How to use this Handbook

The information in this book has been divided into seven parts.

General Information (the India coloured pages) lists what you need to know about the University as a whole, introduces some of the services available and notes the most important rules and procedures. You should read this part in its entirety.

For further information about the University and its activities, see the University Calendar.

Faculty Information.

Undergraduate Study outlines the courses available in each school in the faculty.

Graduate Study is about higher degrees.

Subject Descriptions lists each subject offered by the schools in the faculty. The schools are listed numerically.

Information includes:
- Subject number, title and description
- Prerequisite, co-requisite and excluded subjects, where applicable
- Additional information about the subject such as unit values, credit hours, teaching hours per week, sessions when taught

Financial Assistance to Students is a list of scholarships and prizes, available at undergraduate and graduate level in the faculty.

Staff list.

For detailed reference, see the list of Contents.
The address of the University of New South Wales is:

PO Box 1, Kensington,
New South Wales, Australia 2033

Telephone: (02) 663 0351
Telegraph: UNITECH, SYDNEY
Telex AA26054

The University of New South Wales Library has catalogued this work as follows:

UNIVERSITY OF NEW SOUTH WALES
Faculty of Engineering
Handbook.
Annual. Kensington.
1962+

University of New South Wales —
Faculty of Engineering — Periodicals.
Subjects, courses and any arrangements for courses including staff allocated, as stated in the Calendar or any Handbook or any other publication, announcement or advice of the University, are an expression of intent only and are not to be taken as a firm offer or undertaking. The University reserves the right to discontinue or vary such subjects, courses, arrangements or staff allocations at any time without notice.

Information in this Handbook has been brought up to date as at 13 September 1982, but may be amended without notice by the University Council.

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General Information

To obtain the maximum benefit from your studies you should make an effort to learn what facilities the University offers, to investigate the best methods of study and to discover as much as possible about the course for which you are enrolled.

This Handbook has been specially designed as a detailed source of reference for you in all matters related to your Faculty. This General Information Section is intended to help you put the Faculty into perspective with the University as a whole, to introduce you to some of the services available to students and to note some of the most important rules and procedures.

For fuller details about some aspects of the University and its activities you might need to consult the University Calendar.

Some people who can help you

If you are experiencing difficulties in adjusting to the requirements of the University you will probably need advice. The best people to talk to on matters relating to progress in studies are your tutors and lecturers. If your problem lies outside this area there are many other people with specialized knowledge and skills who may be able to help you.

The Deputy Registrar (Student Services), Mr Peter O'Brien, and his Administrative Assistant, Mrs Anne Beaumont, are located on the first floor of the Chancellery. They will help those students who need advice and who have problems but who do not seem to be provided for by the other organizations and services mentioned. As well as dealing with general enquiries they are especially concerned with the problems of physically handicapped and disabled students. Enquire at room 148E, phone 2482.

Note: All phone numbers below are University extension numbers. If you are outside the University, dial 663 0351 and ask for the extension. Alternatively you may dial 662 and then the extension number. This prefix should only be used when you are certain of the extension that you require as callers using 662 cannot be transferred to any other number.

The Assistant Registrar (Admissions and Examinations), Mr Jack Hill, is located on the ground floor of the Chancellery. General enquiries should be directed to 3715. For information regarding examinations, including examination timetables and clash of examinations, contact the Senior Administrative Officer, Mr John Grigg, phone 2143.
The Assistant Registrar (Student Records and Scholarships - Undergraduate and Postgraduate), Mr Graham Mayne is located on the ground floor of the Chancellery. For particular enquiries regarding illness and other matters affecting performance in examinations and assessment, academic statements, graduation ceremonies, prizes, release of examination results and variations to enrolment programs, phone 3711.

The Adviser for Prospective Students, Mrs Fay Lindsay, is located in the Chancellery and is available for personal interview. For an appointment phone 3453.

The Assistant Registrar (Careers and Employment), Mr Jack Foley, is located in the Chancellery. Enquiries should be directed to 3259.

The Off-campus Housing Officer, Mrs Judy Hay, is located in Room 148E in the Chancellery. For assistance in obtaining suitable lodgings phone 3260.

Student Loans enquiries should be directed to Mrs Judy Hay, Room 148E in the Chancellery, phone 3164.

The Student Health Unit is located in Hut E15b at the foot of Basser Steps. The Director is Dr Geoffrey Hansen. For medical aid phone 2679, 2678 or 2677.

