 Computations IV (3cp)
47162 Advances in Pollution Control (3cp)
47160 Concrete Design III (3cp)

Stage 6

Autumn semester
47164 Metals Technology (3cp)
47166 Geotechnical Engineering (3cp)
or
47176 Ground Modification (3cp)
47167 Road Engineering (3cp)
Elective*
Spring semester
47171 Steel Structures and Concept Design I (4cp)
47175 Water Engineering (3cp)
47179 Construction Contracts (3cp)
47003 Project#
Elective*

Stage 7

Autumn semester
47177 Transportation Engineering (3cp)
47178 Project Economics (3cp)
Electives *
Project #
Spring semester
47189 Management for Engineers (4cp)
Electives *
Projects #

** Industrial Experience, 47997 (Sandwich) and 47999 (Part-time) to be undertaken in accordance with the faculty's Industrial Experience Rules.

Project subject numbers:

47002 Project (2cp)
47003 Project (3cp)
47004 Project (4cp)
47006 Project (6cp)
47009 Project (9cp)
47012 Project (12cp)
47015 Project (15cp)

Project to be between 9 and 15 credit points over a maximum of three semesters.
* Electives to be between 9 and 15 credit points such that the course requirements at 192 credit points is met.

BACHELOR OF ENGINEERING IN STRUCTURAL ENGINEERING

Credit point values are shown in brackets.

Sandwich Attendance Pattern

Stage 1	
33121	Engineering Mathematics IA (3cp)
47110	Introduction to Civil Engineering (3cp)
47113	Computations I (4cp)
47117	Statics (4cp)
47118	Surveying IA (3cp)
63131	Engineering Physics (Civil) (6cp)

Stage 2	
33122	Engineering Mathematics IB (3cp)
47120	Graphics (3cp)
47127	Mechanics of Solids I (4cp)
47128	Surveying IB (3cp)
51131	Communications I (3cp)
62178	Engineering Chemistry (6cp)
63721	Materials Science for Engineers (3cp)

Stage 3	
33221	Engineering Mathematics IIA (3cp)
47131	Structural Mechanics (3cp)
47133	Computations II (3cp)
47134	Construction Materials (3cp)
47135	Fluid Mechanics (4cp)
47137	Mechanics of Solids II (3cp)
62388	Geology for Engineers (3cp)

Stage 4	
47141	Structural Analysis I (3cp)
47140	Concrete Design I (3cp)
47142	Environmental Engineering (3cp)
47144	Timber Design (3cp)
47146	Soil Mechanics (4cp)
47237	Domestic Building Design and Construction (3cp)
47149	Construction (3cp)
51161	Communications II (3cp)

Stage 5	
47153	Computations III (3cp)
47151	Structural Analysis II (4cp)
47161	Steel Design I (3cp)
47150	Concrete Design II (4cp)
47156	Soil Engineering (3cp)
47154	Concrete Technology (3cp)
47159	Project Planning (3cp)

Stage 6	
47160	Concrete Design III (3cp)
47163	Computations IV (3cp)
47164	Metals Technology (3cp)
47265	Finite Element Analysis (3cp)
47267	Approximate Methods in Structural Analysis (3cp)
47268	Dynamics of Structures (3cp)
47171	Steel Structures and Concept Design I (4cp)
	Elective* (3cp)

Stage 7	
47178	Project Economics (3cp)
47179	Construction Contracts (3cp)
47270	Concrete Design IV (3cp)
47275	Bridge Design (3cp)
47277	Loading on Building Structures (3cp)
47278	Structural Stability (3cp)
47281	Steel Structures and Concept Design II (3cp)
	Project# (3cp)

Stage 8	
47189	Management for Engineers (4cp)
47285	Design Project (6cp)
47287	Structural Testing (3cp)
47288	High Rise Buildings (3cp)
	Elective * (3cp)
	Project # (6cp)

Part-time Attendance Pattern

Stage 1	
Autumn semester	
33121	Engineering Mathematics IA (3cp)
47117	Statics (4cp)
47120	Graphics (3cp)
63132	Engineering Physics (part-time) (3cp)
Spring semester	
33122	Engineering Mathematics IB (3cp)
47110	Introduction to Civil Engineering (3cp)
47113	Computations I (4cp)
47118	Surveying IA (3cp)
63132	Engineering Physics (part-time) (3cp)

Stage 2	
Autumn semester	
47127	Mechanics of Solids I (4cp)
47128	Surveying IB (3cp)
51131	Communications I (3cp)
62178	Engineering Chemistry (6cp)
Spring semester	
33221	Engineering Mathematics IIA (3cp)
47131	Structural Mechanics (3cp)
47133	Computations II (3cp)
47149	Construction (3cp)

Stage 3

Autumn semester

47135 Fluid Mechanics (4cp)
47137 Mechanics of Solids II (3cp)
63721 Materials Science for Engineers (3cp)
62388 Geology for Engineers (3cp)

Spring semester

47134 Construction Materials (3cp)
47146 Soil Mechanics (4cp)
47141 Structural Analysis I (3cp)
47142 Environmental Engineering (3cp)

Stage 4

Autumn semester

47140 Concrete Design I (3cp)
47144 Timber Design (3cp)
47237 Domestic Building Design and Construction (3cp)
47153 Computations III (3cp)

Spring semester

47161 Steel Design I (3cp)
47150 Concrete Design II (4cp)
47154 Concrete Technology (3cp)
51161 Communications II (3cp)

Stage 5

Autumn semester

47151 Structural Analysis II (4cp)
47156 Soil Engineering (3cp)
47159 Project Planning (3cp)
47267 Approximate Methods in Structural Analysis (3cp)

Spring semester

47160 Concrete Design III (3cp)
47163 Computations IV (3cp)
47268 Dynamics of Structures (3cp)
47265 Finite Element Analysis (3cp)
47179 Construction Contracts (3cp)

Stage 6

Autumn semester

47164 Metals Technology (3cp)
47178 Project Economics (3cp)
47277 Loading on Building Structures (3cp)
47287 Structural Testing (3cp)

Spring semester

47171 Steel Structures and Concept Design I (4cp)
47189 Management for Engineers (4cp)
47270 Concrete Design IV (3cp)
47275 Bridge Design (3cp)

Stage 7

Autumn semester

47278 Structural Stability (3cp)
47281 Steel Structures and Concept Design II (3cp)
Elective*
Project#

Spring semester

47285 Design Project (6cp)
47288 High Rise Buildings (3cp)
Electives *
Project #

** Industrial Experience, 47997 (Sandwich) and 47999 (Part-time) to be undertaken in accordance with the faculty's Industrial Rules.

Project subject numbers:

47002 Project (2cp)
47003 Project (3cp)
47004 Project (4cp)
47006 Project (6cp)
47009 Project (9cp)

Project to be between 6 and 9 credit points over a maximum of three semesters.
* Electives to be between 6 and 9 credit points so that the course requirements of 192 credit points is met.

ELECTIVES PROGRAM

Elective subjects are common to the Civil and Structural Engineering degree programs. Furthermore, Civil Engineering students may take core subjects from the Structural Engineering degree program as electives – similarly Structural Engineering students may take core Civil Engineering subjects as electives.

Electives are offered on demand, and not all are offered in every semester or even every year. The availability of a particular elective is determined at the beginning of each semester and classes scheduled only if sufficient numbers of students are enrolled.

Proposed electives 1993

47304 Coastal Engineering (3cp)
47306 Geomechanics (3cp)
47301 Railway Engineering (3cp)
47305 Risk and Reliability Analysis (3cp)
47308 Road Materials (3cp)
47302 Welding (3cp)
47303 Land Development (3cp)
47307 Construction Management (3cp)
47318 Urban Stormwater Drainage (3cp)
47312 Water Supply and Sewerage (3cp)

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 2/560A ext 2615.

	Room	Ext
Professor of Civil Engineering and Head of School		
Professor S L Bakoss	511C	2629
Structural Mechanics		
Deputy Head of School		
Mr E A Brady	511A	2627
Surveying		
Professor of Civil Engineering		
Professor K A Faulkes	528	2646
Associate Professors		
Mr T A Anderson	521	639
Construction and Management		
Dr M R Hausmann	527	2645
Soil Engineering		
[Leave A/93]		
Dr G G O'Loughlin	526	2644
Water Engineering		
Academic Staff		
Dr S C Beecham	507	2623
Water Engineering		
Dr H W Chung	519	2637
Construction Materials		
Dr J W Ivering	529	2647
[Leave A/93]		
Civil Engineering Design		
Mr E Jankulovski	537	2648
Structural Stability		
Seismic Design		
Dr M R Karim	505	2621
Structural Mechanics		
Mr P J Kenny	502	2618
Roads and Transport		
Dr K L Lai	510	2626
Structural Mechanics		
Mr P C Liu	508	2624
Civil Engineering Design		
Dr S Parsanejad	504	2620
Design of Steel Structures		
Structural Analysis		
Dr M Patarapanich	524	2642
Water Engineering		
Mr W G Peters	518	2636
(Leave A/93)		
Civil Engineering Design		
Dr R Sri Ravindrarajah	509	2625
Concrete Technology		
Dr G L Ring	506	2622
Soil Engineering		
Dr A Saleh	517	2635
Structural Mechanics		
Dr B Samali	513	2632
Structural Dynamics and Structural Mechanics		
Mr K B Shafiuddin	501	2617
Water Engineering		
Dr S Vigneswaran	523	2641
Environmental Engineering		
Academic Staff		
Fractional-time		
Mr K Halstead	522	2640
Local Government Engineering		
Mr E Jankulovski	537	
Structural Dynamics		
Mr C Wilkinson	537	
Structural Mechanics – Fabric Structures		
Support Staff		
Mrs L Venglinsky	511	2630
Secretary to Head of School		
Mr B Blakeway	560A	2615
Office Manager		
Mrs S Ali	512	2650
General Secretary		
Ms J Chetcuti		
P/T Word Processor Op	560	2616
Mr M J Taragel	114	2519
Engineer in Charge		
Mr I A Hutchings	116J	2512
Engineer		
Mr D A Tapner	116K	2513
Engineer		
Mr A Lah	1/2A252	1030
Engineer		
Ms L Punton	116L	2125
Engineering Research and Development		
Mr J Holmes	542	2514
Senior Technical Officer		
Mr P M Chatfield	1/2A252	1024
Technical Officer		
Mr H Hefka	116	2515
Technical Officer		

Mr W House Technical Officer	102B	2502
Mr J P Martinus Technical Officer	1/2A252	1029
Mr H H Ngo Technical Officer	547	2653
Mr St J Parmigiani Technical Officer	116M	2517
Mr H Myers Senior Laboratory Craftsman	1/2A253B	1026
Mr L Slade Senior Laboratory Craftsman	253	1026
Mr J McMahon Technical Officer	204	2537
Mr M Benitez Technical Officer	116M	2516
Mr D J Byfield Laboratory Craftsman	1/2A253B	1026
Mr D R Hooper Eng Trade Assistant	116N	2518
Mr S E Gabor Stores Officer	205B	2536

SCHOOL OF ELECTRICAL ENGINEERING

The School offers Bachelor degrees in Electrical Engineering and Computer Systems 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.

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

BACHELOR OF ENGINEERING IN ELECTRICAL ENGINEERING

Credit point values are shown in brackets.

Sandwich Attendance Pattern

Stage 1	
33110	Engineering Mathematics I (6cp)
63113	Engineering Physics I (6cp)
45115	Engineering Practice* (3cp)
33100	Discrete Mathematics (3cp)
45113	Digital Techniques (3cp)
45116	Electrical Engineering I (4cp)

Stage 2	
63123	Engineering Physics II (3cp)
45125	Engineering Discovery* (3cp)
33210	Engineering Mathematics II (6cp)
45123	Fundamentals of Computing(4cp)
63734	Materials Technology (3cp)
45124	Electrical Engineering II (7cp)

Stage 3	
45133	Software Engineering I (3cp)
45135	Engineering Communications (3cp)
33310	Engineering Mathematics III (6cp)
45134	Network Theory (7cp)
63133	Engineering Physics III (3cp)

Stage 4	
45144	Electronic Devices and Circuits (7cp)
45145	Engineering Statistics (3cp)
45242	Electromagnetics (3cp)
45141	Continuous and Discrete Systems (7cp)
45143	Computer Hardware (3cp)

* Category B students (those who gained admission other than from the HSC) enrol in the subject 52001 History of Ideas instead of Engineering Practice and Engineering Discovery.

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

Stage 5	
45151	Signal Theory I (4cp)
45154	Contextual Studies(4cp)
45252	Power Apparatus and Systems (6cp)
45155	Project A (3cp)
45264	Fields and Waves (3cp)
43153	Analogue Electronics (6cp)

Stage 6	
45163	Real Time Software and Interfacing (3cp)
45152	Signal Theory II (3cp)
45166	Project Management (4cp)
45665	Data Communications (3cp)
63155	Communications Physics (3cp)
45663	Digital Transmission (3cp)
45265	Numerical Methods (3cp)

Stage 7	
45661	Communications Networks (3cp)
45662	Signal Processing (3cp)
45678	Project B (Tel) (3cp)
45182	Thesis I (3cp)
45664	Communications Engineering (3cp)
45176	Systems Engineering (4cp)
45274	Physical Design and Production (3cp)
	Elective (3cp)

Stage 8	
45681	Communications Systems (6cp)
45183	Thesis II (8cp)
	Professional Electives (6cp)
	Social Science Elective (3cp)

Power and Machines Strand

Stage 5	
45151	Signal Theory I (4cp)
45154	Contextual Studies (4cp)
45252	Power Apparatus and Systems (6cp)
45153	Analogue Electronics (6cp)
45155	Project A (3cp)
45265	Numerical Methods (3cp)

Stage 6	
45163	Real Time Software and Interfacing (3cp)
45264	Fields and Waves (3cp)
45166	Project Management (4cp)
45461	Power Circuit Theory (3cp)
45481	Dynamics of Electric Machines (3cp)
45274	Physical Design and Production (3cp)
45482	Power Equipment Design (3cp)
45462	Power Electronics (3cp)

Stage 7	
45152	Signal Theory II (3cp)
63154	Electric Power Generation (3cp)
45182	Thesis I (3cp)
45176	Systems Engineering (4cp)
45472	Project B (P&M) (3cp)
	Electives (9cp)

Stage 8	
45483	Power Systems Analysis and Protection (6cp)
45484	Electrical Variable Speed Drives (3cp)
45183	Thesis II (8cp)
	Social Science Elective (3cp)

Instrumentation and Control Strand

Stage 5

45151 Signal Theory I (4cp)
45154 Contextual Studies (4cp)
45252 Power Apparatus and Systems (6cp)
45153 Analogue Electronics (6cp)
45155 Project A (3cp)
45264 Fields and Waves (3cp)

Stage 6

45163 Real Time Software and Interfacing (3cp)
45152 Signal Theory II (3cp)
45166 Project Management (4cp)
45561 Digital Systems Design (3cp)
45581 Analogue and Digital Control (6cp)
45265 Numerical Methods (3cp)

Stage 7

45562 Data Acquisition and Distribution Systems (6cp)
45662 Signal Processing (3cp)
45577 Project B (I&C) (3cp)
45182 Thesis I (3cp)
45176 Systems Engineering (4cp)
45274 Physical Design and Production (3cp)
Professional Elective (3cp)

Stage 8

45583 Adaptive and Multi-variable Control (3cp)
45582 Computer-Aided Design of Electronic Circuits (3cp)
45183 Thesis II (8cp)
Professional Electives (6cp)
Social Science Elective (3cp)

Part-time Attendance Pattern

Stage 1

Autumn semester
33110 Engineering Mathematics I (6cp)
33100 Discrete Mathematics (3cp)
45113 Digital Techniques (3cp)
45115 Engineering Practice* (3cp)
Spring semester
63113 Engineering Physics I (6cp)
45116 Electrical Engineering I (4cp)
45123 Fundamentals of Computing (4cp)
45125 Engineering Discovery* (3cp)

*Category B students (those who gained admission other than from the HSC) undertake the subject 52001 History of Ideas instead of Engineering Practice and Engineering Discovery.

Stage 2

Autumn semester
33210 Engineering Mathematics II (6cp)
63123 Engineering Physics II (3cp)
63734 Materials Technology (3cp)
Spring semester
45124 Electrical Engineering II (7cp)
63133 Engineering Physics III (3cp)
45133 Software Engineering I (3cp)
45135 Engineering Communication (3cp)

Stage 3

Autumn semester
33310 Engineering Mathematics III (6cp)
45134 Network Theory (7cp)
Spring semester
45144 Electronic Devices and Circuits (7cp)
45145 Engineering Statistics (3cp)
45242 Electromagnetics (3cp)

Stage 4

Autumn semester
45141 Continuous and Discrete Systems (7cp)
45143 Computer Hardware (3cp)
45151 Signal Theory I (4cp)
45154 Contextual Studies (4cp)
Spring semester
45153 Analogue Electronics (6cp)
45252 Power Apparatus and Systems (6cp)
45155 Project A (3cp)

Stage 5

Autumn semester
45152 Signal Theory II (3cp)
45163 Real Time Software and Interfacing (3cp)
45166 Project Management (4cp)
Spring semester
Subjects selected from Strand
45265 Numerical Methods (3cp)

Stage 6

Autumn semester
Subjects selected from Strand
45274 Physical Design and Production (3cp)
Social Science Elective (3cp)
Spring semester
Electives
45176 Systems Engineering (4cp)
Project B (3cp)
45182 Thesis I (3cp)

Stage 7

Autumn semester
Subjects selected from Strand
45183 Thesis II (8cp)

*Industrial Experience, 45997 (Sandwich) and 45999 (Part-time) to be undertaken in accordance with the faculty's Industrial Experience Rules.

BACHELOR OF ENGINEERING IN COMPUTER SYSTEMS ENGINEERING

Credit point values are shown in brackets.

Sandwich Attendance Pattern

Stage 1	
33110	Engineering Mathematics I (6cp)
63113	Engineering Physics I (6cp)
45115	Engineering Practice* (3cp)
33100	Discrete Mathematics (3cp)
45113	Digital Techniques (3cp)
45116	Electrical Engineering I (4cp)

Stage 2	
63123	Engineering Physics II (3cp)
45125	Engineering Discovery* (3cp)
33210	Engineering Mathematics II (6cp)
45123	Fundamentals of Computing (4cp)
63734	Materials Technology (3cp)
45124	Electrical Engineering II (7cp)

*Category B students (those who gained admission other than from the HSC) enrol in the subject 52001 History of Ideas instead of Engineering Practice and Engineering Discovery.

Stage 3	
45143	Computer Hardware (3cp)
45133	Software Engineering I (3cp)
45135	Engineering Communications (3cp)
33310	Engineering Mathematics III (6cp)
45134	Network Theory (7cp)

Stage 4	
45144	Electronic Devices and Circuits (7cp)
45145	Engineering Statistics (3cp)
45163	Real Time Software and Interfacing (3cp)
45141	Continuous and Discrete Systems (7cp)
45342	Electromechanical Systems (3cp)

Stage 5	
45353	Operating Systems (6cp)
45151	Signal Theory I (4cp)
45364	Digital Systems (3cp)
45153	Analogue Electronics (6cp)
45155	Project A (3cp)
45363	Software Engineering II (3cp)

Stage 6	
45154	Contextual Studies (4cp)
45152	Signal Theory II (3cp)
45166	Project Management (4cp)
45665	Data Communications (3cp)
45372	Computer Systems Analysis (3cp)
45562	Data Acquisition and Distribution Systems (6cp)
31141	Database Structures and Management (3cp)

Stage 7	
45661	Communications Networks (3cp)
46701	Robotics and Flexible Manufacturing (3cp)
45265	Numerical Methods (3cp)
45182	Thesis I (3cp)
45176	Systems Engineering (4cp)
45732	Computer Systems Analysis (3cp)
45387	Project B (CSE) (3cp)
31163	Knowledge-Based Systems (3cp)

Stage 8	
45381	Computer-Aided Engineering (3cp)
45382	Computer Systems Design (3cp)
45183	Thesis II (8cp)
	Professional Electives (6cp)
	Social Science Elective (3cp)

Part-time Attendance Pattern

Stage 1	
Autumn semester	
33110	Engineering Mathematics I (6cp)
33100	Discrete Mathematics (3cp)
45113	Digital Techniques (3cp)
45115	Engineering Practice* (3cp)
Spring semester	
63113	Engineering Physics I (6cp)
45116	Electrical Engineering I (4cp)
45123	Fundamentals of Computing (4cp)
45125	Engineering Discovery* (3cp)

Stage 2	
Autumn semester	
33210	Engineering Mathematics II (6cp)
63123	Engineering Physics II (3cp)
63734	Materials Technology (3cp)
Spring semester	
45124	Electrical Engineering II (7cp)
45143	Computer Hardware (3cp)
45133	Software Engineering I (3cp)
45135	Engineering Communications (3cp)

Stage 3	
Autumn semester	
33310	Engineering Mathematics III (6cp)
45134	Network Theory (7cp)
Spring semester	
45144	Electronic Devices and Circuits (7cp)
45145	Engineering Statistics (3cp)
45342	Electromechanical Systems (3cp)

* Category B students (those who gained admission other than from the HSC) enrol in the subject 52001 History of Ideas instead of Engineering Practice and Engineering Discovery.

Stage 4

Autumn semester

45141 Continuous and Discrete Systems (7cp)
45163 Real Time Software and Interfacing (3cp)
45151 Signal Theory I (4cp)
45154 Contextual Studies (4cp)

Spring semester

45153 Analogue Electronics (6cp)
45353 Operating Systems (6cp)
45155 Project A (3cp)

Stage 5

Autumn semester

45152 Signal Theory II (3cp)
45364 Digital Systems (3cp)
45363 Software Engineering II (3cp)
45166 Project Management (4cp)

Spring semester

45665 Data Communications (3cp)
45562 Data Acquisition and Distribution Systems (6cp)
31141 Database Structures and Management (3cp)

Stage 6

Autumn semester

45661 Communication Networks (3cp)
45372 Computer Systems Analysis (3cp)
46701 Robotics and Flexible Manufacturing (3cp)
45265 Numerical Methods (3cp)
Social Science Elective

Spring semester

31163 Knowledge-Based Systems (3cp)
Elective
Elective
45176 Systems Engineering (4cp)
45387 Project B (CSE) (3cp)

Stage 7

45381 Computer-Aided Engineering (3cp)
45382 Computer Systems Design (3cp)
45183 Thesis II (8cp)

* Industrial Experience, 45997 (Sandwich) and 45999 (Part-time) to be undertaken in accordance with the faculty's Industrial Experience Rules.