The Student Counselling and Research Unit is located at the foot of Basser Steps. For assistance with educational or vocational problems ring 3681 or 3685 for an appointment.

The University Librarian is Mr Allan Morton. Library enquiries should be directed to 2048.

The Chaplaincy Centre is located in Hut E15a at the foot of Basser Steps. For spiritual counselling phone Anglican – 2684; Catholic – 2379; Greek Orthodox – 2683; Lutheran – 2683; Uniting Church – 2685.

The Students’ Union is located on the second floor of Stage III of the University Union, where the SU President, Secretary-Treasurer, Education Vice-President, Welfare-Research Officer, Director of Overseas Students and a full-time solicitor employed by the Students’ Union are available to discuss any problems you might have.

Cashier’s Hours The University Cashier’s office is open from 9.30 am to 1.00 pm and from 2.00 pm to 4.30 pm, Monday to Friday. It is open for additional periods at the beginning of Session 1. Consult noticeboards for details.

### Calendar of Dates

#### The Academic Year

The academic year is divided into two sessions, each containing 14 weeks for teaching. There is a recess of five weeks between the two sessions and there are short recesses of one week within each of the sessions. Session 1 commences on the first Monday of March.

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#### Third and Fourth Years

| Term 1 (8 weeks)            | 24 January to 3 April |
| Term 2 (8 weeks)            | 11 April to 15 May |
| Term 3 (8 weeks)            | 16 May to 22 May |
| Term 4 (8 weeks)            | 23 May to 19 June |

#### Fifth Year

| Term 1 (8 weeks)            | 24 January to 3 April |
| Term 2 (8 weeks)            | 28 March to 22 May |
| Term 3 (8 weeks)            | 30 May to 24 July |
| Term 4 (8 weeks)            | 1 August to 25 September |

#### January

| Monday 3 | Public Holiday |
| Tuesday 4 | Last day for applications for review of results of annual examinations |
| Friday 14 | Last day for acceptance of applications by Admissions Office for transfer to another undergraduate course within the University |
| Monday 31 | Australia Day — Public Holiday |
February

Thursday 3  Enrolment period begins for new undergraduate students and undergraduate students repeating first year
Monday 21  Enrolment period begins for second and later year undergraduate students and graduate students enrolled in formal courses
Monday 28  Last day for undergraduate students who have completed requirements for pass degrees to advise the Registrar they are proceeding to an honours degree or do not wish to take out the degree for which they have applied for any other reason

March

Monday 7  Session 1 begins— all courses except Medicine III, IV and V
Wednesday 9  List of graduands for April/May ceremonies and 1982 prizewinners published in *The Sydney Morning Herald*
Monday 14  Last day for notification of correction of details published in *The Sydney Morning Herald* on 9 March concerning April/May graduation ceremonies
Friday 18  Last day for acceptance of enrolment by new undergraduate students (late fee payable thereafter)
Thursday 31  Last day for acceptance of enrolment by undergraduate students re-enrolling in second and later years (late fee payable thereafter)

April

Friday 1  Good Friday—Public Holiday
Saturday 2  Easter Saturday—Public Holiday
Monday 4  Easter Monday—Public Holiday
Friday 22  Last day for undergraduate students to discontinue without failure subjects which extend over Session 1 only
Monday 25  Anzac Day—Public Holiday

May

Monday 2  *Confirmation of Enrolment* forms despatched to all students
Wednesday 11  Last day for acceptance of corrected *Confirmation of Enrolment* forms
Friday 13  Last day for undergraduate students completing requirements for degrees at the end of Session 1 to submit *Application for Admission to Degree* forms
Monday 16  **May Recess begins**
Thursday 19  Publication of provisional timetable for June/July examinations
Sunday 22  **May Recess ends**
Friday 27  Last day for students to advise of examination clashes

June

Tuesday 7  Publication of timetable for June/July examinations
Monday 13  Queen's Birthday Holiday
Sunday 19  **Session 1 ends**
Monday 20  **Midyear Recess begins**
Tuesday 21  Examinations begin

July

Wednesday 6  Examinations end
Monday 18  Examination results mailed to students
Tuesday 19  Examination results displayed on University noticeboards
Tuesday 13 to Friday 22  Students to amend enrolment programs following receipt of June examination results
Sunday 24  **Midyear Recess ends**
Monday 25  **Session 2 begins**

August

Thursday 4  Last day for applications for review of June assessment results
Friday 5  Foundation Day—no classes held
Monday 29  Last day for students to discontinue without failure subjects which extend over the whole academic year