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 2432.

	Room	Ext
Head of School		
Professor K W Yates Communication System Theory, Signal Processing, Digital Radio Transmission and Multiple Access, Spread Spectrum Communications	2427	2436
General Office		
Enquiries	2424	2432
Academic Staff		
Mr T Aubrey Analogue Electronics, Communication Systems, Microwave Electronics.	2019	2359
Associate Professor G E Beard Satellite Communication Systems, UHF, VHF and Microwave Electronics, Electrical Instrumentation, Analogue Electronics	2419B	2413
Professor W R Belcher Antennas, Microwave Systems, Communication Systems, Systems Engineering, Computer-Aided Engineering	2419C	2423
Associate Professor P Bryce Microhydroelectricity, Appropriate Technology, Fibre Optic Communications, Electromagnetic Theory	2420A	2425
Associate Professor T Buczkowska Microcomputer System Design, Software Engineering, Computer Networks, Data Communications	2542	2458
Dr J D Carmo Electromagnetics, Reliability Theory, Numerical Methods and Optimisation	1921	2338
Mr N H Carmody Microcomputer System Design, Operating Systems, Computer Architecture, VLSI, Digital Control Systems	2221C	2391
Professor C Drane Satellite Positioning Systems, Multimedia Telecommunications, Software Engineering	2221B	2390
Mr K K Fung Parallel Processing, Software Engineering	2225	2394

Mr G I Gedgovd 2420E 2429
Power Systems, Computer Applications, Operations Research, Numerical Methods and Optimisation, Education Research and Cooperative Education

Dr A Ginige 2224B 2393
Digital Systems, Systems Engineering, Image Processing Real Time Systems, Computer Networks, Rehabilitation Engineering

Ms T Ginige 2323B 1911
Telecommunications

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

Dr S Y R Hui 2420D 2428
Power Electronics, Computer Modelling, Electrical Machines

Mr J R M Leaney 2221A 2389
System Engineering, Software Engineering, Computer System Design, Real Time Computing, Microprocessor Based Instrumentation, Industrial Control

Mr P G Lewis 2420C 2431
Professional Development, Engineering Education

Ms V McKain 2433 2443
Biomedical Engineering

Mr P McLean 1921 2339
Power Systems

Dr R Meegoda 2227 2396
CASE Tools and Expert Systems, Communications and Protocol Design, CSI, MAP, TOP, Computer Integrated Manufacture and Robotics, CAD/CAM, Control Systems

Mr S Murray 2520A 1553
Computer Hardware

Associate Professor H T Nguyen 2517 2451
Control Systems Theory, Power Electronics, Control Theory, Instrumentation, Machine Control, Production Processes, Real Time Signal Processing, Computer Simulation, Computer Systems

Dr J G Nicol 2431 2370
Control Theory, Optimal Control, Multi-variable Control

Associate Professor C E Peterson 2220A 2392
Computer Integrated Manufacturing, Image Analysis, Process Control, Robotics, Artificial Intelligence

Dr V Ramaswamy 2417A 2418
Power Electronics, Electrical Machines, Computer Systems

Associate Professor V S Ramsden 2417C 2420
Electrical Machines, Electrical Variable Speed Drives, Rehabilitation Engineering, Field Theory, Electromagnetics

Associate Professor S Riesenfeld 2512B 2448
Communication Systems, Satellite Communication, Information Theory, Modulation Channel Coding, Synchronisation

Dr B S Rodanski 2420 2426
Device Modelling for CAD, Numerical Methods, Computer-Aided Design, Software Engineering

Dr A M Sanagavarapu 2512A 2447
Electromagnetic Compatibility, Antennas

Dr A Seneviratne 2431 2441
Data Communications, Protocol Design, Software Engineering Computer Networks

Dr D Sharma 2419C 2422
Energy Economics, Planning and Policy, Energy Management, Decision Process Modelling, Institutional Restructuring Project Planning and Performance

Mr T Stevenson 2545 2460
Signal Processing, Communication Systems, Electromagnetics

Ms E Taylor 2432 2442
Sociology and Engineering, Engineering Education, Appropriate Technology, Law and Engineering

Dr P J White 2315 2401
Antennas and Propagation, Microwave and RF Circuit Design, Analogue Electronics

Industrial Training Advisers
Dr D Sharma
Mr P G Lewis
Ms E Taylor

Selected Support Staff
Mrs E With 2423 2432
Student Administration

Mr W A Symons 2210B 2379
Vax Computer Manager

Mr R Jelliffe Research Computing Centre Manager	2020	2355
Mr J B Vagg Laboratory Manager	2430	2440
Mr P D Cooper Engineer (Telecommunications)	2324	2414
Mr W M Holliday Engineering (P&M)	1814	2315
Mr P Mallon Engineer (CSE)	2210C	2380
Mr R Nicholson Engineer (Instrumentation and Control)	2118	2369
Mr A J Boswell Senior Technical Officer, Power and Machines	2212	2382
Mr A C Curgenven Senior Technical Officer, Power and Machines	2021	2364
Mr G Evans Senior Technical Officer, Communications	2313	2398
Mr S Y Shoon Engineer	2520C	2454
Mr L Weber Senior Technical Officer, Instrumentation and Control	2520D	2455
Mr R Moore Senior Technical Officer, Mechanical Workshop	2033	2366

SCHOOL OF MECHANICAL ENGINEERING

The School offers Bachelor degrees in Mechanical and Manufacturing Engineering.

Mechanical engineers are responsible for the design, manufacture, development, installation, testing, control and maintenance of machinery. They provide technical input and management for a wide range of industrial projects and processes, including power generation and transport. 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 Engineering includes the design, development and optimisation of both product and process technology. This involves interacting with other professionals, including market researchers and industrial designers.

The courses in Mechanical and Manufacturing Engineering provides 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 skills are also important. The need for sensitivity to the social, economic and environmental context of engineering is incorporated in subjects throughout the courses.

BACHELOR OF ENGINEERING IN MECHANICAL ENGINEERING and BACHELOR OF ENGINEERING IN MANUFACTURING ENGINEERING

Credit point values are shown in brackets.

Sandwich Attendance Pattern

Stage 1	
33121	Engineering Mathematics IA (3cp)
46110	Mechanics I (6cp)
46310	Introduction to Engineering (3cp)
46311	Engineering Graphics (3cp)
46810	Introduction to Computing (3cp)
62178	Engineering Chemistry (6cp)

Stage 2	
33122	Engineering Mathematics IB (3cp)
46111	Mechanics 2 (4cp)
46712	Manufacturing Processes IA (3cp)
46713	Manufacturing Processes IB (2cp)
46811	Computer Programming (4cp)
63117	Engineering Physics (Mechanical) (4cp)
63704	Materials Engineering I (4cp)

Stage 3	
33221	Engineering Mathematics IIA (3cp)
46120	Mechanics 3 (4cp)
46220	Solid Mechanics I (5cp)
46420	Fluid Mechanics (4cp)
46620	Engineering Communication (4cp)
63127	Electrical Engineering I (Mechanical) (4cp)

Stage 4	
33222	Engineering Mathematics IIB (3cp)
46121	Mechanics of Machines (4cp)
46320	Design I (4cp)
46421	Thermodynamics (5cp)
46722	Manufacturing Processes IIA (3cp)
46723	Manufacturing Processes IIB (2cp)
46820	Engineering Statistics (3cp)

Stage 5	
45931	Electrical Engineering II (Mechanical) (4cp)
46130	Dynamics of Mechanical Systems (4cp)
46230	Solid Mechanics II (4cp)
46430	Thermofluids (4cp)
46630	Engineering and Society (4cp)
46830	Numerical Analysis (4cp)

Stage 6	
63741	Materials Engineering II (4cp)
46330	Computer-Aided Drafting and Design (5cp)
46431	Heat Transfer (4cp)
46530	Measurement and Instrumentation (4cp)
46531	Control Engineering I (4cp)
46631	Engineering Management (3cp)
During an industrial experience period	
46990	Industrial Review (3cp)

Stage 7	
46030	Project I (2cp)
46332	Design II (3cp)
46991	Professional Review (3cp)
	Humanities Elective (3cp)
	Professional Elective 1 ** (3cp)
	Professional Elective 2 (3cp)
	Professional Elective 3 (3cp)

Stage 8	
46033	Project A (6cp)
46034	Project B (6cp)
46333	Design III (3cp)
	Professional Elective 4 (3cp)
	Professional Elective 5 (3cp)
46641	Commercial Issues for Engineers (3cp)

Part-time Attendance Pattern

Stage 1	
Autumn semester	
46110	Mechanics I (6cp)
33121	Engineering Mathematics IA (3cp)
46310	Introduction to Engineering (3cp)
46810	Introduction to Computing (3cp)
Spring semester	
62178	Engineering Chemistry (6cp)
46311	Engineering Graphics (3cp)
63117	Engineering Physics (Mechanical) (4cp)

Stage 2	
Autumn semester	
46111	Mechanics II (4cp)
33122	Engineering Mathematics IB (3cp)
46712	Manufacturing Processes IA (3cp)
63704	Materials Engineering I (4cp)
Spring semester	
46220	Solid Mechanics I (5cp)
46811	Computer Programming (4cp)
46713	Manufacturing Processes IB (2cp)
63127	Electrical Engineering I (Mechanical) (4cp)

Stage 3	
Autumn semester	
46120	Mechanics III (4cp)
46420	Fluid Mechanics (4cp)
46722	Manufacturing Processes IIA (3cp)
46620	Engineering Communication (4cp)
Spring semester	
46421	Thermodynamics (5cp)
33221	Engineering Mathematics IIA (3cp)
46723	Manufacturing Processes IIB (2cp)
46320	Design I (4cp)

Stage 4	
Autumn semester	
46121	Mechanics of Machines (4cp)
33222	Engineering Mathematics IIB (3cp)
46820	Engineering Statistics (3cp)
46630	Engineering and Society (4cp)
Spring semester	
46230	Solid Mechanics II (4cp)
46830	Numerical Analysis (4cp)
46330	Computer-Aided Drafting and Design (5cp)

Stage 5

Autumn semester

46130 Dynamics of Mechanical Systems (4cp)
46430 Thermofluids (4cp)
45931 Electrical Engineering II (Mechanical) (4cp)

Spring semester

46431 Heat Transfer (4cp)
46531 Control Engineering I (4cp)
46631 Engineering Management (3cp)
46990 Industrial Review (3cp)

Stage 6

Autumn semester

46530 Measurement and Instrumentation (4cp)
63741 Materials Engineering II (4cp)
Professional Elective 1** (3cp)
Humanities Elective (3cp)

Spring semester

46030 Project I (2cp)
Professional Elective 2(3cp)
46991 Professional Review (3cp)
46332 Design II (3cp)

Stage 7

Autumn semester

46033 Project A (6cp)
Professional Elective 3(3cp)
46641 Commercial Issues for Engineering (3cp)
46333 Design III (3cp)

Spring semester

46034 Project B (6cp)
Professional Elective 4 (3cp)
Professional Elective 5 (3cp)

*Industrial Experience, 46997 (Sandwich) and 46999 (Part-time) to be undertaken in accordance with the faculty's Industrial Experience Rules,

**Professional electives are chosen from the subjects listed below.

PROFESSIONAL ELECTIVE SUBJECTS

Manufacturing and Management

46640 Terotechnology (3cp)
46642 Engineering Economics (3cp)
46740 Quality And Reliability (3cp)
46741 Flexible Manufacturing (3cp)
46742 Production and Cost Control (3cp)
46743 Work Study (3cp)
46744 Computer-Aided Manufacturing (3cp)

Applied Mechanics and Design

46140 Kinematics and Dynamics of Machines (3cp)
46141 Applied Dynamics (3cp)
46142 Robotics (3cp)
46143 Einstein's Universe (3cp)
46240 Solid Mechanics III (3cp)
46241 Finite Element Applications (3cp)
46340 Structures (3cp)
46341 Machine Design (3cp)
46342 Unitised Load Handling (3cp)
46343 Appropriate Technology (3cp)
46344 Engineering Speculation (3cp)
46345 Industrial Design (3cp)
46346 Bulk Materials Handling (3cp)

Energy and Control

46441 Combustion and Air Pollution (3cp)
46442 Advanced Fluid Dynamics (3cp)
46443 Refrigeration and Air-Conditioning (3cp)
46444 Power Cycles (3cp)
46445 Fluid Machines (3cp)
46540 Programmable Controllers (3cp)
46541 Control Engineering II (3cp)
46542 Process Control (3cp)
46840 Advanced Engineering Computing (3cp)
46841 Operations Research (3cp)
46842 Microprocessors (3cp)

Ungrouped

46040 Ergonomics (3cp)
62174 Corrosion Technology for Engineers (3cp)
91379 Environmental Science for Engineers (3cp)

Students selecting elective subjects from the following list, except where approved in writing on an individual basis by the Head of School, may graduate in Manufacturing Engineering, otherwise students graduate in Mechanical Engineering.

46640 Terotechnology
46642 Engineering Economics
46740 Quality and Reliability
46741 Flexible Manufacturing
46742 Production and Cost Control
46744 Computer-Aided Manufacturing
46142 Robotics
46342 Unitised Load Handling
46346 Bulk Materials Handling
46345 Industrial Design
46540 Programmable Controllers
46541 Control Engineering II
46840 Advanced Engineering Computing
46841 Operations Research
46842 Microprocessors
46040 Ergonomics

The humanities elective is chosen from subjects offered by the Faculty of Business or the Faculty of Social Sciences.

BACHELOR OF TECHNOLOGY IN MANUFACTURING ENGINEERING

The Bachelor of Technology in Manufacturing Engineering, abbreviated as BTech (Mfg Eng), is now offered through the Faculty of Engineering. This 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.

Stage 1	
65025	Chemistry (4cp)
48011	Computing for Manufacturing and Management (4cp)
48010	Introduction to Manufacturing (4cp)
Stage 2	
48022	Materials for Manufacturing (4cp)
48021	Numerical Methods (4cp)
48020	Communication in Manufacturing and Management (4cp)
Stage 3*	
48032	Financial Planning for Manufacturing (4cp)
48031	Computer-Aided Drawing and Design (4cp)
48030	The Industrial Environment (4cp)
Stage 4*	
24221	Principles of Marketing (4cp)
48041	Computer-Aided Manufacturing (4cp)
48040	Management for Manufacturing (4cp)
Stage 5*	
48053	Technological Change and Strategic Planning (3cp)
48052	Professional Review (3cp)
48051	Metrology and Inspection (3cp)
48050	Engineering Documentation (3cp)
Stage 6*	
79370	Law and Contracts for Manufacturing (3cp)
48062	Terotechnology (3cp)
48061	Design for Manufacture (3cp)
48060	Quality for Manufacturing (3cp)

* Stages 3-6 subject to final approval.

Enquiries: General enquiries can be made by phone during office hours on (02) 330 2666.

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 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 ext 2669.

	Room	Ext
Head of School		
Mr S F Johnston Design, Ergonomics, Social Context of Technology	612B	2668
Professor of Mechanical Engineering		429B
2603		
Prof J P Gostelow Turbomachinery, Gas Turbines, Fluid Mechanics, Innovation	627	2685
James N Kirby Professor of Manufacturing Engineering		
Prof F B Swinkels Design for Manufacturing, Materials, Computer-Aided Design and Computer-Aided Manufacturing	416	2588
Assoc Prof S L Hall Combustion, Acoustics, Instrumentation, Aero/Thermodynamics, Technology/Education Policy	608	2662
Assoc Prof C T Mathews Control Engineering, Industrial Instrumentation Energy Resources, Technical Change, Engineering Management, Engineering Education	628	2686
Assoc Prof R M Spencer Production Planning and Control, Product Process Design and Development, Computer-Aided Manufacture, Metrology/CMM, Robotics	606	2667
Dr Y P Bhasin Operations Management, Work Study, Planning and Control, Engineering Economics, Quality and Reliability, Manufacturing Processes	605	2659
Mr A J Burfitt Stress Analysis, Photoelasticity, Design	630	2689
Dr K S Chan Applied Mechanics, Design, Materials Handling, Air-conditioning and Refrigeration	604	2658
Dr G Hong Turbulence Transition, Internal Combustion Engines, Thermodynamics, Engineering Statistics	619	2667

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
Mrs H McGregor Human Communication, Engineering and Social Issues, Cooperative Education, Engineering Documentation Education and Professional Development	620	2678
Mr L E Reece Turbomachinery, Thermofluids, Ergonomics, Philosophy of Technology	613	2673
Dr F C O Sticher Advanced Kinematics Dynamics, Instrumentation	623	2681
Mr K A Stillman Control Engineering, Chemical Engineering, Real Time Computing, Simulation, Optimisation	624	2682
Mr R B Ward Management, Technical Communication, Maintenance Hazard and Risk	621	2679
Mr H G R Wiedemann Materials, Hydraulic and Pneumatic Transport of Solids, Machine Design, CAD/CAM	614	2674
Mr R M Wiltshire Stress Analysis, Structural and Vehicle Dynamics, Machine Design, Computer-Aided Engineering	609	2663
Support Staff		
Mrs S Tanuwidjaja Executive Officer	612	2671
Mrs C Lew Administrative Assistant	612	2670
Mrs K Johnston Administrative Assistant	612	
Mr J J McCaffrey Engineer	323C	2558
Mr K W Bowyer Engineer	602	2656
Mr K C Barnes Engineering	603	2657
Mr A Revel Engineer	301A	2550
Mr P H Alt Assistant Laboratory Manager	313A	2569
Mr T Bayfield Assistant Laboratory Manager	649A	2691
Mr C E Evans Senior Technical Officer	212B	2544
Mr C Chapman Professional Officer	318A	2561
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 Craftsman	212	2545
Mr S M Gordon Senior Laboratory Craftsman	212	2546
Mr T E Wells Senior Laboratory Craftsman	253	1026
Mr J R Grove Workshop Supervisor	253B	1026
Mr L Stonard Senior Laboratory Craftsman	253	1026
Mr L Slade Senior Laboratory Craftsman	253	1026
Mr T Newton Stores Officer	205B	2535

POSTGRADUATE COURSES

The Faculty of Engineering offers the degree of Doctor of Philosophy (PhD) and a number of programs which lead to the degree of Master of Engineering. A Masters degree by coursework is available in Engineering Management on a three year part-time attendance pattern. A Masters degree by coursework and a Graduate Diploma are available in Local Government; these are joint courses of the Faculties of Engineering and Business. A Master of Engineering in Telecommunications/Engineering is offered on a full-time or part-time attendance pattern. Each School within the faculty also offers opportunities to undertake research work leading to the degree of Master of Engineering by thesis.

The PhD and Master of Engineering in Groundwater Management and the Graduate Diploma in Groundwater Management are offered through the National Centre for Groundwater Management, which operates jointly with the Faculty of Science.

In addition, the faculty offers a Graduate Diploma in Engineering available over one year full-time or two years part-time. The School of Civil Engineering offers a Graduate Diploma in Local Government Engineering available on a two-year block release pattern of attendance.

GENERAL INFORMATION

Semester Patterns

The academic year of the university is divided into two semesters: Autumn (March - June) and Spring (August - December).

Most courses have their major intake in March at the start of the academic year, and details of the relevant closing dates are given in the section *Principal Dates for 1993*.

A few places may be available for postgraduates in the second semester beginning in August. Potential applicants should contact the faculty Graduate Studies Officer, Ms Beate Buckenmaier on 330 2606, in April for initial advice.

Attendance and academic credit

Class attendance requirements vary with the courses. The actual weekly contact hours for a subject are denoted by semester hours – the hours of attendance per week for one semester.

Each subject also has a credit point rating denoting its academic value towards the award, as does research or project work not requiring regular class attendance.

DURATION OF COURSES

Graduate Diploma courses are of two years' duration on a part-time basis and one year's duration on a full-time basis. Both attendance patterns are not necessarily available every year. Classes in most subjects are available in the evening as well as during the day, in one of the two semesters. In some cases, however, it is necessary for part-time students to attend the university one afternoon a week.

Masters Degree programs by research and thesis are normally 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 program in a shorter time.

Masters Degree programs by coursework are normally of three semesters duration on a full-time basis or five or six semesters part-time.

PhD programs are normally a minimum of three years' duration on a part-time basis and two years' duration on a full-time basis if the candidate holds a Masters degree, or four years part-time, and three years full-time for candidates with a Bachelor degree.

The faculty also offers a number of short Continuing Professional Education courses, which do not lead to formal awards. Information on these is available separately.

APPLICATION FOR ADMISSION

Intending postgraduate students must lodge an application for admission with the UTS Student Information Service by the dates indicated below. An application form can be obtained from the UTS Student Information Service, level 4 of Building 1 (the Tower Building), 15-73 Broadway, or by writing to the Academic Registrar, UTS, PO Box 123, Broadway NSW 2007, Australia, or by telephoning (02) 330 1990.

English Proficiency

Applicants must comply with the unit's English language proficiency requirements. Details are given in the General Information section on Admission.

Documentation

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

Applicants with overseas qualifications are advised to contact the UTS Student 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
> Tel (06) 264 1111

As the processing of a NOOSR assessment may take some weeks, applicants are advised to contact the UTS Information Service well before the closing date of 29 October 1993 for assessment advice.

Closing date for Autumn semester 1994 is Friday 29 October 1993.

All applicants 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.

Applications for Doctor of Philosophy and Masters Degree by Thesis
In general, applications for most Doctoral and Masters (by thesis) programs will be accepted at any time and a decision advised as soon as possible. There is no firm closing date for these applications. However, as processing can sometimes be quite lengthy, applicants are advised to apply well in advance of the time they hope to commence their research. Please refer also to detailed information on these courses, below.

Late applications
Late applications may be accepted for some postgraduate courses after the closing date. Applicants should contact the UTS Student Information Service to check which courses are still being offered.

The following conditions apply to all late applicants:

> A non-refundable late application fee will be charged;
> Subject to available class places, late applicants will be considered for offers only after on-time applications have been considered;
> The nominal closing date for late applications is 31 January. However, the university reserves the right to close late applications at any time for any course without prior notice.

Result of Application
Applicants who apply by the appropriate closing dates will be advised of the outcome of their applications by mail in late December 1993 - January 1994.

Exemptions/credit by substitution
In certain courses, exemption from particular subjects, or credit by substitution, may be granted on the basis of prior studies. Candidates intending to apply for exemption or credit by substitution should submit an Application for Subject Exemption with their application for admission to the course. Such an application should be accompanied by outlines of the subjects or courses previously undertaken, on the basis of which exemption or credit by substitution is sought. A photocopy from the relevant course handbook will suffice.

Application for subject exemption forms are available from the UTS Student Information Service, Level 4, Tower Building. Further information is available from the faculty Graduate Studies Officer, Ms Beate Buckenmaier, on (02) 330 2606.

The current exemptions/credit by substitution policies are as follows:

Master of Engineering Management and Graduate Diploma in Local Government Engineering There will be no exemption or credit by substitution on the basis of prior studies at undergraduate level.

Where students have completed postgraduate subjects equivalent to those in this course, they may be granted exemptions up to a maximum of half the course less one subject.

Where students have gained expertise in a subject by taking appropriate courses in the past, a subject in lieu may be granted. The student will be required to gain agreement from both the relevant subject coordinator and the Director of the course on the question of expertise, and to agree with the Director a suitable subject in lieu.

Other programs Exemptions or credit by substitution are not normally available.

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

Block release students in the Graduate Diploma in Local Government usually complete formal enrolment procedures during their first period of block release at UTS.

Enrolment for Doctoral and Masters programs (by thesis) for those who do not apply in the normal admission period is by arrangement with the Graduate Studies Officer of the university.

Deferment of Enrolment
Deferment of enrolment is not allowed for postgraduate courses.

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 not normally granted for a total period exceeding two years.

Fees and Charges
All students are required to pay compulsory student fees/charges at enrolment*. Currently, these fees/charges are as follows:

Students' Association	$A43.00
UTS Union (General Fee)	$A150.00
UTS Union (Entrance Fee) (non-refundable)	$A20.00
Student Accommodation Levy	$A42.00
Student Identification Card charge (non-refundable)	$A4.00
TOTAL	*$A259.00

*Compulsory student fees/charges are subject to revision.

Students will be exempt from union fees if they are able to 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 (02) 330 1990.

In addition to the above charges, most 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.

In 1992 Graduate Diploma in Engineering students were liable for HECS charges of approximately $250 per subject. Master of Engineering Management, Master of Engineering in Telecommunications Engineering and Graduate Diploma in Local Government Engineering students paid a postgraduate course fee of $425 per subject. Master of Local Government students paid a postgraduate course fee of $550 per subject. These were in lieu of the HECS charge. The corresponding figures for 1993 have not yet been determined.

Full information on fees is included with offers of admission, or may be obtained in advance from the UTS Student Information Service, Level 4, Tower Building, Broadway.

INFORMATION FOR FEE-PAYING OVERSEAS APPLICANTS

This section should be read in conjunction with the section on International Students Program, above.

Students from countries outside Australia are able to enrol in certain full-time postgraduate programs at UTS on a fee-paying basis.

Fees for courses offered to fee paying overseas students in 1993 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 (02) 330 1990.

SCHOLARSHIPS

Students undertaking Graduate Diploma 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 Masters or PhD degree may be eligible for a scholarship at UTS. Scholarships available are listed below:

Scholarships for research programs
Australian Postgraduate Research Award
Australian Postgraduate Research Award (Industry)
University Doctoral Research Scholarship
R L Werner Postgraduate Research Scholarship

Scholarships for coursework programs
Australian Postgraduate Course Award

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, Tower Building.

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 a separate publication dealing exclusively with Scholarships. Interested students should contact the Postgraduate Studies and Scholarships Office, level 5, Tower Building on (02) 330 1990.

ASSOCIATED CENTRES AND SCHOOLS

The Faculty of Engineering is also associated with several major Centres in the university, which offer research opportunities in engineering and related fields. Four of these are:

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; groundwater geophysics and remote sensing; and hydraulic modelling with applications such as irrigation management. Enquiries:

> Associate Professor M J Knight
> Director, National Centre for Groundwater Management
> Room 2/525,
> UTS Broadway
> Tel 330 1984

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). Enquiries should be directed to

> Associate Professor Kevin Sproats
> Director, Centre for Local Government Education and Research
> Room 1/1714
> UTS Broadway
> Tel 330 2643

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

Centre for Materials Technology Enquiries should be made to the Faculty of Science.

Australian Graduate School of Engineering Innovation is a national Advanced Engineering Centre promoting an engineering culture which brings together technology, management and marketing, with an overall focus on wealth creation and the introduction of a more effective process of engineering innovation into Australian industry.

AGSEI has been formed jointly by the University of Sydney and the University of Technology, Sydney and is located separately from both of them. It will have a number of industry partners, and all its programs will be strongly interactive with industry.

Its objectives are:

> To ensure that today's engineers, as well as those of tomorrow, are better equipped to take leadership roles in assuring the success of industrial enterprises.
> To educate engineers and others to think and contribute across disciplines in a corporate environment.
> To demonstrate the central role of innovation in achieving competitive advantage.
> To provide industry with convenient access to national and international best practice in engineering management and the application of technology.
> To enhance the capability to commercialise new technology and the results of research and development.
> To foster the creation of new industry through technology transfer and the introduction of appropriate management systems.
> To raise understanding in the professions and society of the role of industry, technology and engineering in the creation of national wealth.
> To educate engineers to understand and contribute to enterprise management, and to educate executive managements to understand and utilise their engineering capability more effectively.

Students Initially programs are being structured for engineers and other professionals who have been in industry for two or three years after completing their Bachelor degree. It is expected that programs will be developed for undergraduate courses.

The programs AGSEI offers an array of courses based on Engineering Management, Engineering Innovation, and Industrial Systems Engineering.

The programs cover topics in quality; innovation; technology; systems engineering; information technology and management; computer-aided engineering and logistic support; human resources and change management; professional and business ethics; design and documentation; manufacturing; government; economics; marketing; finance; law.

The approach taken is distinctly different from that of MBA programs, which teach generic management. AGSEI builds specifically on the capability of *engineers*, and is wholly about organisation and application of engineering effort to innovation and business performance – *total engineering*, not total management.

Modules The basic program element is the module, typically offered over one week and involving intensive material presentation plus workshop and project sessions. Subject to approval by the Academic Boards of the two sponsoring universities, it is expected that modules may be aggregated, by those who wish to do so, to lead to formal awards at several levels such as Graduate Certificate or Masters Degree.

Modules will have the following characteristics:

> all modules will be available in stand-alone form, designed expressly to meet the needs of engineers and engineering enterprises;
> all programs require the course content to be tested in industry, with advice from AGSEI staff, and (where possible) the results to be

reported and discussed in workshop session;
heavy use is made of industry-based project work;
wherever possible, modules involve group interaction, normally multi-disciplinary. AGSEI acts not only as a teaching and advisory resource but as a framework in which participants (engineers and other professionals who deal with engineers) learn from each other and from inter-organisation contacts.

More detailed information may be obtained from the Faculty of Engineering offices of the two sponsoring universities.

DOCTOR OF PHILOSOPHY

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.

Further details of the requirements are given in the Rules relating to Doctoral Degree Students, set out in full in the University Calendar.

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, and it is intended that this will continue to grow rapidly.

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.

Entry Requirements

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

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

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 Masters degree and six semesters for a holder of a Bachelor degree. For part-time candidates, the program is normally of at least six semesters' duration for the holder of a Masters degree and eight semesters for the holder of a Bachelor degree.

Applications

In addition to the completed application form and supporting documentation, applicants must submit a covering letter indicating (a) why they wish to undertake the program and (b) the names, addresses and phone numbers of two professional referees. The application and/or the letter must indicate (c) the proposed research topic and (d) the name of a member of academic staff with whom the topic has been discussed and who is willing to supervise the candidate's work; and should also include (e) any evidence of ability to conduct research and to complete a substantial project.

For part-time candidature, the applicant 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 should not be lodged until the intending candidate has made suitable enquiries 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

Research programs based in the major sub-disciplines of engineering are accommodated within one or more of the faculty's long-established Schools:

Civil Engineering (incorporating Structural Engineering)
Electrical Engineering (incorporating Computer Systems Engineering)
Mechanical Engineering (incorporating Manufacturing Engineering).

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 support staff. Many opportunities exist for interesting and challenging research programs.

Most intending PhD candidates will be able to classify their area of research interest as falling primarily within one of these Schools, and should contact the relevant School directly to discuss their application.

In addition, the faculty has established a ***Graduate School of Engineering.*** In early 1993 the School will operate in planning mode only, while the scope of its programs and its substantive mode of operation are determined. It may be anticipated that a major emphasis will be on programs and research topics that are generic to engineering as a discipline (rather than to the fields of application represented by the three existing Schools); those that are essentially multi-disciplinary in nature but with an essential engineering involvement; and those which focus on the practice and management of engineering. As one example, candidates who wish to pursue research in engineering management will probably be accommodated through the Graduate School. Further details will be published as they become available.

A brief summary follows of research interests and opportunities in the three current Schools.

School of Civil Engineering Engineering materials, soils and foundation engineering, water engineering, road materials, public health engineering, local government engineering, structural analysis and design, timber engineering, prestressed and reinforced concrete, steel structures, environmental engineering, engineering construction and project management, FEM and computer applications, concrete technology, regional planning, road and transportation engineering.

School of Electrical Engineering Image processing, intelligent networks, video conferencing, ATM networks, protocol engineering, network management, digital transmission, multiple access schemes, spread spectrum communication, neural networks, information theory as applied to position fixing systems, software engineering, industrial applications of microwaves, microwave circuit design, antennas, digital signal processing in communications, digital systems design, electrical machines and industrial drives, power electronics, instrumentation and data acquisition systems, microhydroelectric control and instrumentation, power systems analysis, adaptive multi-variable control, data encryption, speech and image coding, multi-media distributed data bases, biomedical engineering.

School of Mechanical Engineering Advanced design, air-conditioning, dynamics, biomedical engineering, energy conservation, engineering management, environmental protection, control engineering, fluid dynamics, heat transfer, machine tools, computer aids to manufacturing, computer-aided design and manufacture, robotics, stress analysis, fuels and combustion processes, technology for development, turbomachinery, viscoelastic materials.

Enquiries

Initial enquiries may be made with the faculty Graduate Studies Officer, Ms Beate Buckenmaier on (02) 330 2606.

Academic enquiries, such as the selection of an appropriate research topic, should be directed to the relevant Schools, as follows:

Civil Engineering
Dr S Parsanejad
Room 2/504, tel 330 2620

Electrial Engineering
Associate Professor T Buczkowska
Room 1/2542, telephone: 330 2458
Mr Terry Stevenson
Room 1/2545, tel 330 2460

Mechanical Engineering
Mr S F Johnston
Head of School
Room 2/612B, tel 330 2668

Graduate School of Engineering
Professor W R Belcher
Room 1/2419C, tel 330 2423

MASTER OF ENGINEERING (BY THESIS)

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 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.

Entry Requirements

To qualify for admission to candidature for Masters 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 Masters Degree (by thesis) may be admitted as Masters Qualifying Students, for the purpose of preparing for full candidature.

Further details are given in the Rules relating to Masters Degree by Thesis Students, set out in full in the University Calendar.

Duration and Candidature

Candidature may be on a full-time, part-time or external 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 Masters Degree candidate. For part-time or external 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 normal minimum time.

Applications and Research Areas

Please refer to the corresponding sections under *Doctor of Philosophy*, which apply identically to Master of Engineering (by thesis).

Enquiries

Initial enquiries should be made with the faculty Graduate Studies Officer by telephoning (02) 330 2606. Academic enquiries, such as the selection of an appropriate research topic, should be directed to the relevant Schools (see above).

MASTER OF ENGINEERING MANAGEMENT

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

The program provides opportunity for engineers who seek career prospects in engineering management to undertake a formal course of relevant study at the Masters 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.

The Master of Engineering Management aims to equip its graduates with the ability to formulate technical strategies and successfully deal with the human aspects, organisation issues, project considerations and resource allocations at all phases of the life cycle of technical activities. It enhances skills for the comprehensive treatment of issues at the decision-making level, and focuses on the management of basic and applied research; of development and design; of operations/construction /manufacturing; of technology transfer; and of maintenance.

The course consists of eight core subjects and either a project or four electives.

Duration

The course requires 72 credit points of study. The program is structured for part-time attendance and is scheduled for two evening sessions per week for three years. An occasional attendance may be required outside the normal evening session times.

Overseas Students

The 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. The cost in 1992 was A$12,000 per annum or A$6,000 per semester.

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 program, a detailed *curriculum vitae* including the names, phone numbers and addresses of two professional referees and a statement indicating the level of their employer's support for the application.

Enquiries

Initial enquiries and expressions of interest in admission to this course can be made by telephoning the faculty Graduate Studies Officer, Ms Beate Buckenmaier on (02) 330 2606.

Course Structure

All subjects have a credit point value of six.

Stage 1	
43811	Economics for Engineers
21718	Organisation Analysis and Design
Stage 2	
42812	Technological Change
44802	Management Decisions
Stage 3	
22726	Accounting and Financial Administration
43833	Project Management
Stage 4	
21719	Organisational Behaviour
41823	Systems Engineering and Decision Modelling
Stage 5/6	
Electives:	4 subjects chosen from the following:
79737	Engineering Law
21779	Management Skills
24734	Managerial Marketing
25742	Financial Management
21720	Employment Relations
21728	Public Sector Management
21741	Operations Management
(one other graduate subject may be substituted for one of the above electives by agreement)	
	or
44144	Major Project (24 credit points)

MASTER OF LOCAL GOVERNMENT

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

This course is administered jointly by the Faculties of Engineering and Business, 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 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:

Possession of other relevant post-secondary qualifications;
A minimum of five years' work experience at a senior level in local government; and
Adequate preparation and capacity to pursue successfully postgraduate studies.

Course Structure

Stage 1	
43451	Environment of Professions in Local Government (6cp)
21728	Public Sector Management (6cp)
Stage 2	
43452	Environmental Management (6cp)
21731	Resources Management (Public) (6cp)
Stage 3	
43453	Infrastructure Management (6cp)
	Project or elective (1 subject) (6cp)
	or
	Research Stream (1 subject) (6cp)

Stage 4	
21729	Human Resource Management (Public) (6cp) Project or Elective (1 subject) (6cp) or Research Stream (1 subject) (6cp)
Stage 5	
	Project or Elective (2 subjects) (12cp) or Research Stream (2 subjects) (12cp)
Stage 6	
43454	Managing Local Enterprises (6cp)
21758	Strategic Management (Public) (6cp)

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 offered by block attendance mode, normally completed over three years (six semesters). All students will enrol in the Masters 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.

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 I and II. This is conditional upon approval of the student's portfolio of short courses and completion of the short courses during the period of enrolment in the Master of Local Government. No credit will be allowed for short courses completed prior to enrolment.

Advanced Standing

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

Fees

Course fees for 1992 were $550 per subject (equivalent to six credit points). Students will also pay the Student Service Charge of $252 per year.

MASTER OF ENGINEERING IN TELECOMMUNICATIONS ENGINEERING

This course is offered jointly by UTS and the University of Wollongong. The combined resources of the telecommunications research laboratories of both institutions are considerable, and students consequently have a greater range of areas from which to select their research speciality. The course is designed to enable graduates of 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 both universities.

Admission Requirements

Engineers wishing to enter the program must hold 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, phones 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 Masters program. A qualifying program may comprise subjects totalling up to 48 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 Masters program.

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

Overview of the Course

The course consists of up to six subjects and a research thesis. The research thesis has a 50% weighting when six coursework subjects are undertaken and 100% weighting when no coursework is undertaken. The following coursework subjects are presently offered at the rate of two per semester; but since the actual program of subjects may vary, the current program should be requested from the Graduate Studies Officer.

41865 Communication Protocols
41867 Teletraffic Engineering
41868 Transmission Systems
41864 Integrated Services Networks
41866 Telecommunications Signal Processing Elective

The elective may be chosen from any graduate level subject in Telecommunications Engineering, Computer Systems Engineering, Statistics or Computer Science offered by either university. One such suitable subject would be Telecommunications Management offered at UTS.

Attendance Arrangements

Some lectures will be held in the evening, for three hours, and some will be offered in three, two-day modules, with students to independently undertake computer assignments and reading programs between modules. Subjects will be examined by means of a formal examination at the end of each semester. Students will undertake a research project at the university of their principal supervisor. Excellent facilities for computer-aided design, hardware development and system simulation are available at each university.

Each of the subjects may be undertaken independently as a short course and later credited towards a Masters degree. For information on short courses, applicants should contact the UTS Continuing Professional Education Unit on 330 1620/1624/1626.

Duration

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

Fees

In 1992 the fee for fee-paying overseas students was $16,500 per annum for the Graduate Diploma and the Masters degree.

The course fee for "local" students was approximately $425 per subject, to be paid soon after the student enrolled. This course fee is in lieu of the Commonwealth Government HECS charge.

MASTER OF ENGINEERING IN GROUNDWATER MANAGEMENT

This course is offered through the National Centre for Groundwater Management and in collaboration with the Faculty of Science. The course is designed to enable students to develop specialist skills in the area of groundwater management including aspects of geology, hydrology, hydraulics and resource management. This provides a multi-disciplinary perspective to issues of groundwater management.

Admission Requirements

Applicants must possess a degree in engineering from UTS or an equivalent qualification and 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; and the names, phone 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.

Enquiries

Associate Professor Michael Knight
Director
National Centre for Groundwater Management
Room 2/429
Tel (02) 330 1984

Course Structure

Autumn semester	
62326	Hydrogeology (5cp)
44150	Computing for Groundwater Specialists*
44155	Groundwater Modelling (5cp)
62328	Hydrogeochemistry (5cp)
44151	Surface Hydrology and Groundwater (5cp)
	Elective 1 (5cp)
	Elective 2 (5cp)
Spring semester	
	Project (30cp)

Electives:

62380	Geopollution Management (5cp)
62392	Groundwater Geophysics (5cp)
44154	Groundwater Computing (5cp)
62393	Geophysics and Remote Sensing of Groundwater Resources (5cp)
	An approved subject offered elsewhere (3cp)

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

GRADUATE DIPLOMA IN LOCAL GOVERNMENT ENGINEERING

This course has been designed for professional engineers practising in the field of local government. The course gives an opportunity for study in depth, and at a professional level, of the special factors necessary for the proper function of local government engineering.

The completion of this course will provide senior personnel with the necessary technical and administrative skills appropriate to the duties of the local government engineer.

Duration and Attendance Patterns

The course is offered, subject to resource allocation, on a block release pattern of study. The block release pattern is designed to accommodate the special problems of students who live in the country enrolling in the course.

The normal attendance pattern is based on two subjects each semester requiring a minimum of four semesters to complete the course.

The block release pattern of study currently consists of three sessions each semester in Sydney at the university. Each session involves three days of full-time attendance, covering two subjects per semester.

Admission Requirements

Engineers wishing to enter the course must either possess a Bachelor degree in Civil Engineering or Structural Engineering or hold an equivalent qualification acceptable to the Institution of Engineers, Australia.

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

In special circumstances engineers who do not possess a degree (or equivalent) will be admitted to the program if they can submit evidence of general and professional qualifications and experience which will satisfy the faculty that they possess the educational preparation and capacity to pursue graduate studies.

Enquiries

Further information may be obtained by telephoning the faculty Graduate Studies Officer, Ms Beate Buckenmaier on (02) 330 2606.

Course Structure

43401	Environmental Planning (6cp)
43402	Traffic and Transportation (6cp)
43403	Management and Industrial Relations (6cp)
43404	Asset Maintenance Management (6cp)
43405	Water and Sewerage Systems Operations (6cp)
43406	Roads and Streets (6cp)
43407	Water Engineering (6cp)
43408	Powers, Duties and Financial Management in Local Government Engineering (6cp)

GRADUATE DIPLOMA IN ENGINEERING and GRADUATE CERTIFICATE IN ENGINEERING

The objective 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 bring their engineering and associated skills up to date with recent advances in engineering. The emphasis of the courses is directed towards engineering practitioners who have found that their previous education and professional experience have not provided adequately for current or future career prospects. 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' experience in employment related to the course. Applicants are required to submit two letters with their application: one indicating why they wish to undertake the course, and the other a statement indicating the level of their employer's support for the application. They are also required to submit a detailed *curriculum vitae* and a description of their work experience.

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

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

Duration

The Graduate Diploma requires completion of subjects totalling 48 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 daytime. For part-time attendance it will usually be possible to design suitable programs from subjects available predominantly in the evenings.

Course Structure

Each student designs his/her own program, structured to suit their individual needs. Program details are determined *prior* to enrolment, in consultation with, and with the approval of, an academic adviser appointed by the Dean. There is opportunity to choose from the broad range of undergraduate and graduate subjects offered by the university's nine faculties, class size quotas permitting.

At least 60% of the content of any individual program should consist of subjects offered by the Faculty of Engineering. Normally this will be interpreted as 30 credit points in a program leading to the Graduate Diploma, and 15 credit points in a program leading to the Graduate Certificate.

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.

Enquiries

Initial enquiries should be made to the faculty Graduate Studies Officer, Ms Beate Buckenmaier on (02) 330 2606.