September

Sunday 4  **August Recess begins**
Tuesday 6  **August Recess ends**

Tuesday 7  List of graduands for October graduation ceremonies published in *The Sydney Morning Herald*
Friday 9  Last day for undergraduate students to discontinue without failure subjects which extend over Session 2 only
Monday 12  Last day for notification of correction of details published in *The Sydney Morning Herald* on 7 September concerning October graduation ceremonies
Monday 19  *Confirmation of Enrolment* forms despatched to all students
Wednesday 28  Last day for acceptance of corrected *Confirmation of Enrolment* forms
Friday 30  Last day for applications from undergraduate students completing requirements for degrees at the end of Session 2 to submit applications for *Application for Admission to Degree* forms

**Last day to apply to UCAC for transfer to another tertiary institution in New South Wales**
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<td>Monday 19</td>
<td>Examination results mailed to students</td>
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<tr>
<td></td>
<td>Tuesday 20</td>
<td>Examination results displayed on University noticeboards</td>
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<td>Sunday 25</td>
<td>Christmas Day</td>
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<td>Monday 26</td>
<td>Boxing Day – Public Holiday</td>
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<td>Tuesday 27</td>
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<tr>
<td>November</td>
<td>Sunday 6</td>
<td>Session 2 ends</td>
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<td>Monday 7</td>
<td>Study Recess begins</td>
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<td>Sunday 13</td>
<td>Study Recess ends</td>
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<td>Monday 14</td>
<td>Examinations begin</td>
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<tr>
<td>December</td>
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**Faculty of Medicine**

<table>
<thead>
<tr>
<th>First and</th>
<th>Second Years</th>
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<tr>
<td>Term 1 (10 weeks)</td>
<td>23 January to 1 April</td>
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<tr>
<td>Term 2 (9 weeks)</td>
<td>9 April to 13 May</td>
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<tr>
<td>Term 3 (9 weeks)</td>
<td>25 June to 26 August</td>
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<tr>
<td>Term 4 (10 weeks)</td>
<td>3 September to 29 November</td>
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<th>Third and Fourth Years</th>
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<tbody>
<tr>
<td>May Recess: 14 May to 20 May</td>
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<td>Midyear Recess: 18 June to 22 July</td>
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<th>Fifth Year</th>
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<td>Term 1 (8 weeks)</td>
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<td>Term 4 (8 weeks)</td>
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<td>Term 5 (8 weeks)</td>
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<td>Monday 30</td>
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<td>Friday 20 to Monday 23</td>
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<td>Wednesday 25</td>
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Organization of the University

Rapid development has been characteristic of the University of New South Wales since it was first incorporated by an Act of Parliament in 1949, under the name of the New South Wales University of Technology.

In 1982 the University had 19,016 students and over 3,600 staff who worked in more than eighty buildings. These figures include staff and students at Broken Hill (W.S. and L.B. Robinson University College), Duntroon (the Faculty of Military Studies) and Jervis Bay.

The Professorial Board

The Professorial Board is one of the two chief academic bodies within the University and includes all the professors from the various faculties. It deliberates on all questions such as matriculation requirements, the content of courses, the arrangement of syllabuses, the appointment of examiners and the conditions for graduate degrees. Its recommendations on these and similar matters are presented to Council for its consideration and adoption.

The Council

The chief governing body of the University is the Council which has the responsibility of making all major decisions regarding its policy, conduct and welfare.

The Council consists of 44 members from the State Parliament, industry and commerce, agriculture, the trade unions, professional bodies, the staff, the students and the graduates of the University.

The Council meets six times per year and its members also serve on special committees dealing with, for example, academic matters, finance, buildings and equipment, personnel matters, student affairs and public relations.

The Faculties/Boards of Studies

The dean, who is also a professor, is the executive head of the faculty or board of studies. Members of each faculty or board meet regularly to consider matters pertaining to their own areas of study and research, the result of their deliberations being then submitted to the Professorial Board.

The term 'faculty' is used in two distinct senses in the University. Sometimes it is used to refer to the group of schools comprising the faculty, and at others to the deliberative body of academic members of the Schools within the faculty.