Academic enquiries should be directed to Schools, as follows:

Civil Engineering
Dr S Parsanejad
Room 2/504C, tel 330 2620

Electrical Engineering
Associate Professor T Buczkowska
Room 1/2542, tel 330 2458
Mr Terry Stevensn
Room 1/2545, tel 330 2460

Mechanical Engineering
Dr Y Bhasin
Room 2/605, tel 330 2659

GRADUATE DIPLOMA IN ENGINEERING IN GROUNDWATER MANAGEMENT

This course is offered through the National Centre for Groundwater Management and is designed for students working in the area of groundwater resource management.

Admission Requirements

Applicants should hold a degree in engineering from UTS or 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 requires completion by the end of the teaching semester.

Enquiries

Associate Professor Michael Knight
Director
National Centre for Groundwater Management
Room 2/429
Tel (02) 330 1984

Course Structure

Autumn semester	
62326	Hydrogeology (5cp)
44150	Computing for Groundwater Specialists*
44155	Groundwater Modelling (5cp)
62328	Hydrogeochemistry (5cp)
44151	Surface Hydrology and Groundwater(5cp)
	Elective 1 (5cp)
	Elective 2 (5cp)

Spring semester	
	Project (15cp)

Electives

As for Master of Engineering course.

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

GRADUATE CERTIFICATE IN SOFTWARE ENGINEERING

This is a professional postgraduate course for those who need to lead, manage or influence projects containing a significant software component, but who have no special training in the methods and tools of modern software engineering practice.

It should be of value particularly to software project leaders, software engineers, analysts and programmers who need to bring projects in reliably and effectively, on time and on budget.

The course consist of two modules, Software Development and Software Project Management, which run in the Spring and Autumn semesters respectively. Either may be taken singly, or successful completion of both will result in the award of the Graduate Certificate.

Entry is open to those who have tertiary qualifications or equivalent, and several years experience in industry with some involvement in projects where software is a significant component. Typically the attendee will be involved in hardware/software projects and/or real-time software.

The course concentrates on building the professional skills and knowledge required to manage the development of quality software to a firm schedule and budget.

Theory and case studies are backed up with extensive guided "hands on" laboratory exercises. Laboratories will be made available to participants outside of normal class time to extend their knowledge and implement their own case studies.

The equipment for the course consists of the latest engineering workstations, project management tools and software life cycle case tools based on Yourdon-DeMarco Hatley methodology, with object-oriented support.

The course particularly addresses the issues of industrial and telecommunications software engineering. It is limited to 24 persons and structured so that at least one staff member is available per session per 10 participants.

This a full fee course, and meets the requirements of the Commonwealth Training Levy. Fees in 1992 are $4,200 for either module, or $7,000 for both.

Enquiries

Initial enquiries should be made to the faculty Graduate Studies Officer, Ms Beate Buckenmaier on (02) 330 2606. Academic enquiries should be directed to Mr John Leaney, School of Electrical Engineering, on 330 2389.

STAFF AND LOCATION OF FACILITIES

The names, office locations and professional interests of academic staff from the Graduate School of Engineering, Management Studies in Engineering, and the National Centre for Groundwater Engineering are listed below. Details of other teaching staff appear in the School staff lists in this handbook.

	Room	Ext
Graduate School of Engineering		
Head of School		
Professor W R Belcher	1/2419C	2423
Director of Management Studies in Engineering		
Associate Professor J V Parkin	2/528	2638

National Centre for Groundwater Management
Centre Director
Associate Professor M J Knight 429 1894
Groundwater contamination, waste disposal

Senior Lecturers
Dr W A Milne-Home 429 1984
Hydrogeology, pump test analysis, isotope applications
Mr N P Merrick 429 1984
Groundwater modelling and geophysics

Research Fellow
Dr R McLaughlan 429 1984
Groundwater contamination, bore corrosion and performance

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 Social Sciences
6 =	Faculty of Science (School of Physical Sciences)
7 =	Faculty of Law and Legal Practice
91 =	Faculty of Science (School of Biological and Biomedical Sciences.)
92 =	Faculty of Nursing
E/TE =	Faculty of Education

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'
Postgraduate subjects begin with '43'

Electrical Engineering
Undergraduate subjects begin with '45'
Postgraduate subjects begin with '41'

Mechanical Engineering
Undergraduate subjects begin with '46'
Postgraduate subjects begin with '42'

Bachelor of Technology subjects begin with '48'.

Key to abbreviated course names used in descriptions

CE	Bachelor of Engineering in Civil Engineering
SE	Bachelor of Engineering in Structural Engineering
EE	Bachelor of Engineering in Electrical Engineering
CSE	Bachelor of Engineering in Computer Systems Engineering
ME	Bachelor of Engineering in Mechanical Engineering
MFG	Bachelor of Engineering in Manufacturing Engineering
BT	Bachelor of Technology in Manufacturing Engineering

MEM	Master of Engineering in Management
MEng(Tel)	Master of Engineering in Telecommunications
MLG	Master of Local Government
GDLGE	Graduate Diploma in Local Government Engineering
GradDipEng	Graduate Diploma in Engineering
GWM	Master of Engineering in Groundwater Management and Graduate Diploma in Groundwater Management

NOTE: Methods of assessment given in the following descriptions are subject to change. Assessment for some postgraduate subjects is given as a guideline only.

Guide to subject descriptions

The subject descriptions shown below indicate the subject code and name, the number of credit points for the subject (ie *3cp*), the duration of the subject, indicated as semester weeks, if applicable, and the number of formal contact hours each week (ie *four hpw*); for some subjects, there may also be practical components off-campus, and this is indicated in the text. Also shown are the prerequisites or corequisites if any, the method of assessment and name of the subject coordinator, if known, and a brief outline of the content.

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

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

21718 ORGANISATION ANALYSIS AND DESIGN *(6cp); three hpw;* **MEM**

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 organisational design. The method of presentation is a weekly class of three hours which will involve a combination of lectures, discussion of readings, analysis of case studies and simulation exercises. Students are expected to have read the assigned material in advance so that there can be more informal discussion of key issues.

Assessment: three assignments

21719 ORGANISATIONAL BEHAVIOUR *(6cp); three hpw;* **MEM**

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. Social psychology's work on group dynamics is presented and applied to the management of work groups and committees. Various theories of leadership are examined and critically assessed. The question of intergroup behaviour and conflict is discussed as is power and politics in organisations. The question of change in organisations draws upon much of the foregoing. The subject takes a critical approach to management theory and practice.

Assessment: case study 20%, seminar paper 30%, presentation 10%, final examination 40%

21720 EMPLOYMENT RELATIONS *(6cp); three hpw;* **MEM**

An introduction to the areas of industrial relations and personnel management. The historical steps in the development of the personnel function and the forces which have shaped the development of the personnel function are examined. The major functions of personnel and industrial relations managers are explored, as well as the relationship between the personnel and 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.

Assessment: essay 30%, presentation 10%, field report 30%, examination 30%

21728 PUBLIC SECTOR MANAGEMENT *(6cp); three hpw;* **MEM**

Provides a broad conceptual framework for studying approaches to management within the political environment of the public sector. An evaluation is undertaken of the utility of contemporary business management concepts in public sector organisations. Topics: organisations and management; perceptions of management in the public sector; managerial roles and skills; catalysts for reform; performance management; politics and management; strategic management; decision making and implementation; program and project management; resources acquisition and management; dealing with the public; ethics and values; accountability; the future.

Assessment: project 30%, 2 class presentations 30%, examination 40%

21729 HUMAN RESOURCE MANAGEMENT (PUBLIC) *(6cp); three hpw;* **MLG**

Human Resource Management (Public) adopts a strategic perspective to the management of human resources in public sector organisations with particular emphasis on local government, analysing strategies and processes to meet the needs of both organisations and individuals. An analysis is conducted of the balance of responsibilities between achieving broad governmental objectives and agency goals; and agency performance and a just concern for employees.

Assessment: assignments and projects 50%, examinations 50%

21731 RESOURCE MANAGEMENT *(6cp); three hpw;* **MLG**

An overview for managers for the management of material resources in local government and aims to develop broad competencies in related areas. Topics include impacts of current legislation; accrual accounting; budget preparation and presentation; financial management; contracting out; managing capital assets; working with auditors.

Assessment: assignments and projects 50%, examinations 50%

21741 OPERATIONS MANAGEMENT *(6cp); three hpw;* **MEM**

The aim is to develop an understanding of the workings of business operations and systems as a base for discussion of various techniques for effectively managing operations functions. Topics include comparison of production and service processes; product-process matrix; service operations; planning, scheduling and controlling production; materials management (including Just in Time, Materials Requirement Planning); human resources and labour relations in operations; quality planning and control; interface with marketing and accounting/finance functions; strategic planning.

Assessment: assignments and case studies, 25%, research paper 25%, final examination 40%, lecturer's assessment 10%

21758 STRATEGIC MANAGEMENT (PUBLIC) *(6cp); three hpw; prerequisites completion of stages 1-5;* **MLG**

Provides an integrative approach to the development and implementation of strategies appropriate to the peculiar political, legal and financial environments of public sector organisations. Alternative strategy models are examined for their relevance in particular situations.

Assessment: assignments and projects 50%, examinations 50%

21779 MANAGEMENT SKILLS *(6cp); three hpw;* **MEM**

The objective is to develop student insight into the interpersonal skills requirements of managers and to establish a basis for future skill development on the part of the student.

This subject deals 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 non-verbal 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. There is some treatment of interpersonal communication theory.

Assessment: project 60%, seminar papers 40%

22726 ACCOUNTING AND FINANCIAL ADMINISTRATION *(6cp); three hpw:* **MEM**

An introduction to accounting to students 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, budgeting.

Assessment: assignments 30%, quiz 30%, final examination 40%

24221 PRINCIPLES OF MARKETING *(4cp); three hpw; subject coordinator Ms R McGuiggan;* **BT**

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%, final examination 30%

24734 MANAGERIAL MARKETING *(6cp); three hpw;* **MEM**

This subject views marketing as a key managerial decision making area, necessarily at the interface between the firm 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.

Assessment: two case studies 30%, project 40%, class participation 10%, examination 20%

25742 FINANCIAL MANAGEMENT *(6cp); three hpw; prerequisites 22726 Accounting and Financial Administration, 43811 Economics for Engineers;* **MEM**

Topics: analytical techniques applied to financial decision making and the basic structure of the Australian financial system; capital budgeting; capital structure; dividend policy; risk minimisation; current asset management; lease vs borrow analysis; the leveraged lease; the computer as an effective tool of financial management.

Assessment: class work 15%, case study 30%, mid-semester test 20%, final examination 35%

31141 DATABASE STRUCTURES AND MANAGEMENT *(3cp); three hpw; prerequisite 45133 Software Engineering;* **CSE**

The nature of common data structures and their use was introduced in 45133 Software Engineering. 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%, quizzes 60%

31163 KNOWLEDGE-BASED SYSTEMS *(3cp); three hpw; prerequisites 45342 Electromechanical Systems, 63734 Materials Technology ;* **CSE**

Introduce students to the theory, design and implementation of various knowledge-based techniques. While the emphasis will be on expert systems, there will be an overview of Artificial Intelligence, and some examples of knowledge-based systems will be examined in detail.

Topics include: overview of AI: reasoning and computation; knowledge representation, expert systems and knowledge elicitation. The course will be lecture based, however there will be several case studies and students will gain familiarity with a commercially available expert systems shell.

Assessment: project 35%, assignment 25%, final examination 40%

33100 DISCRETE MATHEMATICS *(3cp); three hpw;* **EE/CSE**

The objective is for students to master the symbolism of discrete mathematics, as applied to set theory, logic and the predicate calculus; to introduce the concept of a formal system as a basis of description and proof; and to introduce proving techniques.

The course will cover formal systems and proof methods; propositional logic; quantifiers and predicate logic; method of induction; sets and set operations; indexing, mappings, relations and functions; equivalence relations; recursive definition of functions; partially ordered sets; semigroups, lattices and Boolean algebras and state machines; basic combinational techniques and applications ; isomorphisms and graphs, trees, sequences.

Assessment: class tests 25%, final examination 75%

33110 ENGINEERING MATHEMATICS I *(Electrical) (6cp); six hpw; prerequisite HSC 3-unit Mathematics is assumed;* **EE/CSE**

The objective is for students to master the fundamental mathematical operations used in most branches of electrical engineering. Specifically those of determinants, matrices, vectors and complex numbers; the basic computational methods of single variable differentiation and integration and the properties of elementary functions. Topics include matrices and determinants; solution of linear equations; Gaussian reduction; 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; trigonometric and hyperbolic functions; and L'Hopital's rule.

Assessment: class tests 25%, final examination 75%

33121 ENGINEERING MATHEMATICS IA *(3cp); three hpw;* **EE/CSE** *and* **ME/MFG**

Presents basic aspects of calculus to engineering students. On completion of the subject, students should have a knowledge of the following topics: matrices and determinants; vectors; limits, continuity and differentiation; applications of differentiation.

33122 ENGINEERING MATHEMATICS IB *(3cp); three hpw; prerequisite 33121 Engineering Mathematics IA;* **CE/SE** *and* **ME/MFG**

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.

33210 ENGINEERING MATHEMATICS II *(Electrical) (6cp); six hpw; prerequisite 33110 Engineering Mathematics I (Electrical);* **EE/CSE**

The fundamental aspects of differential calculus and the solution of ordinary differential equations, and the conceptualisation of abstract vector spaces. This is achieved through development of expertise in some areas of theoretical linear algebra, in functions of several variables and partial derivatives and in ordinary differential equations and their solution by classical and Laplace transform methods. Topics include methods of integration; sequences and their convergence; series and their convergence; tests for convergence; power series; radius of convergence; Taylor series; vector spaces; linear independence; bases; inner products; linear transformations; rank of matrix; ordinary differential equations; first order linear and variable separate equations; solution of linear equations by auxiliary equation and undetermined coefficients; systems of linear equations; application of matrix exponentials; partial derivatives; gradient; Lagrange multipliers; Laplace transforms; application to ordinary differential equations; and convolution theorem. There will be emphasis on formally proving the fundamental concepts.

Assessment: class tests 25%, final examination 75%

33221 ENGINEERING MATHEMATICS IIA *(3cp); three hpw; prerequisite 33122 Engineering Mathematics IB;* **CE/SE** *and* **ME/MFG**

Builds on the elementary aspects of calculus covered in Engineering Mathematics IA and IB. 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%, final examination 75%

33222 ENGINEERING MATHEMATICS IIB *(3cp); three hpw; prerequisite 33221 Engineering Mathematics IIA;* **ME/MFG**

This is the fourth of a series of mathematics subjects which develop the mathematical skills and awareness needed by engineering students (in the ME and MFG degrees). This subject focuses on solution of more difficult equations.

Topics: 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%, final examination 75%

33310 ENGINEERING MATHEMATICS III *(Electrical) (6cp); six hpw; prerequisite 33210 Engineering Mathematics II (Electrical);* **EE/CSE**

The series solution of differential equations and the conceptualisation of simple problems requiring multi-dimensional 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%, final examination 75%

41749 MANAGEMENT OF TELECOMMUNICATIONS *(6cp); three hpw;* **MEM** *and* **ME(Tel)**

Introduces the main concepts of the assessment, control and management of telecommunications systems. Its aim is to develop an understanding of the importance of telecommunications policy and strategic planning of communications resources for efficient operation of an organisation, and to provide

necessary tools to apply this understanding and underlying concepts techniques to real life case studies.

41823 SYSTEMS ENGINEERING AND DECISION MODELLING *(6cp); three hpw;* **MEM**

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 system engineering process are examined from an Engineering Management viewpoint. Systems management, work breakdown, performance reliability, maintainability, human factors, life cycle, decision theory applications, concurrent engineering.

Assessment: quizzes 20%, assignments 40%, project and seminar 40%

41864 INTEGRATED SERVICES NETWORKS *(6cp); three hpw;* **ME(Tel)**

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: tutorials 20%, examination 80%

41865 COMMUNICATION PROTOCOLS *(6cp); three hpw;* **ME(Tel)**

Layered architectures, OSI reference model, protocol evaluation criteria, physical layer, data link control, LAN protocols, transport protocols, session protocols, presentation and application layer protocols. Laboratory work will involve C language implementation of protocols and the use of protocol analysers.

Assessment: assignments 20%, practical work 30%, examination 50%

41866 TELECOMMUNICATIONS SIGNAL PROCESSING *(6cp); three hpw;* **ME(Tel)**

Speech and image coding, multi-rate processing, block processing, adaptive filtering, waveform generation, modulation, linearisation. Laboratory work will involve using TMS320C25 DSP processor.

Assessment: assignment 20%, examination 80%

41867 TELETRAFFIC ENGINEERING *(6cp); three hpw;* **ME(Tel)**

Network design issues, statistics review, queuing theory, traffic theory, capacity design, throughput analysis, network control and management.

Assessment: tutorials 20%, examination 80%

41868 TRANSMISSION SYSTEMS *(6cp); three hpw;* **ME(Tel)**

Satellite, terrestrial microwave, fibre optics, mobile communications, modulation techniques, channel models, link budgets, error correction coding, synchronisation, multiple access. Laboratory work will involve computer simulation of digital communications systems.

Assessment: assignment 20%, examination 80%

42812 TECHNOLOGICAL CHANGE *(6cp); three hpw;* **MEM**

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 80%, seminar 20%

43401 ENVIRONMENTAL PLANNING *(6cp); three hpw;* **GDLGE**

The aim is to ensure that the local government engineer has a sound knowledge and understanding of the principles and procedures of urban and regional planning. Topics to be covered include evolution of town and country planning; New South Wales environmental planning legislation; environmental planning process; neighbourhood planning; development control process and the civil engineer; national, state and regional planning; noise analysis; traffic environmental impact assessment.

Assessment: assignments and projects 50%, examinations 50%

43402 TRAFFIC AND TRANSPORTATION *(6cp); three hpw;* **GDLGE**

Provides the basic principles in transportation planning and traffic engineering. The influence of environmental and political aspects will be analysed as well as technical aspects. Emphasis will be directed towards the application of traffic engineering in the planning and reorganisation of traffic problems in local government situations.

Assessment: assignments and projects 50%, examinations 50%

43403 MANAGEMENT AND INDUSTRIAL RELATIONS *(6cp); three hpw;* **GDLGE**

Examines the principles of management and considers the aspect of corporate management as developed by the Local Government and Shires Association of New South Wales. The following topics will be covered: elements of management and

industrial relations; concepts of corporate management; the Council; financial management; works management; policies, codes and delegated authority and the review process.

Assessment: assignments and projects 50%, examinations 50%

43404 ASSET MAINTENANCE MANAGEMENT *(6cp); three hpw;* **GDLGE**

Examines the combination of management, financial, engineering and other practices applied to physical assets in the pursuit of economic life style costs. It aims to enable the local government engineer to develop a proper maintenance strategy. Topics to be included are terotechnology, logistics and benefit cost analysis.

Assessment: assignments and projects 50%, examinations 50%

43405 WATER AND SEWERAGE SYSTEMS OPERATIONS *(6cp); three hpw;* **GDLGE**

The operation and maintenance of municipal wastewater treatment plants, sewerage systems and water supply systems. Topics to be covered include statutory requirements, constituents and quality of wastewaters, description, operation and control of treatment processes, performance monitoring, description and operation of sewerage and water supply systems, trouble-shooting and problem solving.

Assessment: assignments and projects 50%, examinations 50%

43406 ROADS AND STREETS *(6cp); three hpw;* **GDLGE**

The aim is to equip students with the knowledge of good practice in the design, construction and maintenance of roads, as well as the basic principles involved in pavement design and construction. Particular attention is drawn to the design, construction and maintenance of streets in residential areas. Students will also become conversant with; design standards of road and street alignment as practised by the appropriate authorities in New South Wales; road elements; road features; and road structures.

Assessment: assignments and projects 50%, examinations 50%

43407 WATER ENGINEERING *(6cp); three hpw;* **GDLGE**

Focuses on urban drainage and methods of control and protection as well as aspects of coastal engineering. Topics to be covered include urban drainage design; design flood estimation techniques; culvert design; erosion and scour protection; flood mitigation practice and coastal engineering.

Assessment: assignments and projects 50%, examinations 50%

43408 POWERS, DUTIES AND FINANCIAL MANAGEMENT IN LOCAL GOVERNMENT ENGINEERING *(6cp); three hpw;* **GDLGE**

Presents the legislative requirements within which the Local Government Engineer operates. The Local Government Act and other related legislation (including Environmental and Road) are examined. Topics to be covered include roads, drainage, water and sewer services.

Assessment: assignments and projects 50%, examinations 50%

43451 ENVIRONMENT OF PROFESSIONS OF LOCAL GOVERNMENT *(6cp); three hpw;* **MLG/GDLGE**

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 stages.

Assessment: assignments and projects 50%, examinations 50%

43452 ENVIRONMENTAL MANAGEMENT *(6cp); three hpw;* **MLG/GDLGE**

Examines current environment issues and their implications at the local level. Global, national and local policy approaches are evaluated as a basis for developing local government multi-disciplinary management approaches.

Assessment: assignments and projects 50%, examinations 50%

43453 INFRASTRUCTURE MANAGEMENT *(6cp); three hpw;* **MLG/GDLGE**

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: assignments and projects 50%, examinations 50%

43454 MANAGING LOCAL ENTERPRISES *(6cp); three hpw;* **MLG/GDLGE**

This subject, together with Strategic Management (Public), forms the capstone of the course. Students prepare a management plan, of publishable standard, for a selected local development issue (such as unemployment or environmental degradation). The

emphasis is on issues in a council's external environment.

Assessment: assignments and projects 50%, examinations 50%

43811 ECONOMICS FOR ENGINEERS *(6cp); three hpw;* **MEM**

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: assignments 30%, seminars 30%, final examination 40%

43833 PROJECT MANAGEMENT *(6cp); three hpw;* **MEM**

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 sub-contractors will be considered.

Assessment: assignments 30%, reading list evaluations 30%, project 40%

44144 MAJOR PROJECT *(24 cp); three hpw;* **MEM**

This capstone subject is taken across two consecutive semesters and provides an opportunity for the practical application and integration of the professional background and skills presented in Project Management and other subjects. The emphasis is to be on small team project work in interdisciplinary groups.

Assessment: milestone assessments, final report assessment

44150 COMPUTING FOR GROUNDWATER SPECIALISTS *(Note: this subject does not carry academic credit); three hpw;* **GWM**

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.

44151 SURFACE HYDROLOGY AND GROUNDWATER *(5cp); three hpw;* **GWM**

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, problems, short examinations and field tutorial reports

44152, 44153 GROUNDWATER PROJECTS *(5cp); three hpw;* **GWM**

Provides candidates with the opportunity to research specific engineering groundwater resource or contamination problems. Topics include investigation consisting of one or more of: modelling, laboratory experiments, fieldwork related to hydrogeology and groundwater management, contaminant transport and processes, waste disposal and groundwater impact.

44154 GROUNDWATER COMPUTING *(5cp); three hpw;* **GWM**

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, problems, short examinations and field tutorial reports

44155 GROUNDWATER MODELLING *(5cp); three hpw;* **GWM**

Provides the computer modelling tools required for groundwater resource management. Topics include groundwater modelling of porous media, fractured rock and low permeability materials; analogue, numerical analytical models; matrix structure and inverse methods, stochastic modelling and characterisation of variability; modelling multiphase fluids and regional groundwater flow; applications to borefield management, salt water intrusion, mine dewatering, geotechnical problems.

Assessment: continuous assessment involving assignments, problems, short examinations and field tutorial reports

44802 MANAGEMENT DECISIONS *(6cp); three hpw;* **MEM**

This subject presents a critique of rational decision aids in the light of modern descriptive theories of judgement, choice and decision in organisations. The methods of management science, decision analysis and judgement 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: assignments 60%, quiz 30%, lecturer's assessment 10%

45113 DIGITAL TECHNIQUES *(3cp); three hpw; subject coordinator Assoc Professor C Peterson;* **EE/CSE**

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%, lab work 20%, final examination 60%

45115 ENGINEERING PRACTICE *(3cp); three hpw; subject coordinator Mr P Lewis;* **EE/CSE**

This subject is undertaken only by students who gained admission on the basis of a TER score, ie 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 I *(4cp); three hpw; corequisite 33110 Engineering Mathematics I (Electrical); subject coordinator Mr W Hooper;* **EE/CSE**

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: lab work 10%, mid-semester examination 30%, final examination 50%, tutorials 10%

45123 FUNDAMENTALS OF COMPUTING *(4cp); three hpw; prerequisite 33100 Discrete Mathematics (recommended); subject coordinator Mr K K Fung;* **EE/CSE**

An introduction to computing providing the basics of computer architecture and operating systems. The PASCAL programming language is then taught together with software engineering principles of structured analysis, design and testing. The overall emphasis is on the importance of achieving a correct, well structured design before implementation, in the programming building process.

Assessment: assignments 40%, final examination 60%

45124 ELECTRICAL ENGINEERING II *(7cp); six hpw; prerequisite 45116 Electrical Engineering I; corequisite 33210 Engineering Mathematics II (Electrical); subject coordinator Dr J Carmo;* **EE**

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 eletromechanical devices. It consists of lectures, tutorials, laboratory and computing work.

Assessment: lab reports 10%, problems 24%, experiments 2%, mid-semester test 14%, final examination 50%

45125 ENGINEERING DISCOVERY *(3cp); three hpw; prerequisite 45115 Engineering Practice; subject coordinator Mr P Lewis;* **EE/CSE**

This subject is undertaken by students who gained admission with a TER score, ie 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 or 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 ENGINEERING I *(3cp); three hpw; prerequisite 45123 Fundamentals of Computing; corequisite 33100 Discrete Mathematics; subject coordinator Dr R Meegoda;* **EE/CSE**

Analysis, design and testing techniques: module quality, information clusters, abstract data types: type, operations, preconditions, axioms; pre/post conditions, simple program proving, testing; recursive definitions; abstract data types, introduction to object oriented techniques. Implementation techniques; PASCAL:- modules; pointers; recursion, object oriented concepts. Data structures and algorithms: queues, stacks, lists, trees; sorting, searching.

Assessment: assignments 40%, examination 60%

45134 NETWORK THEORY *(7cp); six hpw; prerequisites 45124 Electrical Engineering II, 33210 Engineering Mathematics II (Electrical); subject coordinator Mr G Gedgovd;* **EE/CSE**

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: lab and assignments 10%, mid-semester examination 40%, final examination 50%

45135 ENGINEERING COMMUNICATION *(3cp); three hpw; prerequisite 45125 Engineering Discovery; subject coordinator Mr N Carmody;* **EE/CSE**

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%, report and essays 33%, final examination 34%

45141 CONTINUOUS AND DISCRETE SYSTEMS *(7cp); six hpw; prerequisites 33310 Engineering Mathematics III (Electrical), 45134 Network Theory; subject coordinator Dr J Nicol;* **EE/CSE**

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 6 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 locu, stability criteria (Routh, Hurwitz, Jury, Nyquist).

Assessment: lab work 20%, mid-semester examination 30%, final examination 50%

45143 COMPUTER HARDWARE *(3cp); three hpw; prerequisites 45116 Electrical Engineering I, 45113 Digital Techniques; subject coordinator Mr K K Fung;* **EE**

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%, final examination 70%

45144 ELECTRONIC DEVICES AND CIRCUITS *(7cp); six hpw; prerequisites 63133 Engineering Physics III (Electrical), 45134 Network Theory; subject coordinator Dr B Rodanski;* **EE/CSE**

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%, lab 8%, mid-semester examination 30%, final examination 50%

45145 ENGINEERING STATISTICS *(3cp); three hpw; prerequisites 33310 Engineering Mathematics III (Electrical), 45123 Fundamentals of Computing, 45124 Electrical Engineering II; subject coordinator Mr T Stevenson;* **EE/CSE**

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%, mid-semester quiz 30%, final examination 30%

45151 SIGNAL THEORY I *(4cp); three hpw; prerequisite 45141 Continuous and Discrete Systems; subject coordinator Mr T Stevenson;* **EE/CSE**

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 II.

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%, mid-semester quiz 40%, final examination 50%

45152 SIGNAL THEORY II *(3cp); three hpw; prerequisites 45151 Signal Theory I, 45145 Engineering Statistics; subject coordinator Professor W Yates;* **EE/CSE**

Applies the analytical techniques developed in Signal Theory I 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%, mid-semester quiz 40%, final examination 50%

45153 ANALOGUE ELECTRONICS *(3cp); six hpw; prerequisites 45144 Electronic Devices and Circuits, 45141 Continuous and Discrete Systems; subject coordinator Dr V Ramaswamy;* **EE**

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 non-linear electronic analogue circuits and systems, test and measure the parameters of analogue circuits and systems using standard laboratory equipment.

Assessment: assignments 20%, two examinations 80%

45154 CONTEXTUAL STUDIES *(4cp); three hpw; prerequisites at least 22 weeks of Approved Industrial Experience and 45135 Engineering Communication; subject coordinator Ms E Taylor;* **EE/CSE**

Aims to develop an appreciation of the contexts within which engineers practice; 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%, participation 20%, journal 30%, final examination 30%

45155 PROJECT A *(3cp); three hpw; prerequisite 45143 Computer Hardware; corequisites 45151 Signal Theory I, 45153 Analogue Electronics; subject coordinator Assoc Professor G Beard;* **EE/CSE**

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 *(3cp); three hpw; prerequisites 45133 Software Engineering I, 45143 Computer Hardware; subject coordinator Mr N Carmody;* **EE/CSE**

Introduces students to the methods used to develop solutions for real-time computer controlled applications. The optimal design of both the software and hardware required to interface to the "outside world" is the objective of this course. It will emphasise the real time and complex interface issues through case studies and laboratory work. The single chip microcomputer and supporting devices will be used to develop a stand alone real-time application.

Assessment: lab 50%, final examination 50%

45166 PROJECT MANAGEMENT *(4cp); three hpw; prerequisite 45145 Engineering Statistics; subject coordinator Dr J Parkin;* **EE/CSE**

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%, quizzes and final examination 50%

45176 SYSTEMS ENGINEERING *(4cp); three hpw; prerequisites 45166 Project Management, Industrial Experience 60 weeks minimum; subject coordinator Professor E Aslaksen;* **EE/CSE**

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%, quizzes 30%, final examination 40%

45182 THESIS I *(3cp); three hpw; prerequisites 45155 Project Management, 45176 Systems Engineering (recommended); subject coordinator Assoc Professor P Bryce;* **EE/CSE**

The primary objective of the subjects Thesis I and II 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 I provides for the definition, analysis and specification of a task, culminating in a documented program for completion of the task within Thesis II.

45183 THESIS II *(8cp); six hpw; prerequisite 45182 Thesis I; subject coordinator Assoc Professor PBryce;* **EE/CSE**

A significant engineering task, researched within Thesis I, is completed in this subject with the presentation of a seminar and production of a thesis document.

45242 ELECTROMAGNETICS *(3cp); three hpw; prerequisites 33310 Engineering Mathematics III (Electrical), 45134 Network Theory; subject coordinator Assoc Professor P Bryce;* **EE**

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%, examination 60%

45252 POWER APPARATUS AND SYSTEMS *(6cp); six hpw; prerequisite 45242 Electromagnetics; subject coordinator Dr V Ramaswamy;* **EE**

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: lab 20%, mid-semester examination 30%, final examination 50%

45264 FIELDS AND WAVES *(3cp); three hpw; prerequisite 45242 Electromagnetics; subject coordinator Assoc Professor G Beard;* **EE**

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%, final examination 70%

45265 NUMERICAL METHODS *(3cp); three hpw; prerequisites 45144 Electronic Devices and Circuits, 45145 Engineering Statistics, 45141 Continuous and Discrete Systems, 45242 Electromagnetics; subject coordinator Dr J Carmo;* **EE/CSE**

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%, eight problems 40%

45274 PHYSICAL DESIGN AND PRODUCTION *(3cp); three hpw; prerequisites 63133 Engineering Physics III (Electrical), 63734 Materials Technology; subject coordinator Assoc Professor R Stere;* **EE**

Introduce 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%, mid-semester examination 40%, final examination 40%

45342 ELECTROMECHANICAL SYSTEMS *(3cp); three hpw; prerequisite 45124 Electrical Engineering II; subject coordinator Assoc Professor V Ramsden;* **EE**

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: lab 20%, project 30%, final examination 50%

45353 OPERATING SYSTEMS *(6cp); six hpw; prerequisite 45163 Real-Time Software and Interfacing; subject coordinator N Carmody;* **CSE**

Introduction to concurrency, methods of process synchronisation, proof of correctness, concurrency modelling using Petri nets, design of an operating system, distributed operating systems, multiprocessor systems, design of a real time Kernel. Methods of implementing real time systems, design of I/O, device handlers. One third of the subject is taught by the School of Computing Sciences.

45363 SOFTWARE ENGINEERING II *(3cp); three hpw; prerequisite 45163 Real-Time Software and Interfacing; subject coordinator J Leaney;* **CSE**

Aims to bring students to the point where they are fluent in the issues and objectives of software engineering, competent in structured analysis techniques, able to apply mathematical techniques to the programming process, 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%, two examinations 50%

45364 DIGITAL SYSTEMS *(3cp); three hpw; prerequisite 45163 Real-Time Software and Interfacing; subject coordinator Dr A Ginige;* **CSE**

Introduces methodologies, techniques, tools and architectures for specification, design, verification using simulation, and implementation of medium to large scale digital systems.

Assessment: lab 5%, assignments 45%, final examination 50%

45372 COMPUTER SYSTEMS ANALYSIS *(3cp); three hpw; prerequisites 45145 Engineering Statistics, 45363 Software Engineering II; subject coordinator Professor C Drane;* **CSE**

Draws 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 the various hardware and software components in the system and the effects on system specification (response time, data access issues, reliability, resilience etc). The lecture program will be supported by a laboratory program based on systems simulation and performance measurement.

The topics include: queuing models of computer systems, logical architecture, physical architecture, computer simulation of systems, modelling techniques, analytical modelling of computer systems and design options.

Assessment: assignments 50%, final examination 50%

45381 COMPUTER-AIDED ENGINEERING *(3cp); three hpw; prerequisite 45364 Digital Systems; subject coordinator Mr N Carmody;* **CSE**

Examines the impact that the computer has had on the process of engineering. The student will appreciate how the computer has changed the way engineers design, control, manage, plan and function in their profession. The impact of the computer on productivity, creativity, and on Australian society will be examined and an appreciation will be gained of the new emerging engineering frontiers.

Assessment: assignments 50%, examination 50%

45382 COMPUTER SYSTEMS DESIGN *(3cp); three hpw; prerequisite 45372 Computer Systems Analysis; subject coordinator Professor C Drane;* **CSE**

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) *(3cp); three hpw; prerequisites 45372 Computer Systems Analysis, 45176 Systems Engineering (recommended); corequisite: 45382 Computer Systems Design; subject coordinator Assoc Professor C Peterson;* **EE/CSE**

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 form the basis of the subjects 45182 and 45183 (Thesis I and Thesis II).

45461 POWER CIRCUIT THEORY *(3cp); three hpw; prerequisites 45252 Power Apparatus and Systems, 45265 Numerical Methods; subject coordinator Dr J Carmo;* **EE**

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%, experiments 15%, assignment 15%, examination 45%

45462 POWER ELECTRONICS *(3cp); three hpw; prerequisites 45153 Analogue Electronics, 45252 Power Apparatus and Systems; subject coordinator Dr R Hui;* **EE**

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%, two examinations 75%

45472 PROJECT B (POWER AND MACHINES) *(3cp); three hpw; 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 Ramaswamy*; EE

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 student's teams to choose from. Students may also propose projects. The topics offered will be based on, or will required 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 *(3cp); three hpw; prerequisites 45252 Power Apparatus and Systems, 45265 Numerical Methods; subject coordinator Dr V Ramaswamy;* **EE**

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: lab 15%, assignments 25%, two examinations 60%

45482 POWER EQUIPMENT DESIGN *(3cp); three hpw; prerequisite 45252 Power Apparatus and Systems; corequisite 45274 Physical Design and Production; subject coordinator Assoc Professor V Ramsden;* **EE**

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%, field trip 5%, lab 5%, final examination 25%

45483 POWER SYSTEMS ANALYSIS AND PROTECTION *(6cp); six hpw; prerequisite 45461 Power Circuit Theory; subject coordinator Dr J Carmo;* **EE**

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 microprocessor-based relays.

Assessment: assignments 50%, problems 20%, experiments 10%, final examination 20%

45484 ELECTRICAL VARIABLE SPEED DRIVES *(3cp); three hpw; prerequisites 45462 Power Electronics, 45481 Dynamics of Electrical Machines; subject coordinator Assoc Professor V Ramsden;* **EE**

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: lab reports 15%, assignments 35%, examination 50%

45561 DIGITAL SYSTEMS DESIGN *(3cp); three hpw; prerequisites 45143 Computer Hardware, 45123 Fundamentals of Computing; subject coordinator Dr A Ginige;* **EE/CSE**

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

Assessment: lab 5%, assignments 45%, examination 50%

45562 DATA ACQUISITION AND DISTRIBUTION SYSTEMS *(6cp); six hpw; prerequisites 45153 Analogue Electronics, 45163 Real-Time Software and Interfacing; subject coordinator Assoc Professor R Stere;* **EE/CSE**

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: lab 10%, mid-semester examination 40%, final examination 50%

45577 PROJECT B (INSTRUMENTATION AND CONTROL) *(3cp); three hpw; corequisites 45581 Analogue and Digital Control, 45562 Data Acquisition and Distribution Systems; subject coordinator Assoc Professor R Stere;* **EE**

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 Multi-variable 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 *(6cp); six hpw; prerequisite 45141 Continuous and Discrete Systems; subject coordinator Assoc Professor H Nguyen;* **EE/CSE**

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 *(3cp); three hpw; prerequisites 45153 Analogue Electronics, 45265 Numerical Methods; subject coordinator Dr B Rodanski;* **EE**

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%, project 45%

45583 ADAPTIVE AND MULTI-VARIABLE CONTROL *(3cp); three hpw; prerequisite 45581 Analogue and Digital Control; subject coordinator Dr J Nicol;* **EE**

In this subject students will study multi-variable control, adaptive control and optimal control to an advanced level. Laboratory projects are conducted on a continuous basis through the semester. Topics include: direct and inverse Nyquist arrays, characteristic locus, robust control, pole shifting techniques, identification algorithms, minimum variance control, self-tuning adaptive regulators linear quadratic regulatory design, state estimation and the Kalman filter, Hoo design.

Assessment: lab work 50%, assignments 50%

45584 PRINCIPLES OF VLSI DESIGN *(3cp); three hpw; prerequisites 45561 Digital Systems Design, 45144 Electronic Devices and Circuits; subject coordinator Mr N Carmody;* **EE/CSE**

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%, lab 40%, final examination 50%

45661 COMMUNICATION NETWORKS *(3cp); three hpw; corequisite 45665 Data Communications; subject coordinator Dr A Seneviratne;* **EE**

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%, lab 25%, final examination 60%

45662 SIGNAL PROCESSING *(3cp); three hpw; prerequisite 45152 Signal Theory II; subject coordinator Professor W Yates;* **EE/CSE**

Covers the theoretical basis of signal processing algorithms used in signal processing and the practical implementation of these algorithms using DSP microprocessors. 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%, quiz 40%, final examination 50%

45663 DIGITAL TRANSMISSION *(3cp); three hpw; prerequisite 45662 Signal Theory II; subject coordinator Assoc Professor S Reisenfeld;* **EE**

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%, lab 20%, mid-semester examination 20%, final examination 40%

45664 COMMUNICATIONS ENGINEERING *(3cp); three hpw; prerequisites 45151 Signal Theory I, 45153 Analogue Electronics, 45264 Fields and Waves; subject coordinator Assoc Professor G Beard;* **EE**

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 non-linearities 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%, design study 25%, mid-semester quiz 15%, final examination 40%

45665 DATA COMMUNICATIONS *(3cp); three hpw; prerequisite 45145 Engineering Statistics; subject coordinator Assoc Professor T Buczkowska;* **EE/CSE**

Introduces the network layering concept and develops in detail the functions of three lower levels of the Open Systems Interconnection Model. The emphasis is placed on the mathematical treatment of systems with delays in order to develop the base for the introduction to routing in data networks and topological design. On completion students should be able to evaluate the performance of a data link, determine the routing and flow control strategies and perform some basic delay/throughput analysis.

Assessment: assignments 20%, lab 20%, final examination 60%

45678 PROJECT B (TELECOMMUNICATIONS) *(3cp); three hpw; prerequisite/ corequisite either 45662 Signal Processing or 45665 Data Communications; subject coordinator Assoc Professor T Buczkowska;* **EE**

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 *(6cp); six hpw; prerequisite 45663 Digital Transmission; subject coordinator Dr Aruna Seneviratne;* **EE**

The subject involves two modules of which students must undertake one. Each module involves a major case study which students are required to evolve a working solution. In each module students will be given lectures covering background information 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.

45931 ELECTRICAL ENGINEERING II (MECHANICAL)*(4cp); four hpw; prerequisite 63127 Electrical Engineering I (Mechanical);* **ME/MFG**

Introduces fundamental Electronic/Electrical devices and circuits to undergraduate students in the School of Mechanical and Manufacturing 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

45999 INDUSTRIAL EXPERIENCE (part-time)EE/CSE

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 requirement 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 above.

46030 PROJECT I *(2cp); two hpw; corequisite 46332 Design II; subject coordinators H McGregor, R Wiltshire;* **ME/MFG**

In this, and the following subjects, Project A and B, 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.

In Project I, students are introduced to project planning and management and the selection of the project is made. The student is also required to formalise this selection, write a preliminary design report, give a short seminar on the chosen project to the project class, and complete a literature search and any preliminary planning appropriate to the initial stages of such an exercise.

Assessment: essay and report 100%

46033 PROJECT A *(part-time and sandwich) (6cp); four and a half hpw; prerequisite 46030 Project I; subject coordinator R M Spencer;* **ME/MFG**

This is the second of three 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 three 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% of all the remaining activities that follow the preliminary planning phase of an engineering project completed in Project I. 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% (oral presentation if required)

46034 PROJECT B *(part-time and sandwich) (6cp); four and a half hpw; corequisite 46033 Project A; subject coordinator R M Spencer;* **ME/MFG**

This is the third of three related project subjects in which students are responsible for the complete execution of a project, from specification to final report. Projects many be initiated by staff, students or employers, and students may work individually or in groups. A project many 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 three related subjects is expected to be equivalent to at least 500 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% (oral presentation if required)

46040 ERGONOMICS *(3cp); three hpw; prerequisite 46631 Engineering Management;* **ME/MFG**

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%, final examination 70%

46110 MECHANICS I *(6cp); six hpw;* **ME/MFG**

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% and two examinations (30% and 50%)

46111 MECHANICS II *(4cp); four hpw; prerequisites 46110 Mechanics I, 33121 Engineering Mathematics IA; corequisite 33122 Engineering Mathematics IB;* **ME/MFG**

An analysis of three-dimensional force systems in equilibrium, followed by area moments and mass of inertia and the kinematics and dynamics of relative motion extended to systems of bodies. This subject completes the discussion of particle mechanics introduced in Mechanics I. The subject concludes with a preparatory discussion of planar rigid body kinematics.

Assessment: assignments 15%, examination 85%

46120 MECHANICS III *(4cp); four hpw; prerequisite 46111 Mechanics II;* **ME/MFG**

This subject presents Kinematics and Dynamics in a more general way than Mechanics II. 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.