The eleven faculties are Applied Science, Architecture, Arts, Biological Sciences, Commerce, Engineering, Law, Medicine, Military Studies, Professional Studies and Science. In addition, the Board of Studies of the Australian Graduate School of Management (AGSM) and the Board of Studies in General Education fulfil a function similar to that of the faculties. The Board of Studies in Science and Mathematics, which was established to facilitate the joint academic administration of the Science and Mathematics degree course by the faculties of Biological Sciences and Science, considers and reports to the Professorial Board on all matters relating to studies, lectures and examinations in the science and mathematics degree course.

The Schools

Once courses of study have been approved they come under the control of the individual schools (eg the School of Chemistry, the School of Mathematics). The head of the school in which you are studying is the person in this academic structure with whom you will be most directly concerned.
Executive Officers

As chief executive officer of the University, the Vice-Chancellor and Principal, Professor Michael Birt, is charged with managing and supervising the administrative, financial and other activities of the University.

He is assisted in this task by two Pro-Vice-Chancellors, Professor Ray Golding and Professor Athol Carrington, together with the Deans and the three heads of the administrative divisions.

Award of the University Medal

The University may award a bronze medal to undergraduate students who have achieved highly distinguished merit throughout their degree course.

Identification of Subjects by Numbers

For information concerning the identifying number of each subject taught in each faculty as well as the full list of identifying numbers and subjects taught in the University, turn to the first page of the section Subject Descriptions. This list is also published in the Calendar.

Textbook Lists

Textbook lists are not published in the faculty handbooks. Separate lists are issued early in the year and are available at key points on the campus.

Students should allow quite a substantial sum for textbooks. This can vary from $250 to $600 per year depending on the course taken. These figures are based on the cost of new books. The Students’ Union operates a secondhand bookshop. Information about special equipment costs, accommodation charges and cost of subsistence on excursions, field work, etc, and for hospital residence (medical students) are available from individual schools.

Co-operative Bookshop

Membership is open to all students, on initial payment of a fee of $10, refundable when membership is terminated.

General Studies Program

Almost all undergraduates in faculties other than Arts and Law are required to complete a General Studies program. The Department of General Studies within the Board of Studies in General Education publishes its own Handbook which is available free of charge. All enquiries about General Studies should be made to the General Studies Office, Room G56, Morven Brown Building, phone 3475.
Student Services and Activities

Accommodation

Residential Colleges

There are seven residential colleges on campus. Each college offers accommodation in a distinctive environment which varies from college to college, as do facilities and fees. A brief description of each college is given below, and further information may be obtained directly from the individual colleges. In addition to basic residence fees, most colleges make minor additional charges for such items as registration fees, caution money or power charges. Intending students should lodge applications before the end of October in the year prior to the one in which they seek admission. Most colleges require a personal interview as part of the application procedure.

The Kensington Colleges

The Kensington Colleges comprise Basser College, Goldstein College and Philip Baxter College. They house 450 men and women students, as well as tutorial and administrative staff members. Fees are payable on a session basis. Apply in writing to the Master, PO Box 24, Kensington, NSW 2033.

International House

International House accommodates 154 male and female students from Australia and up to thirty other countries. Preference is given to more senior undergraduates and graduate students. Eight residents are available to help students. Apply in writing to the Warden, International House, PO Box 1, Kensington, NSW 2033.

New College

New College is an Anglican college and it provides accommodation (with all meals) for 220 graduates and undergraduates, without regard to race, religion, or sex. The College has its own resident tutors, and sponsors a wide range of sporting and social activities. Apply to the Master, New College, Anzac Parade, Kensington 2033 (telephone 662 6066).

Shalom College

Shalom College is a Jewish residential college. It provides accommodation for 86 men and women students. Non-resident membership is available to students who wish to avail themselves of the Kosher dining room and tutorial facilities. Fees are payable on a session basis. Conferences are catered for, particularly with Kosher requirements. Rates are available on application. Apply in writing to the Master, Shalom College, the University of New South Wales, PO Box 1, Kensington, NSW 2033.

Warrane College

Warrane College provides accommodation for 200 men and is open to students of all ages, backgrounds and beliefs. The College offers a comprehensive tutorial program along with a wide range of activities, professional orientation and opportunities to meet members of the University staff informally. Non-resident membership is available to male students who wish to participate in College activities and to make use of its facilities. The general spiritual care of the College has been entrusted to the Catholic association Opus Dei. Enquiries: The Master, Warrane College, PO Box 123, Kensington 2033. Telephone (02) 662 5199.

Creston Residence

Creston Residence offers accommodation to 25 undergraduate and graduate women students. Activities and tutorials are open to non-resident students. The spiritual activities offered at Creston are entrusted to the Women's Section of Opus Dei. Enquiries: 36 High Street, Randwick 2031. Telephone (02) 398 5693.