Assessment: assignments 10%, examinations 90%

46121 MECHANICS OF MACHINES *(4cp); four hpw; prerequisite 46120 Mechanics III;* **ME/MFG**

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 20%, examinations 80%

46130 DYNAMICS OF MECHANICAL SYSTEMS *(4cp); four hpw; prerequisite 46120 Mechanics III;* **ME/MFG**

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 multi-degree 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%, examinations 90%

46140 KINEMATICS AND DYNAMICS OF MACHINES *(3cp); three hpw; prerequisites 46121 Mechanics of Machines, 46130 Dynamics of Mechanical Systems;* **ME/MFG**

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 judgement 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

46141 APPLIED DYNAMICS *(3cp); three hpw; prerequisite 46130 Dynamics of Mechanical Systems;* **ME/MFG**

Aims to introduce 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%, projects 33%

46142 ROBOTICS *(3cp); three hpw; prerequisites 46722 Manufacturing Processes IIA, 46121 Mechanics of Machines, 46723 Manufacturing Processes IIB;* **ME/MFG**

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%, examination 40%

46143 EINSTEIN'S UNIVERSE *(3cp); three hpw; prerequisites 46120 Mechanics III;* **ME/MFG**

Aims to give perspective to the Newtonian model of the Universe (ie 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%, quantitative solution of assignment problems 50%

46220 SOLID MECHANICS I *(5cp); four hpw; prerequisite 46111 Mechanics II;* **ME/MFG**

This is the first of two core subjects dealing with the basics of solid and structural mechanics. The concepts of stress and strain, material properties (both linear and non-linear) 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%, lab 15%, examinations 70%

46230 SOLID MECHANICS II *(4cp); four hpw; prerequisite 46220 Solid Mechanics I;* **ME/MFG**

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 is the second of two core subjects dealing 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: lab and assignments 20%, class quiz 20%, final examination 60%

46240 SOLID MECHANICS III *(3cp); three hpw; prerequisite 46230 Solid Mechanics II;* **ME/MFG**

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 non-linearity, 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%, project 20%, class quiz 20%

46241 FINITE ELEMENT APPLICATIONS *(3cp); three hpw; prerequisites 46240 Solid Mechanics III, 46130 Dynamics of Mechanical Systems; corequisite 46330 Computer-Aided Drafting and Design;* **ME/MFG**

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 non-linearity, dynamic analysis and optimisation. The second part consists of the modelling process and the analysis of finite element solutions. This includes problem formulation, the preparation of data for finite element computer programs, element selection,

convergence and the analysis of errors. Particular attention is paid to the use of behaviour of isoparametric and frame and plate bending elements.

General purpose structural analysis programs, MSC/NASTRAN and MSC/Pal 2, are used to obtain finite element solutions.

Assessment: assignments 60%, project 20%, class quiz 20%

46310 INTRODUCTION TO ENGINEERING *(3cp); three hpw;* **ME/MFG**

Provides an overview or issues and concepts which are important to new engineering students, including the following: UTS rules and requirements; what is engineering?; what do professional engineers do? What are their inputs to choosing and formulating the problems they address?; essential engineering skills; design, a key focus for engineering activity; the engineering method – a systematic approach to the design process; creativity; and technology management.

Practical examples and exercises will be provided to assist students to explore issues for themselves.

The introduction to the profession will include discussion of the roles of the Institution of Engineers, Australia and its code of ethics; and the industrial body, the Association of Professional Engineers and Scientists, Australia. The concept of co-operative 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

46311 ENGINEERING GRAPHICS *(3cp); three hpw;* **ME/MFG**

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

46320 DESIGN I *(4cp); four hpw; prerequisites 46120 Mechanics III, 46220 Solid Mechanics I;* **ME/MFG**

An introduction to design methodology. The main emphasis is on the design of individual machine elements– bolted and welded joints, springs, shafts, gears, bearings and factors affecting materials selection. Power transmission systems are then discussed, including selection criteria, couplings, clutches, chain and belt drives.

It is the first in a sequence of three design subjects. The overall philosophy underlying these three subjects is to introduce the student to the various tasks and decisions associated with engineering design projects from the stage of problem formulation to final presentation. The subject involves the completion of a major project extending over approximately one-third of the course.

In all design subjects and projects students will be required to give particular attention to applicable codes and regulations, safety and requirements of the human operators, and the wider responsibilities of the engineer in preserving health, the environment and public safety.

Assessment: assignments 20%, projects 20%, examinations 60%

46330 COMPUTER-AIDED DRAFTING AND DESIGN *(5cp); four hpw; prerequisites 46722 Manufacturing Processes IIA, 46723 Manufacturing Processes IIB;* **ME/MFG**

Students are introduced to the use of computers in 2D drafting and 3D wire frames, surface and solids modelling. These modelling techniques are then applied to determine 2D sectional properties and 3D mass properties. Computer-aided machine element design is introduced including mechanism design and analysis.

Assessment: assignments 25%, projects 50%, examinations 25%

46332 DESIGN II *(3cp); three hpw; prerequisites 46320 Design I, 46130 Dynamics of Mechanical Systems;* **ME/MFG**

This is the second subject in the three which comprise the core of the treatment of design in the course. The subject uses a number of projects to offer the student a creative and disciplined approach to the solution of problems. Specific systems are examined and further emphasis is given to methodology. Experimental stress analysis, weld and pressure vessel design are discussed. Occupational health and safety, and fatigue design are treated in detail.

Assessment: two major projects 50%, assignments 25%, final examination 25%

46333 DESIGN III *(3cp); three hpw; prerequisite 46332 Design II;* **ME/MFG**

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 driven subject.

Industrial visits will be arranged to provide state-of-the-art information. Students will undertake design projects, singly or in groups.

Assessment: projects 45%, final examination 55%

46340 STRUCTURES *(3cp); three hpw; prerequisite 46230 Solid Mechanics II;* **ME/MFG**

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%, final examination 40%

46341 MACHINE DESIGN *(3cp); three hpw; prerequisites 46320 Design I, 46121 Mechanics of Machines, 46230 Solid Mechanics II, 46130 Dynamics of Mechanical Systems;* **ME/MFG**

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%, project 40%

46342 UNITISED LOAD HANDLING *(3cp); three hpw; corequisite 46332 Design II;* **ME/MFG**

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; pipe line 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%, assignments/visit reports 40%, projects 30%

46343 APPROPRIATE TECHNOLOGY *(3cp); three hpw; prerequisite 46320 Design I, 46630 Engineering and Society;* **ME/MFG**

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%, seminar 25%, project 50%

46344 ENGINEERING SPECULATION *(3cp); three hpw; prerequisite 46630 Engineering and Society; corequisite 46631 Engineering Management;* **ME/MFG**

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 *(3cp); three hpw; corequisite 46332 Design II;* **ME/MFG**

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

46346 BULK MATERIALS HANDLING *(3cp); three hpw; corequisite 46332 Design II;* **ME/MFG**

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%, assignments/visit reports 40%, projects 30%

46420 FLUID MECHANICS *(4cp); four hpw; prerequisites 33121 Engineering Mathematics IA, 46110 Mechanics I;* **ME/MFG**

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%, lab reports 10%, examinations 80%

46421 THERMODYNAMICS *(5cp); four hpw; prerequisites 33121 Engineering Mathematics IA, 33122 Engineering Mathematics IB, 46420 Fluid Mechanics, 63117 Engineering Physics (Mechanical);* **ME/MFG**

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%, lab reports 15%, examinations 75%

46430 THERMOFLUIDS *(4cp); four hpw; prerequisites 46420 Fluid Mechanics, 46421 Thermodynamics;* **ME/MFG**

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%, lab tests and reports 15%, examinations 75%

46431 HEAT TRANSFER *(4cp); four hpw; prerequisites 46420 Fluid Mechanics, 46421 Thermodynamics;* **ME/MFG**

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%, lab reports 10%, examinations 80%

46441 COMBUSTION AND AIR POLLUTION *(3cp); three hpw; prerequisite 46421 Thermodynamics;* **ME/MFG**

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: exam 40%, essay 40%, assignments 20%

46442 ADVANCE FLUID DYNAMICS *(3cp); three hpw; prerequisites 46430 Thermofluids, 46830 Numerical Analysis;* **ME/MFG**

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%, assignments 50%, examination 25%

46443 REFRIGERATION AND AIR CONDITIONING *(3cp); three hpw; prerequisites 46430 Thermofluids, 46431 Heat Transfer;* **ME/MFG**

Gives student experience in applying the principles of thermodynamics, heat transfer and fluid mechanics to the air conditioning 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 air conditioning and refrigeration systems is reviewed.

Assessment: projects 10%, lab assignments 10%, examination 80%

46444 POWER CYCLES *(3cp); three hpw; prerequisite 46430 Thermofluids;* **ME/MFG**

Covers steam and gas power cycles in depth. Combustion chemistry and efficiency, equipment details, augmentation methods and cogeneration systems are presented. It aims to develop proficiency in the performance analysis of actual steam and gas turbine power plants.

Assessment: examinations 80%, assignments 15%, lab 5%

46445 FLUID MACHINES *(3cp); three hpw; prerequisite 46430 Thermofluids;* **ME/MFG**

The application of thermodynamics and fluid mechanic 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%, lab reports 20%, examinations 70%

46530 MEASUREMENT AND INSTRUMENTATION *(4cp); four hpw; prerequisites 45931 Electrical Engineering II (Mechanical), 46130 Dynamics of Mechanical Systems; corequisite 46531 Control Engineering I;* **ME/MFG**

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: lab reports 75%, four small examinations 25%. Students are required to pass in each type of assessment.

46531 CONTROL ENGINEERING I *(4cp); four hpw; prerequisite 46130 Dynamics of Mechanical Systems; corequisite 46530 Measurement and Instrumentation;* **ME/MFG**

Aims to develop an understanding of simple feedback control systems and the classical control theory usually used to analyse and design these systems.

The methods and concepts required for classical control analysis are developed; mathematical models based on linear differential equations and their Laplace transforms are introduced and transfer functions and block diagrams are used to depict control loops. 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. A proportion of the course is devoted to laboratory studies of various real control systems.

Assessment: assignments 50%, quiz (open book) 10%, final examination (open book) 40%

46540 PROGRAMMABLE CONTROLLERS *(3cp); three hpw; prerequisite 45931 Electrical Engineering II (Mechanical); corequisite 46531 Control Engineering I;* **ME/MFG**

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%, lab reports 40%, examinations 40%

46541 CONTROL ENGINEERING II *(3cp); three hpw; prerequisite 46531 Control Engineering I;* **ME/MFG**

Aims to develop an understanding of the methods of "classical control" and their advantages and limitations.

This subject follows Control Engineering I, extending the control system analysis to include Inverse Nyguist methods and Root Locus methods. Considerable time is devoted to the design of control systems using classical techniques. Additional topics then covered are state variable feedback and control, and a brief introduction to discrete and non-linear systems. A proportion of the course is devoted to laboratory studies of various real control systems.

Assessment: assignments 30%, labs 40%, final examination (open book) 30%

46542 PROCESS CONTROL *(3cp); three hpw; prerequisite 46531 Control Engineering I;* **ME/MFG**

Aims to show control applications in the process industries and to familiarise students with a wide range of modern hardware used in this sector of industry.

It has been structured to complement the control theory subject Control Engineering I. Control theory is applied to the control and instrumentation of process systems. While theory is important, the subject has an equally strong emphasis on practice and current industrial applications. The subject covers measuring transducers, transducers, control valves, controllers (analog and digital), programmable logic controllers and computer control. A small number of highly automated process plants are also studied and visited.

Assessment: tutorials 20%, assignments 20%, reports 20%, final examination 40%

46620 ENGINEERING COMMUNICATION *(4cp); four hpw;* **ME/MFG**

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%

46630 ENGINEERING AND SOCIETY *(4cp); four hpw; prerequisite 46620 Engineering Communication;* **ME/MFG**

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%, seminar 15%, final examination 40%

46631 ENGINEERING MANAGEMENT *(3cp); three hpw; prerequisite 46630 Engineering and Society;* **ME/MFG**

The over-riding 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.

Assessment: continuous assessment, assignments

46640 TEROTECHNOLOGY *(3cp); three hpw; prerequisite 46820 Engineering Statistics; corequisites 46332 Design II, 46631 Engineering Management;* **ME/MFG**

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 Nett 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

46641 COMMERCIAL ISSUES FOR ENGINEERS *(3cp); three hpw; prerequisite 46631 Engineering Management;* **ME/MFG**

This subject deals in more detail with issues raised in 46631 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 would be introduced, such as quality, management of innovative technology, business ethics, and risk management.

Assessment: continuous assessment by reports and assignments

46642 ENGINEERING ECONOMICS *(3cp); three hpw; prerequisite 46631 Engineering Management;* **ME/MFG**

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%, examination 70%

46701 ROBOTICS AND FLEXIBLE MANUFACTURING *(3cp); three hpw; prerequisites 45342 Electromechanical Systems, 63734 Materials Technology;* **CSE**

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%, examination 50%

46712 MANUFACTURING PROCESSES IA *(part-time and sandwich) (3cp); two hpw; corequisite 63704 Materials Engineering I; subject coordinator R M Spencer;* **ME/MFG**

Begins to develop an appreciation and understanding of materials processing principles and their application in manufacturing.

This is the first of four related subjects. It covers classification of processes, safety engineering principles and processes of casting, permanent mould casting and hot working of metals.

Assessment: reports 20%, assignments 15%, examination 65%

46713 MANUFACTURING PROCESS IB *(part-time and sandwich) (2cp); two hpw; corequisite 46712 Manufacturing Processes IA; subject coordinator R M Spencer;* **ME/MFG**

Begins to develop appreciation and understanding of materials processing principles and their application in manufacturing.

This is the second of four related subjects. It covers principles and processes of welding and metal cutting.

Assessment: reports 40%, assignment 10%, examination 50%

46722 MANUFACTURING PROCESSES IIA *(part-time and sandwich) (3cp); two hpw; prerequisite 46713 Manufacturing Processes IB; subject coordinator R M Spencer;* **ME/MFG**

Continues to develop appreciation and understanding of processing principles and their application in manufacturing.

This is the third of four related subjects. It introduces strain hardening theory and its application, to forming processes. It covers the principles and processes associated with forming, sintering and inspection.

Assessment: reports 20%, lab reports 15%, examination 65%

46723 MANUFACTURING PROCESSES IIB *(part-time and sandwich) (2cp); two semester hours (in one semester); prerequisite 46713 Manufacturing Processes IB; corequisite 46722 Manufacturing Processes IIA; subject coordinator R M Spencer;* **ME/MFG**

Continues to develop the appreciation and understanding of processing principles and their application in manufacturing.

This is the fourth of four related subjects. It covers the principles and processes associated with plastic products, computerised numerical controlled (CNC) machines, robots, assembly and finishing.

Assessment: reports 20%, assignments 15%, examination 65%

46740 QUALITY AND RELIABILITY *(3cp); three hpw; prerequisite 46820 Engineering Statistics;* **ME/MFG**

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%, examination 65%

46741 FLEXIBLE MANUFACTURING *(3cp); three hpw; prerequisites 46722 Manufacturing Processes IIA, 46723 Manufacturing Processes IIB;* **ME/MFG**

Emphasises Australia's demographic structure in relation to domestic and international markets; illustrates the need for continuing development; illustrates the inherent flexibility of computer software; and considers the modular development of flexible manufacturing cells.

Topics treated will be chosen from the following: **Planning** – strategic management, marketing, flexibility, definition of flexible manufacturing; life cycles, types of forecasting; handling uncertainty by lead time reduction, inventory reduction, quality, reliability, JIT, maintenance, aggregation; group technology, coding, geometric and matrix flow analysis; facilities design, simulation, investment proposals. **Equipment** – axis servos, interpolators; N/C machine commissioning; material/part handling, robots, mobile carts, conveyors, pallets, loading/unloading, storage, assembly, inspection, modularity. **Programming** – controllers, sequential, servo; offline and online programming, N/C, robots, AGVs, CMMs, probes; unattended machining; interfacing problems, integration.

Assessment: reports 24%, assignments 6%, examination 70%

46742 PRODUCTION AND COST CONTROL *(3cp); three hpw; prerequisite 46631 Engineering Management;* **ME/MFG**

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%, examination 80%

46743 WORK STUDY *(3cp); three hpw; prerequisites 46723 Manufacturing Processes IIB, 46820 Engineering Statistics;* **ME/MFG**

Aims to develop proficiency in the understanding and application of the principles of method improvement and work measurement with due consideration of human factors and environmental constraints.

This subject presents the basic techniques and skills required for method improvement and work measurement in industrial work situations. Emphasis is placed on the use of recording techniques and critical analysis. Work measurement techniques include study and PMTS systems for the development of standard times. Statistical approach is applied in Work Sampling and machine interference. Basic techniques are used to effect improvement in materials handling and plant layout. Knowledge of human factors in relation to the design of work-space and equipment and in relation to environmental constraints is presented.

Assessment: assignments 35%, examinations 65%

46744 COMPUTER-AIDED MANUFACTURING *(3cp); three hpw; prerequisite 46330 Computer-Aided Drafting and Design;* **ME/MFG**

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%, projects 30%, examination 50%

46810 INTRODUCTION TO COMPUTING *(3cp); two hpw;* **ME/MFG**

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, spread sheets, data bases, and programming at an elementary level. Operating systems including UNIX and networking will also be treated at an elementary level.

Assessment: assignments 50%, examinations 50%. Students are required to pass in each section.

46811 COMPUTER PROGRAMMING *(4cp); four hpw; prerequisites 46810 Introduction to Computing, 33121 Engineering Mathematics IA;* **ME/MFG**

Introduces the computer as a means of solving engineering problems and is designed to develop programming skills and competence in the use of a computer. Program structure that leads to uncomplicated and adaptable programs is emphasised.

FORTRAN 77 is the programming language used but others will be discussed. UNIX operating system and its text editing facilities will be used.

Assessment: assignments 45%, quiz (open book) 15%, final examination (open book) 40%

46820 ENGINEERING STATISTICS *(3cp); three hpw; prerequisite 33221 Engineering Mathematics IIA;* **ME/MFG**

Introduces the basic concepts of probability and statistics and show how they are used in prediction, assessment and quality control.

Topics include summarising data; probability, discrete and continuous distributions including the binomial, Poisson and normal distribution; sample statistics; estimation and confidence intervals; tests of hypotheses; regression and correlation; analysis of variance. Applications to experimental design and quality control are treated.

Assessment: assignments 15%, quizzes 25%, examinations 60%

46830 NUMERICAL ANALYSIS *(4cp); four hpw; prerequisite 46820 Engineering Statistics;* **ME/MFG**

Gives students experience in the application of numerical methods to the solution of engineering problems. It follows Computer Programming and makes extensive use of the computer. Topics include numerical precision and errors; integration; solution of equations (linear, non-linear, simultaneous); interpolation; differentiation; curve fitting; differential equations (ordinary, simultaneous, partial).

Assessment: assignments 30%, examinations 70%

46840 ADVANCED ENGINEERING COMPUTING *(3cp); three hpw; prerequisite 46830 Numerical Analysis;* **ME/MFG**

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 data processing 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%, final examination (open book) 30%

468*1 OPERATIONS RESEARCH *(3cp); three hpw;* **ME/MFG**

Prepares the students in the various techniques of operations research to enable them to take management decisions effectively.

This is an introduction to the philosophy of operations research, and a more detailed treatment of selected techniques including simulation, linear programming, dynamic programming, network analysis (CPM, PERT, Least Cost Scheduling), and queuing theory.

Assessment: reports, assignments, examination

46842 MICROPROCESSORS *(3cp); three hpw; prerequisites 46530 Measurement and Instrumentation, 46830 Numerical Analysis;* **ME/MFG**

Introduces the basic concepts of microprocessor architecture and programming, and develop the skills needed for the applications of the microprocessor in industrial systems. The programming models and basic features of microprocessor and microcomputer programming, encoding and number systems developed. The methodology of structured software design will be reviewed with an emphasis on microprocessor applications. The characteristics of the major microprocessor system components will be reviewed at the broad level. Input/output facilities, interrupt systems, and other ancillary devices related to control systems will be explored.

Assessment: assignments 40%, final examination 60%

46990 INDUSTRIAL REVIEW *(3cp); three hpw; corequisite 46631 Engineering Management;* **ME/MFG**

Following selected reading and tutorial discussion, students will write essays reviewing aspects of the structure and operation of the firm with which they are employed. Topics for these essays will be chosen from topics including: 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: essays

46991 PROFESSIONAL REVIEW *(3cp); three hpw; prerequisite 46990 Industrial Review;* **ME/MFG**

The objective of this subject is to review and assess the industrial component of the cooperative Bachelor of Engineering Program. The different philosophies on cooperative education will be discussed. Each student will be required to present a report on their industrial experience and to give a seminar to the class, outlining this experience in the light of the course objectives.

Assessment: seminars 30%, reports 70%

46997 INDUSTRIAL EXPERIENCE (sandwich) ME/MFG

46999 INDUSTRIAL EXPERIENCE (part-time) ME/MFG

This subject name/number is the Industrial Experience subject for Mechanical and Manufacturing 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.

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 *(2cp); two hpw;* **CE**

47003 PROJECT *(3cp); three hpw;* **CE**

47004 PROJECT *(4cp); four hpw;* **CE**

47006 PROJECT *(6cp); six hpw;* **CE**

47009 PROJECT *(9cp); nine hpw;* **CE**

47012 PROJECT *(12cp); twelve hpw;* **CE**

47015 PROJECT *(15cp); fifteen hpw;* **CE**
Subject Coordinator Dr G Ring

(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 *(3cp); three hpw; subject coordinator Dr R Karim;* **CE/SE**

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%, class assignments 20%, seminar 20%, tutorial participation 10%, final examination 30%

47113 COMPUTATIONS I *(4cp); three hpw; subject coordinator Dr K L Lai;* **CE/SE**

Aims to familiarise students with computing as a tool for solving engineering problems. The emphasis in the subject 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 30%, mid-term quiz 20%, final examination 50%

47117 STATICS *(4cp); three hpw; subject coordinator Dr R Karim;* **CE/SE**

Provides students with the fundamental concepts of statics and the application of the basic principles of statics to solving engineering mechanics problems.

Much emphasis in the course will be placed on the concepts of free body diagrams and equilibrium of the free body. At the end of the course students should be able to confidently apply these basic principles to solve statically determinate problems involving non-deformable bodies.

47118 SURVEYING IA *(3cp); three hpw; subject coordinator Mr A Brady;* **CE/SE**

Introduces students to fundamental surveying theory, techniques and instruments which are used in civil engineering. This will include levelling, distance measurement and use of the theodolite. At the completion of Surveying IA the student should have a practical understanding of: the execution of the following surveys in the field and appreciation of the accuracies achievable by: (a) levelling, (b) distance measurement by tape or wire and (c) traversing; and execution of the following computations and appreciation of the accuracies 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 30%, quizzes 30%, final examination 40%

47120 GRAPHICS *(3cp); three hpw;* **CE/SE**

Course under review

47127 MECHANICS OF SOLIDS I *(4cp); three hpw; prerequisite 47117 Statics; subject coordinator Dr B Samali;* **CE/SE**

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 Mechanics of Solids II and the underlying principles in structural analysis as well as design subjects.

Assessment: assignments 10%, mid-semester quiz 20%, final examination 70%

47128 SURVEYING IB *(3cp); three hpw; prerequisite 47118 Surveying IA; subject coordinator Mr A Brady;* **CE/SE**

Students are assisted in developing basic surveying skills and in reaching a significant level of competency 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 introduced to road design. Students will also be introduced to current surveying computer packages.

Assessment: quizzes 40%, assignments and practical reports 30%, practical test 30%

47131 STRUCTURAL MECHANICS *(3cp); three hpw; prerequisite 47127 Mechanics of Solids I; subject coordinator Dr K L Lai;* **CE/SE**

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 15%, two quizzes 40%, final examination 45%

47133 COMPUTATIONS II *(3cp); three hpw; prerequisites 47113 Computations I, 33121 Engineering Mathematics IA, 33122 Engineering Mathematics IB; corequisite 33221 Engineering Mathematics IIA; subject coordinator Dr K L Lai;* **CE/SE**

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 theory, but some theory will be provided to assist in the understanding of the solution techniques.

Assessment: continuous assessment 50%, final examination 50%

47134 CONSTRUCTION MATERIALS *(3cp); three hpw; prerequisite 63721 Materials Science for Engineers; subject coordinator Dr H Chung;* **CE/SE**

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 40%, quizzes 60%

47135 FLUID MECHANICS *(4cp); three hpw; prerequisites 47127 Mechanics of Solids I, 33221 Engineering Mathematics IIA; subject coordinator Dr S Beecham;* **CE/SE**

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 basic principles of mathematics and physics to the empirical procedures used in civil engineering applications.

Assessment: assignments 20%, quizzes 50%, final examination 30%

47137 MECHANICS OF SOLIDS II *(3cp); three hpw; prerequisite 47127 Mechanics of Solids I; subject coordinator P C Liu;* **CE/SE**

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 to 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%, mid-semester quiz 35%, final examination 50%

47140 CONCRETE DESIGN I *(3cp); three hpw; prerequisite 47127 Mechanics of Solids I; corequisite 47137 Mechanics of Solids II; subject coordinator Professor K A Faulkes;* **CE/SE**

On completion of this subject, the student should understand the behaviour under load of reinforced concrete cimply supported beams, columns, and one-way and two-way slabs with edge supports; be able to analyse from first principles reinforced concrete sections subjected to the bending moment and/or axial force at the stages of serviceability and ultimate strength; be able to design and detail reinforced concrete beams, columns, two-way slabs, and simple footings, considering all common limit states, except torsion; have some familiarity with the Concrete Structures Standard and be aware of the commonly used design aids. The subject is to provide students with a professional base for further studies of the design of concrete structures.

Assessment: tutorials and homework problems 10%, design assignments 20%, classroom quizzes 20%, final examination 50%

47141 STRUCTURAL ANALYSIS I *(3cp); three hpw; prerequisite 47131 Structural Mechanics; subject coordinator Dr S Parsanejad;* **CE/SE**

Teaches students methods, amenable to hand calculations, for analysis of indeterminate structures and to give them a thorough understanding of influence coefficient and the applicability of influence lines to design of structural frameworks.

Assessment: assignments 15%, two quizzes 40%, final examination 45%

47142 ENVIRONMENTAL ENGINEERING *(3cp); three hpw; prerequisite 62462 Environmental Chemistry; subject coordinator Dr S Vigneswaran;* **CE/SE**

The principal objective is to introduce 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; 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%, mid-semester quiz 30%, final examination 50%

47144 TIMBER DESIGN *(3cp); three hpw; prerequisite 47127 Mechanics of Solids I; subject coordinator Mr K Crews;* **CE/SE**

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 20%, mid-semester quiz 30%, final examination 50%

47145 HYDRAULICS *(3cp); three hpw; prerequisite 47135 Fluid Mechanics; subject coordinator Dr M Patarapanich;* **CE**

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%, quizzes 50%, laboratory reports 30%

47146 SOIL MECHANICS *(4cp); three hpw; subject coordinator Dr G Ring;* **CE/SE**

As a particular 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: assignments and laboratory reports 10%, quizzes 40%, final examination 50%

47149 CONSTRUCTION *(3cp); three hpw; subject coordinator Assoc Professor T Anderson;* **CE/SE**

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 actively participate in the evolution of the solution to construction problems.

The subject is the first in the Construction and Management Strand of the course.

Assessment: major assignment 50%, mid-semester quiz 25%, final examination 25%

47150 CONCRETE DESIGN II *(4cp); three hpw; prerequisite 47140 Concrete Design I; subject coordinator Professor K A Faulkes;* **CE/SE**

Students are exposed to the basic concepts of prestressed concrete, relevant to the analysis and design of simply supported beams and slabs. On completion of the subject students should understand the behaviour under load of simple prestressed concrete members of pre-tensioned and post-tensioned type. They will become familiar with the design of prestressed concrete beams and slabs to satisfy strength and serviceability limit states in accordance with the Concrete Structures Standard. The subject relates closely to the concepts learned previously in Concrete Design I and aims at broadening students' ability to design structural components made of concrete.

Assessment: tutorial and assignments 30%, quizzes 20%, final examination 50%

47151 STRUCTURAL ANALYSIS II *(4cp); three hpw; prerequisites 47141 Structural Analysis I, 47133 Computations II; subject coordinator Dr A Saleh;* **CE/SE**

In this subject students will master the analysis of structures using the stiffness method and become familiar with the computer application in this field. Students are also introduced to concepts of material and geometric non-linearities and to problems of elastic stability.

Assessment: quizzes 50%, final examination 50%

47152 PUBLIC HEALTH ENGINEERING *(3cp); three hpw; prerequisite 47142 Environmental Engineering; subject coordinator Dr S Vigneswaran;* **CE/SE**

Provides civil engineering students with a basic knowledge about water quality, the types of water pollution and objectives, processes and technology of wastewater and water treatment, in order for them to become familiar with the water quality constituent, measurement methods and standards; major types of water pollution in NSW; different water and 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%, mid-semester quiz 30%, final examination 50%

47153 COMPUTATIONS III *(3cp); three hpw; prerequisite 47133 Computations II; subject coordinator Dr S Beecham;* **CE/SE**

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. A second component of this subject aims to further the computing skills of students through the use of both of a statistics package and a data base package.

Assessment: assignments 10%, project 20%, computer applications 30%, final examination 40%

47154 CONCRETE TECHNOLOGY *(3cp); three hpw; prerequisite 47134 Construction Materials; subject coordinator Dr R S Ravindrarajah;* **CE/SE**

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%, quizzes 20%, final examination 50%

47155 HYDROLOGY *(3cp); three hpw; prerequisite 47135 Fluid Mechanics; subject coordinator Assoc Professor G O'Loughlin;* **CE/SE**

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 flowrates for various situations, and be familiar with basics of reservoir yield analysis and hydrological modelling.

Assessment: assignments 50%, class exercises 10%, final examination 40%

47156 SOIL ENGINEERING *(3cp); three hpw; prerequisite 47146 Soil Mechanics; subject coordinator Dr G Ring;* **CE/SE**

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%, final examination 50%

47159 PROJECT PLANNING *(3cp); three hpw; subject coordinator Assoc Professor T Anderson;* **CE/SE**

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 20%, project 30%, final examination 50%

47160 CONCRETE DESIGN III *(3cp); three hpw; prerequisite 47150 Concrete Design II; subject coordinator Professor K A Faulkes;* **CE/SE**

Develops the ability to apply the analytical methods learned in previous subjects of this strand, and in this subject, to the design of concrete structures. Through the involvement in the lectures, selected examples, and numerical assignments the student should acquire the skill of representing typical reinforced concrete structures of medium complexity, particularly those incorporating slabs, by statistical systems suitable for the analysis of forces and dimensioning individual components. Students should become aware of the relative merits of various analytical models applied to the design of reinforced concrete structures and, given the task, be able to select a suitable method and design the structure.

Assessment: tutorial problems 10%, homework assignments 30%, quizzes 20%, final examination 50%

47161 STEEL DESIGN I *(3cp); three hpw; prerequisite 47137 Mechanics of Solids II; subject coordinator Mr P Liu;* **CE/SE**

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%, mid-semester quiz 35%, final examination 50%

47162 ADVANCES IN POLLUTION CONTROL *(3cp); three hpw; prerequisite 47152 Public Health Engineering; subject coordinator Dr S Vigneswaran;* **CE**

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%, mid-semester examination 30%, final examination 50%

47163 COMPUTATIONS IV *(3cp); three hpw; prerequisite 47153 Computations III; subject coordinator Dr A Saleh;* **CE/SE**

Familiarises students with a number of advanced computational techniques relevant to the solution of

engineering problems. Emphasis will be given to the role of computer software packages, their advantages and limitations in solving such problems.

Assessment: assignments 50%, final examination 50%

47164 METALS TECHNOLOGY *(3cp); three hpw; prerequisite 47134 Construction Materials; subject coordinator Dr H Chung;* **CE/SE**

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%, quizzes 20%, final examination 50%

47166 GEOTECHNICAL ENGINEERING *(3cp); three hpw; prerequisite 47156 Soil Engineering; subject coordinator Assoc Professor M Hausmann ;* **CE**

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 Soil Mechanics and the methods of analysis treated in 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 materials. 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 judgement (the art of geotechnical design).

Assessment: assignments 10%, fieldwork 20%, design project 30%, final examination 40%

47167 ROAD ENGINEERING *(3cp); three hpw; prerequisites 47156 Soil Engineering, 47159 Project Planning, 47155 Hydrology; subject coordinator Mr P Kenny;* **CE**

Provides students with a general introduction to Australian methods for the analysis and design of various road components.

Assessment: assignments and reports 50%, final examination 50%

47168 SURVEYING II *(3cp); three hpw; prerequisite 47128 Surveying IB; subject coordinator Mr A Brady;* **CE**

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%, practical reports and assignments 30%, final examination 40%

47171 STEEL STRUCTURES AND CONCEPT DESIGN I *(4cp); three hpw; prerequisites 47161 Steel Design I, 47141 Structural Analysis I, 47137 Mechanics of Solids II; subject coordinator Dr S Parsanejad;* **CE/SE**

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 preciously acquired knowledge.

Assessment: limited state project 50%, two quizzes 50%

47175 WATER ENGINEERING *(3cp); three hpw; prerequisites 47145 Hydraulics, 47155 Hydrology; subject coordinator Assoc Professor G O'Loughlin;* **CE**

Students will be made familiar with the general nature of the water industry, and certain aspects of hydraulics, which form a basis for future specialist studies.

This is aimed at reinforcing earlier teaching in hydrology and hydraulics, and providing information to round-out the knowledge needed in these fields. The water industry component informs students of the framework within which water engineering work is carried out, and encourages a wide, multi-disciplinary perspective. The hydraulics part covers important topics in hydraulics and the methods applied in these situations.

Assessment: assignments 40%, tutorials 20%, quizzes 40%

47176 GROUND MODIFICATION *(3cp); three hpw; prerequisite 47156 Soil Engineering; subject coordinator Assoc Professor M Hausmann;* **CE**

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 engineering will be better able to evaluate alternative solutions when confronted with difficult foundation conditions or marginal building materials.

Assessment: assignment and quizzes 50%, project 50%

47177 TRANSPORTATION ENGINEERING *(3cp); three hpw; prerequisite 47167 Road Engineering; subject coordinator Mr P Kenny;* **CE**

Provides students with a basic understanding with the issues involved in planning for transport and making transport work more effectively in the community.

Assessment: practical reports and class assignments 50%, final examination 50%

47178 PROJECT ECONOMICS *(3cp); three hpw; prerequisite 47159 Project Planning; subject coordinator Assoc Professor G O'Loughlin;* **CE/SE**

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%, project 30%, final examination 40%

47179 CONSTRUCTION CONTRACTS *(3cp); three hpw; subject coordinator Assoc Professor T Anderson;* **CE/SE**

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 5%, quizzes 35%, final examination 60%

47189 MANAGEMENT FOR ENGINEERS *(4cp); three hpw; prerequisites 47149 Construction, 47159 Project Planning, 47179 Construction Contracts; subject coordinator Assoc Professor T Anderson;* **CE/SE**

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 30%, class assessment 30%, final examination 40%

47237 DOMESTIC BUILDING DESIGN AND CONSTRUCTION *(3cp); three hpw; prerequisite 47127 Mechanics of Solids I; corequisite 47137 Mechanics of Solids II; subject coordinator Mr K Crews;* **SE**

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 25%, three quizzes 75%

47265 FINITE ELEMENT ANALYSIS *(3cp); three hpw; prerequisites 47151 Structural Analysis II, 47133 Computations II; subject coordinator Dr A Saleh;* **SE**

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%, final examination 50%

47267 APPROXIMATE METHODS IN STRUCTURAL ANALYSIS *(3cp); three hpw; prerequisites 47141 Structural Analysis I, 47137 Mechanics of Solids II, 47140 Concrete Design I ,47161 Steel Design I; subject coordinator Dr S Parsanejad;* **SE**

Explores the assumptions underlying the approximate methods of analysis and their justification and to equip 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%, two quizzes 70%

47268 DYNAMICS OF STRUCTURES *(3cp); three hpw; prerequisites 47151 Structural Analysis II, 47133 Computations II; subject coordinator Dr B Samali;* **SE**

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 building, 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%, three quizzes 60%

47270 CONCRETE DESIGN IV *(3cp); three hpw; prerequisites 47140 Concrete Design I, 47150 Concrete Design II, 47160 Concrete Design III;* **CE/SE**

On completion of this subject, students 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 Australian Standards.

Assessment: assignments 18%, three mini quizzes 12%, mid-semester examination 25%, final examination 45%. It is necessary to gain at least 45% in the final examination and at least 65% in the assignments.

47275 BRIDGE DESIGN *(3cp); three hpw; prerequisites 47150 Concrete Design II, 47161 Steel Design I; subject coordinator Dr J Ivering;* **SE**

An introduction to the Australian practice of bridge design. The assignments will require the student 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%, seminar 10%, two quizzes 30%

47277 LOADING ON BUILDING STRUCTURES *(3cp); three hpw; prerequisite 47268 Dynamics of Structures; subject coordinator Dr B Samali;* **SE**

Familiarises students with various types of loads and phenomena responsible for inducing stresses and strains in building structures, and to develop 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%, three quizzes 60%

47278 STRUCTURAL STABILITY *(3cp); three hpw; prerequisite s47151 Structural Analysis II, 47133 Computations II; subject coordinator Professor S Bakoss;* **SE**

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%, final examination 50%

47281 STEEL STRUCTURES AND CONCEPT DESIGN II *(3cp); three hpw; prerequisite 47171 Steel Structures and Concept Design I; subject coordinator Dr S Parsanejad;* **SE**

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.

47285 DESIGN PROJECT *(6cp); six hpw; prerequisites 47281 Steel Structures and Concept Design II, 47160 Concrete Design III; subject coordinator Professor S Bakoss;* **SE**

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%, preliminary designs 30%, final design and documentation 35%

47287 STRUCTURAL TESTING *(3cp); three hpw; prerequisites 47137 Mechanics of Solids II, 47151 Structural Analysis II, 47150 Concrete Design II; subject coordinator Dr R Karim;* **SE**

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%, laboratory reports 50%, examinations and quizzes 40%

47288 HIGH RISE BUILDINGS *(3cp); three hpw; prerequisite 47277 Loading on Building Structures; subject coordinator Dr S Parsanejad;* **SE**

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%, assignments 20%, 2 quizzes 50%

47301 RAILWAY ENGINEERING *(elective) (3cp); three hpw; subject coordinator Mr A Brady;* **CE/SE**

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 inter-relationships 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%, bridge design project 30%, quiz 30%

47302 WELDING *(elective) (3cp); three hpw; prerequisite 47164 Metals Technology; subject coordinator Dr H Chung;* **CE/SE**

Introduces the 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: assignment 40%, quizzes 60%

47303 LAND DEVELOPMENT *(elective) (3cp); three hpw; subject coordinator Mr A Brady;* **CE/SE**

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%, final examination 30%

47304 COASTAL ENGINEERING *(elective) (3cp); three hpw; prerequisite 47175 Water Engineering; subject coordinator Dr M Patarapanich;* **CE**

Coastal Engineering is offered as an elective in the water engineering strand within the civil engineering course. The main objective is to provide a general introduction to natural behaviour of water waves and their interactions with the coastline and coastal structures. Topics covered: wave generation processes and wave forecasting; wave theories and their limits of validity; wave kinematics in deep and shallow water, shoaling; wave refraction; wave reflection; wave diffraction; wave forces on walls and piles; design of breakwater and marina; measurement and statistical analysis of random waves; estimation of extreme waves; tide and other long period water level fluctuations; coastal sediment transport and shore protection methods; marine outfall for sewage disposal; physical and computer models.

Assessment: assignments/reports 50%, examinations 50%

47305 RISK AND RELIABILITY ANALYSIS *(elective) (3cp); three hpw; prerequisite 47113 Computations I; subject coordinator Dr B Samali;* **CE/SE**

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%, 2 quizzes 70%

47306 GEOMECHANICS *(elective) (3cp); three hpw; prerequisites 47156 Soil Engineering, completion of 47166 Geotechnical Engineering strongly recommended;* **CE/SE**

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%, quiz 20%, report 60%

47307 CONSTRUCTION MANAGEMENT *(elective) (3cp); three hpw; prerequisites 47149 Construction, 47159 Project Planning, 47179 Construction Contracts;* **CE/SE**

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%, project submission 40%, skills test 30%

47312 WATER SUPPLY AND SEWERAGE *(3cp); three hpw; prerequisites 47155 Hydrology, 47152 Public Health Engineering;* **CE/SE**

Students will be made familiar with the nature of water supply and sewerage facilities. They are to see these in a "systems" context and understand how the various components relate to each other, and the

bases on which components should be designed. The emphasis is on hydraulics and the conveyance of water and wastewater, rather than on treatment processes or pollution impacts. Through exercises, students are to gain an appreciation of design processes and tools.

Subject content includes purposes of water supply and sewerage systems; types of water supply system components – source, extraction facility, treatment works, pumps, conveyances, appurtenences, storages, distribution system; design principles – water demands, quality standards, reliability of supply; system hydraulics – pipe network analysis, water hammer; types of sewerage system components – collection system, pumping stations, conveyances, appurtenences, treatment works, receiving waters; design principles – sewage quantities and characteristics, overflow frequencies, effluent standards, gravity and pumped pipe system hydraulics, sulphide protection; and hydraulics of water and sewerage treatment works – rapid mixing, flocculation, sedimentation and filtration.

Assessment: assignments 100%

47318 URBAN STORMWATER DRAINAGE *(elective) (3cp); three hpw; prerequisite 47155 Hydrology;* **CE/SE**

Students will be given a grounding in design and analysis of urban stormwater drainage systems. They are to see these in their social and environmental setting, and to understand the rationale for design and operation. By performing exercises they will become familiar with standard design procedures and aware of problems encountered in practice.

Topics covered include urban stormwater drainage systems; two problems – flooding and pollution; approach to design; hydrology and hydraulics; pipe system design – rational method and computer procedures; trunk drainage design – basic manual procedures and computer models; culvert hydraulics; detention basins; roof and property drainage; erosion and sedimentation; stormwater pollution – sources, effects remedial measures; interactions with sanitary sewers; drainage system safety.

Assessment: assignments 100%

47997 PROFESSIONAL EXPERIENCE (sandwich) CE/SE

47999 PROFESSIONAL EXPERIENCE (part-time) CE/SE

Subject coordinator P C Liu

This is the Professional Experience subject for Civil and Structural 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 thishandbook under the heading "Industrial Experience Requirements".

48010 INTRODUCTION TO MANUFACTURING *(4cp); three hpw; subject coordinator C T Mathews;* **BT**

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 is presented in an economic and political context. Students explore the scope manufacturing in Australia through interviews, site visits, and literature research.

Assessment: assignments 100%

48011 COMPUTING FOR MANUFACTURING AND MANAGEMENT *(4cp); four hpw; subject coordinator A N Mack;* **BT**

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, work processing, spreadsheets, databases, simple graphics and elementary programming.

Assessment: assignments 40%, examination 60%

48020 COMMUNICATION IN MANUFACTURING AND MANAGEMENT *(4cp); three hpw; subject coordinator H McGregor;* **BT**

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%

48021 NUMERICAL METHODS *(4cp); four hpw; prerequisite 48011 Computing for Manufacturing and Management; subject coordinator C T Mathews;* **BT**

Builds on the students' knowledge of mathematics in the following areas and cover 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 spread sheets.