Other Accommodation

Off-campus Accommodation

Students requiring other than College accommodation may contact the Housing Officer in the Chancellery, Room 148E for assistance in obtaining suitable accommodation in the way of rooms with cooking facilities, flats, houses, share flats etc. Extensive listings of all varieties of housing are kept up-to-date throughout the year and during vacations. Accommodation in the immediate vicinity of the University is not usually easy to find at short notice, and is expensive.

No appointment is necessary but there may be some delay in February and March. The Housing staff are always happy to discuss any aspect of accommodation.

Special pamphlets on accommodation, lists of estate agents and hints on house-hunting are available on request.

Associations, Clubs and Societies

The Sports Association

The Sports Association is a student organization within the University which caters for a variety of sports for both man
and women. In December 1952 the University Council approved the establishment of the Sports Association, which then consisted of five clubs. As the University has grown the Association has expanded, and it now includes thirty-eight clubs.

The Association office is situated on the 3rd floor, Squarehouse, E4, lower campus, and can be contacted on extension 2673. The control of the Association is vested in the General Committee which includes delegates from all the clubs.

Membership is compulsory for all registered students, and the annual fee is as set out later, in Rules and Procedures, Enrolment Procedures and Fees Schedules, section 15. Fees. Membership is also open to all members of staff and graduates of the University on payment of an annual fee as prescribed in the By-laws of the Association. All members are invited to take part in any of the activities arranged by the Association, and to make use of the University's sporting and recreational facilities.

The Association is affiliated with the Australian Universities Sports Association (AUSA) which is the controlling body for sport in all Australian universities.

School and Faculty Associations

Many schools and faculties have special clubs with interests in particular subject fields. Enquire at the relevant Faculty or School Office for information.

Australian Armed Services

The University maintains links with the Royal Australian Navy, the Australian Army Reserve and the Royal Australian Air Force, and opportunities exist for student participation in their activities. See the General Information section of the Faculty Handbooks for details.

Chaplaincy Centre

The University Chapel

The University provides a small chapel for the use of all faiths. In its temporary housing it is located in Hut E15a near the Chemistry Building. The chapel is available for services of worship by arrangement with the full-time chaplains. At other times it is available for private meditation to all members of the University.

Chaplaincy Service

A Chaplaincy Service is available within the University of New South Wales for the benefit of students and staff.

The service offers fellowship, personal counselling and guidance, together with leadership in biblical and doctrinal studies and in worship. The chaplains maintain close liaison with student religious societies.

The chaplains are located in Hut E15a at the foot of Basser steps, which also contains the temporary chapel.

Deputy Registrar (Student Services)

The Deputy Registrar (Student Services), Mr Peter O'Brien, and his Administrative Assistant, Mrs Anne Beaumont, are located on the first floor of the Chancellery.

They will help those students who have problems and need advice but who do not seem to be provided for by the other organizations and services mentioned. As well as dealing with those enquiries, they are especially concerned with the problems of physically handicapped and disabled students.

All enquiries should be made either at room 14BE or by telephoning extension 2482 (general enquiries).

Sport and Recreation Section

The Sport and Recreation Section seeks ways to encourage students and staff to include exercise as an essential part of their daily lives. It does this through Sports Clubs on a competitive basis and by offering physical recreation on a more casual basis to the University community.

The Section serves the Sports Association and its 38 constituent clubs and is responsible for the continuing management of the Physical Education and Recreation Centre at which recreational programs are available for both students and staff.

It makes bookings for use of sporting facilities including tennis courts and playing fields. The section is located on the 3rd Floor, Squarehouse, E4, lower campus. The various services may be contacted by phone on the following extensions: Recreation Program 3271; Grounds Bookings 2235; Sports Association 2673.

Physical Education and Recreation Centre

The Sport and Recreation Section provides a recreational program for students and staff at the Physical Education and Recreation Centre. The Centre consists of eight squash courts, a main building, and a 50-metre indoor heated swimming pool. The main building has a large gymnasium and practice rooms for fencing, table tennis, judo, weight-lifting, karate and jazz ballet, also a physical fitness testing room. The recreational program includes
intramurals, teaching/coaching, camping. The Centre is located on the lower campus adjacent to High Street. The Supervisor at PERC may be contacted on extension 3271.