Assessment: assignments 40%, final examination 60%

48022 MATERIALS FOR MANUFACTURING *(4cp); three hpw; prerequisite 65025 Chemistry;* **BT**

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%, laboratory and visit reports 20%, examination 60%

48030 THE INDUSTRIAL ENVIRONMENT *(4cp); three hpw; prerequisites 48020 Communication in Manufacturing and Management; subject coordinator Dr D Cobbin (Centre for Multi-disciplinary Studies);* **BT**

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%, final examination 30%

48031 COMPUTER-AIDED DRAWING AND DESIGN *(4cp); four hpw; prerequisite 48021 Numerical Methods; subject coordinator F Swinkels;* **BT**

Develops an understanding of computer-aided drafting and design technology, including relevant computer algorithms and geometry modellers, and to develop 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%, projects 50%, examination 25%

48032 FINANCIAL PLANNING FOR MANUFACTURING *(4cp); three hpw; subject coordinator Y Bhasin;* **BT**

Introduces the students to the basic concepts of economic and financial analysis and their application to the manufacturing environment. To familiarise students with the methods of costing used in manufacturing.

The subject covers economic evaluation of operational problems; revenue-cost relationships through time-value analysis, break-even analysis, depreciation, effects of income tax on economic evaluations, and replacement studies; general accounting; standard costing and activity-based costing; distribution of overheads; ratio analysis and annual reports.

Assessment: assignments 30%, examination 70%

48040 MANAGEMENT FOR MANUFACTURING *(4cp); three hpw; prerequisites 48020 Communication in Manufacturing and Management; 48032 Financial Planning for Manufacturing; 48030 The Industrial Environment; corequisite 24221 Principles of Marketing; subject coordinator R Ward;* **BT**

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

The over-riding 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%, participation 10%, examination 30%

48041 COMPUTER-AIDED MANUFACTURING *(4cp); four hpw; prerequisite 48031 Computer-Aided Drawing and Design; subject coordinator F Swinkels;* **BT**

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%, projects 50%, examination 25%

48050 ENGINEERING DOCUMENTATION *(3cp); three hpw; subject coordinator H McGregor;* **BT**

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%

48051 METROLOGY AND INSPECTION *(4cp); three hpw; prerequisite 48040 Management for Manufacturing; subject coordinator Y Bhasin;* **BT**

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

The subject will cover principles of measurement mechanical, 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%, laboratory 40%, examination 40%

48052 PROFESSIONAL REVIEW *(3cp); two hpw; prerequisite 48040 Management for Manufacturing; subject coordinator C T Mathews;* **BT**

Focuses the students on their past work experience and require 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%, seminar 20%

48053 TECHNOLOGICAL CHANGE AND STRATEGIC PLANNING *(3cp); two hpw; prerequisite 48040 Management for Manufacturing; subject coordinator C T Mathews;* **BT**

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%, final examination 30%

48060 QUALITY FOR MANUFACTURING *(4cp); three hpw; prerequisite 48051 Metrology and Inspection; subject coordinator R Spencer;* **BT**

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%, examination 70%

48061 DESIGN FOR MANUFACTURE *(4cp); three hpw; prerequisite 48041 Computer-Aided Manufacturing; subject coordinator F Swinkels;* **BT**

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%, projects 25%, examination 50%

48062 TEROTECHNOLOGY *(3cp); two hpw; prerequisites 48040 Management for Manufacturing, 48050 Engineering Documentation, 48051 Metrology and Inspection; subject coordinator Y Bhasin;* **BT**

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%, participation 10%, examination 30%

51131 COMMUNICATIONS I *(3cp); three hpw; subject coordinator Ms K Fry;* **BT**

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: 1 essay 25%, 1 report 25%, oral report 25%, quiz 25%

51161 COMMUNICATIONS II *(3cp); three hpw; prerequisite 51131 Communications I; subject coordinator Ms K Fry;* **BT**

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%, seminar 25%, class assignments 25%, quiz 25%

52001 HISTORY OF IDEAS *(3cp); three hpw;* **EE/CSE**

Designed to familiarise students with major currents in social thought in a global context, as a grounding for later year and advanced units pertinent to professional practice.

62174 CORROSION TECHNOLOGY FOR ENGINEERS *(3cp); three hpw; prerequisite 62178 Engineering Chemistry; corequisite 63704 Materials Engineering I;* **ME/MFG**

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 are 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%, final examination 70

62178 ENGINEERING CHEMISTRY *(6cp); six hpw; subject coordinator B Young (School of Physical Sciences, Chemistry);* **ME/MFG, CE/SE**

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 equilibra, basic

organic chemistry, polymers and the structure of solids.

Assessment: mid-semester examination 40%, final examination 60%

62326 HYDROGEOLOGY *(5cp); three hpw;* **GWM**

Provides a knowledge of geological occurrence and hydraulics of groundwater flow, exploration techniques, extraction engineering and field management.

Assessment: continuous assessment involving assignments, problems, short examinations and field tutorial reports.

62328 HYDROGEOCHEMISTRY *(5cp); three hpw;* **GWM**

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.

Assessment: continuous assessment involving assignments, problems, short examinations and field tutorial reports.

62380 GEOPOLLUTION MANAGEMENT *(5cp); three hpw;* **GWM**

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.

Assessment: continuous assessment involving assignments, problems, short examinations and field tutorial reports.

62388 GEOLOGY FOR ENGINEERS *(3cp); three hpw; subject coordinator Dr S Sangameshwar;* **CE/SE**

Introduce students to the areas of classical geology – rocks and minerals; landscape forming process; elementary rock mechanics.

Assessment: classwork 50%, final examination 50%

62392 GROUNDWATER GEOPHYSICS *(5cp); three hpw;* **GWM**

An advanced application of geophysical techniques for groundwater research, resource management and includes contamination assessment and monitoring.

Assessment: continuous assessment involving assignments, problems, short examinations and field tutorial reports.

62393 GEOPHYSICS AND REMOTE SENSING OF GROUNDWATER RESOURCES *(5cp); three hpw;* **GWM**

Examines both theoretically and practically the geophysical and remote sensing techniques applicable to groundwater resources evaluation and other environmental problems.

Assessment: continuous assessment involving assignments, problems, short examinations, field tutorial reports.

63113 ENGINEERING PHYSICS I (ELECTRICAL)*(6cp); six hpw;* **EE/CSE**

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%, lab work 20%, final examination 60%

63117 ENGINEERING PHYSICS(MECHANICAL) *(4cp); four hpw; prerequisite 33121 Engineering Mathematics IA;* **ME/MFG**

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%, lab reports 20%, final examination 60%

63123 ENGINEERING PHYSICS II (ELECTRICAL)*(3cp); three hpw; prerequisite 63113 Engineering Physics I (Electrical) ;* **EE/CSE**

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%, lab work 20%, final examination 60%

63127 ELECTRICAL ENGINEERING I (MECHANICAL) *(4cp); four hpw; prerequisites 63117 Engineering Physics (Mechanical), 33122 Engineering Mathematics IB;* **ME/MFG**

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; DG generators and motors; three-phase induction motors and synchronous motors.

Assessment: lab work 25%, assignments 10%, class tests (2) 20%, final examination 45%. To pass this subject, students must score at least 40% in the final exam.

63131 ENGINEERING PHYSICS (CIVIL) *(6cp); six hpw; corequisites 33121 Engineering Mathematics IA, 47117 Statics; subject coordinator Assoc Professor P Logan;* **CE/SE**

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%, continuous assessment 23%, final examination 60%

63132 ENGINEERING PHYSICS (CIVIL) *(part-time) (3cp); three hpw; corequisites 33121 Engineering Mathematics IA, 47117 Statics; subject coordinator Assoc Professor P Logan;* **CE/SE**

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%, continuous assessment 23%, final examination 60%

63133 ENGINEERING PHYSICS III (ELECTRICAL) *(3cp); three hpw; prerequisites 63123 Engineering Physics II (Electrical), 63734 Materials Technology;* **EE**

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: lab work 30%, assignments 20%, quiz 10%, examination 40%

63154 ELECTRICAL POWER GENERATION *(3cp); three hpw; prerequisite 63113 Engineering Physics I (Electrical);* **EE**

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.

63155 COMMUNICATION PHYSICS *(3cp); three hpw; prerequisites 45144 Electronic Devices and Circuits, 45145 Engineering Statistics, 45264 Fields and Waves; corequisite 45152 Signal Theory II;* **EE**

Basic aspects of electromagnetic wave propagation and attenuation in specific media. Real boundary problems, distributed source and multi-wavelength 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%, lab work 25%, quiz 15%, examination 45%

63704 MATERIALS ENGINEERING I *(4cp); four hpw; prerequisite 62178 Engineering Chemistry;* **ME/MFG**

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: lab 25%, quizzes 25%, final examination 50%

63721 MATERIALS SCIENCE FOR ENGINEERS *(3cp); three hpw; corequisite 62178 Engineering Chemistry; subject coordinator Dr W Yeung;* **CE/SE**

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%, quizzes 20%, final examination 50%

63734 MATERIALS TECHNOLOGY *(3cp); three hpw; prerequisite 63113 Engineering Physics I (Elec);* **EE**

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: lab work 20%, assignment 5%, quizzes 25%, final examination 50%

63741 MATERIALS ENGINEERING II *(4cp); four hpw; prerequisites 63704 Materials Engineering I, 46220 Solid Mechanics I; corequisite 46820 Engineering Statistics;* **ME/MFG**

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%, lab reports 15%, formal examinations 75%

65025 CHEMISTRY *(4cp); three hpw; subject coordinator Mr B Young (School of Physical Sciences, Chemistry);* **BT**

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%, examination 70%

79370 LAW AND CONTRACTS FOR MANUFACTURING *(3cp); two hpw; prerequisites 48030 The Industrial Environment, 48040 Management for Manufacturing, 48050 Engineering Documentation; corequisite 48053 Technological Change and Strategic Planning;* **BT**

Provides the 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%, participation 10%, examination 30%

79737 ENGINEERING LAW *(6cp); three hpw;* **MEM**

Introduces engineers to an overview of the Australian legal system and to the areas of law in which they may be involved.

Special emphasis will be laid on the law of contract to reflect many recent developments in this area as well as an evaluation of current trends, including the social and commercial policy issues which underlie the law, illustrating the way in which lawyers give effect to these policy considerations through the

development of legal concepts.

Assessment: assignment 40%, examination 60%

91379 ENVIRONMENTAL SCIENCE FOR ENGINEERS *(3cp); three hpw;* **ME/ MFG**

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%, one assignment-desk study 30%, final examination 40%

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E A Taylor, BE (NSW), CPEng, MIEAust

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S Murray, BE (Newcastle), MIEEE

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H R Witjetlaka, BEng (Warwick)

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R S Nicholson
S Y Shoon, BSc (Coll of Chinese Culture, Taiwan), MSc (Nat Taiwan IT)

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Assistant Laboratory Manager
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R M Spencer, DipME (Qld), MSc (UMIST), PhD (NSW), MIEAust

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H McGregor, BS (Drexel), MA (Macq), HERDSA
L E Reece, BE (NSW), MEngSc (Syd), MBioengSc (Strath), MIEAust
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R M Wiltshire, MSc (Cranfield), MIEAust

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S Tanuwidjaja

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K C Barnes, BA (Macq)

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C M Chapman, BSc (UTS)

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Senior Laboratory Craftsmen
S M Gordon
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T E Wells
L S Stonard

Stores Officer
E J Newton

Associated Centres

Centre for Local Government Education and Research

(University Centre with links to the Faculties of Engineering, Business and Design, Architecture and Building.)

Associate Professor and Centre Director
K Sproats, BTP, GradDip HNP (NSW), PhD (NE), MRAPI, AIMM

Deputy Directors
R Crichton, BA (Hons) (Syd), PhC (Vic Coll of Pharmacy)
J O'Neill, BA (NE), DipEd, (Syd), MAIC

National Centre for Groundwater Management

(Jointly with the Faculty of Science)

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Senior Lecturers
W A Milne-Home, BSc (Leicester), MSc (Lond), PhD (Alberta), CertEngGCH (NSW)
N P Merrick, BSc, MSc (Syd), GradDipDataProc (NSWIT)

Research Fellow
R G McLaughlan, BSc (Melb), GradDipCivEng, MAppSc, PhD (NSW)

Administrative Assistant
R Peters, BA (Ramkhamhaeng)

PRINCIPAL DATES FOR 1993

AUTUMN SEMESTER

JANUARY

11	Release of HSC results
11	School of Legal Practice enrolment day at St Leonards
18	Closing date for changes of preference to the Universities Admissions Centre (UAC) from 1992 NSW HSC applicants (by 4.30 pm)
21-29	Enrolment of students at City campus
26	Australia Day
29	Public School Holidays end

FEBRUARY

1 - 26	Enrolment of students at City campus
3 - 5	Enrolment of new undergraduate students at City campus - includes UAC and direct applicants
4 - 5	Enrolment of all Faculty of Nursing students at Kuring-gai campus
10 - 11	Enrolment of all School of Teacher Education students at Kuring-gai campus
22	Enrolment of School of Biological and Biomedical Science students at St Leonards campus

MARCH

1	Classes begin
12	Last day to enrol in a course or add subjects
12	Last day to change to upfront HECS payment
26	Last day to apply for leave of absence without incurring financial penalty
31	HECS Census Date

APRIL

8	Last day to drop a subject without academic penalty*
8	Last day to withdraw from a course without academic penalty*
9	Public School Holidays begin
9	Good Friday
12	Easter Monday
13	Graduation period begins
13 - 16	Vice-Chancellors' Week (non-teaching)
16	Public School Holidays end
25	Anzac Day
30	Graduation period ends
30	Last day to apply to graduate in Spring 1993

MAY

28	Closing date for undergraduate applications for Spring semester

JUNE

14	Formal examination period begins
28	Public School Holidays begin

SPRING SEMESTER

JULY

2	Formal examination period ends
5	School of Legal Practice enrolment day at St Leonards campus
5 - 9	Vice-Chancellors' Week (non-teaching)
9	Public School Holidays end
21	Release of Autumn Semester examination results
26 - 30	Confirmation of Spring programs
27 - 28	Enrolment of new students

AUGUST

2	Classes begin
5	Last day to withdraw form full year subjects without failure*
13	Last day to enrol in a course or add subjects
13	Last day to change to upfront HECS payment
27	Last day to apply for leave of absence
31	HECS Census Date
31	Last day to apply to graduate in Autumn 1994

SEPTEMBER

10	Last day to drop a subject without academic penalty*
10	Last day to withdraw from a course without academic penalty*
27	Public School Holidays begin
27	Vice-Chancellors' Week (non-teaching) begins
27	Graduation period begins
27-29	Conference on Cultural Diversity
30	Closing date for undergraduate applications via UAC (without late fee)
30	Closing date for inpUTS Special Admission Scheme applications
30	Closing date for postgraduate applications – to be confirmed

OCTOBER

1	Vice-Chancellors' Week (non-teaching) ends
1	Graduation period ends
8	Public School Holidays end
29	Closing date for postgraduate research and course award applications
29	Closing date for undergraduate applications via UAC (with late fee)
29	Closing date for undergraduate applications direct to UTS (without late fee)

NOVEMBER

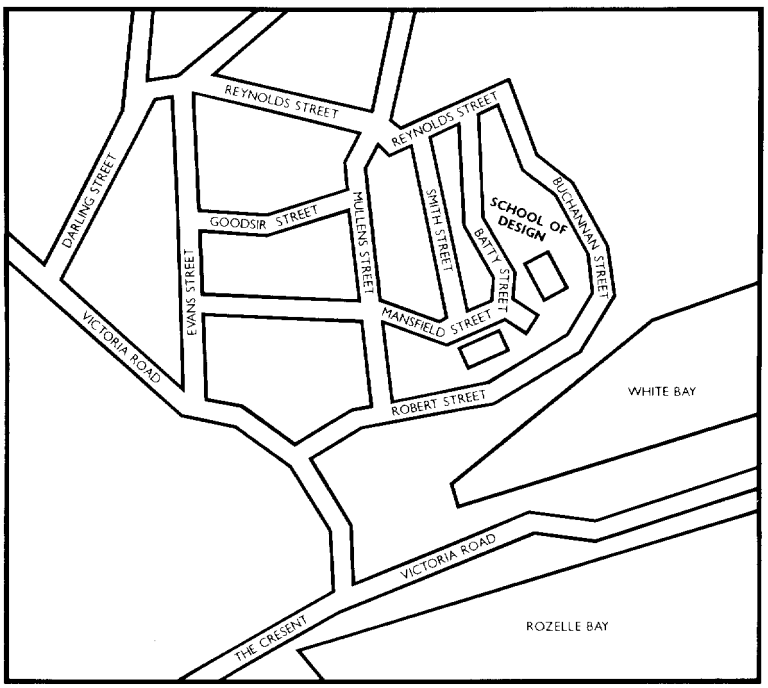
15	Formal examinations begin

DECEMBER

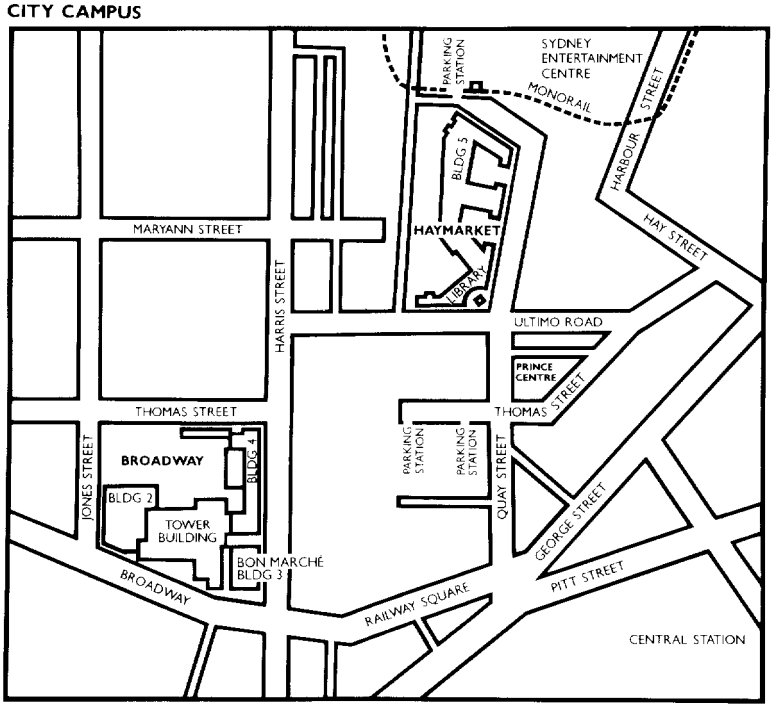
3	Formal examinations end
20	Public School Holidays begin
24	Release of Spring Semester examination results

** HECS or Postgraduate Course Fees still apply after the HECS Census date.*

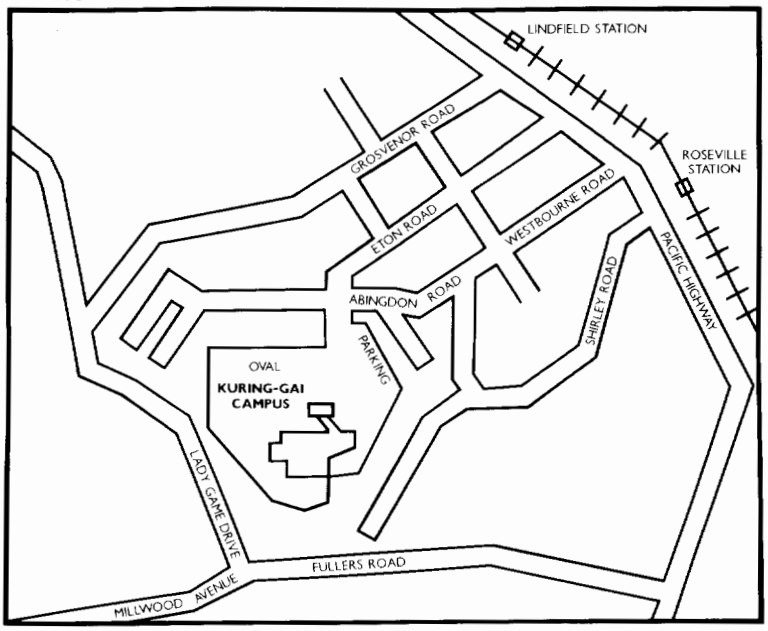
BALMAIN CAMPUS



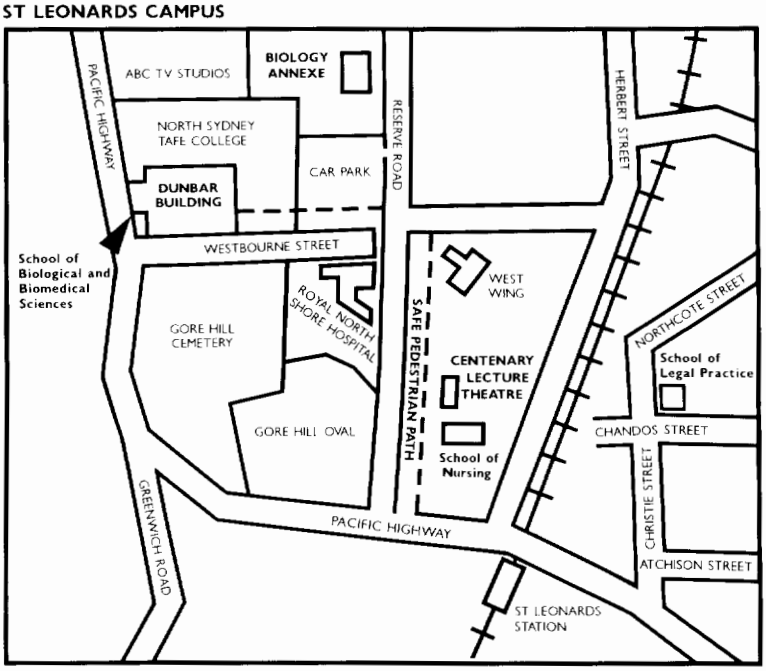
CITY CAMPUS



KURING-GAI CAMPUS



ST LEONARDS CAMPUS



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