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**Student Counselling and Research Unit**

The Student Counselling and Research Unit provides counselling services to students, prospective students, parents and other concerned persons.

The unit is located in the huts near the foot of Basser Steps (access from College Road or Engineering Road).

Appointments are offered throughout the academic year and during recesses between 8 am to 5 pm on week days (up to 7 pm on some evenings). A walk-in service for short interviews is available between 9 am and 5 pm. Appointments may be made by phoning extension 3685 or 3681 between 8.30 am and 5.30 pm.

Counsellors offer assistance in planning, decision-making, problem solving, social and emotional development, and dealing with grievances. Group programs on such topics as study, tutorial and examination skills, stress management, communicating, and self-confidence are offered each session. Brochures are available from the receptionist.

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**Careers and Employment Section**

The Careers and Employment Section provides career advice and assistance in finding employment.

Assistance with careers and permanent employment opportunities includes: the regular mailing of a Job Vacancy Bulletin to registered students and graduates, a Library, and a Campus Interview Program in which final year students have the opportunity to speak to employers regarding employment prospects.

Assistance is also provided in obtaining course-related employment during long vacations as required by undergraduates in Engineering and Applied Science.

The section is located in Undercroft Room LG05 in the Chancellery.

For further information, telephone as follows: careers and employment assistance 3259 or 3630; long vacation industrial training 2086.

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**Student Health Unit**

A student health clinic and first aid centre is situated within the University. The medical service although therapeutic is not intended to replace private or community health services. Thus, where chronic or continuing conditions are revealed or suspected the student may be referred to a private practitioner or to an appropriate hospital. The health service is not responsible for fees incurred in these instances. The service is confidential and students are encouraged to attend for advice on matters pertaining to health.

The service is available to all enrolled students by appointment, free of charge, between 9 am and 5 pm Mondays to Fridays. For staff members, immunizations are available, and first aid service in the case of injury or illness on the campus.

The centre is located in Hut E15b on the northern side of the campus in College Road at the foot of the Basser Steps.

Appointments may be made by calling at the centre or by telephoning extension 2679, 2678 or 2677 during the above hours.

The Family Planning Association of NSW conducts clinics at the Student Health Unit and at the adjacent Prince of Wales Hospital which are available for both staff and students. Appointments may be made for the Student Health Unit clinic by telephoning 588 2333 or for the Prince of Wales Hospital clinics by telephoning 399 0111.

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**The Students' Union**

The Students' Union was formed in 1952 as an organization, duly recognized by the University Council, to represent the student body and to provide a central organization for the administration of student activities. In the words of its constitution, 'The Students' Union is formed for the purpose of advancing the interests of University men and women, facilitating their general scientific and technical education, and fostering a University spirit among them'.

The Students' Union affords a recognized means of communication between the student body and the University administration, and represents its members in all matters affecting their interests. It aims to promote the cultural, educational and recreational life of the University and to encourage a permanent interest among graduates in the life and progress of student activities within the University. The Students' Union also makes representations to government and other bodies outside the University on behalf of its members.

Membership of the Students' Union is compulsory for all registered students of the University; the annual subscription for full-time and part-time students is set out later, in Rules and Procedures, Enrolment Procedures and Fees Schedule, section 15. Fees. All Alumni of the University are eligible for Life Membership.

The Students' Union is governed by a Council consisting in the main of elected student representatives from the
The Water Reference Library situated at Manly Vale (telephone 948 0261) which is closely associated with the Physical Sciences Library.

The activities in which the Students' Union is involved include:

1. A noticeboard for casual job vacancies.
2. Organization of orientation for new students.
3. Organization of Foundation Day.
4. The University's two child care centres.
5. Publication of the student paper Tharunka.
6. A free legal service run by a qualified lawyer employed by the Students' Union Council.
7. A video service with access for students to equipment and advice.
8. The Nuthouse which deals in bulk and health foods.
9. Secondhand Bookshop for cheap texts.
10. CASOC (Clubs and Societies on Campus) which provides money from the SU for affiliated clubs and societies on campus.

The SU office is located on the Second Floor, Stage III, the Union.

The University Library

The University libraries are mostly situated on the upper campus. The library buildings house the Undergraduate Library on Level 3, the Social Sciences and Humanities Library on Level 4, the Physical Sciences Library on Level 7 and the Law Library on Level 8. The Biomedical Library is in the western end of the Mathews Building and is closely associated with libraries in the teaching hospitals of the University.

For details consult Faculty Information in the relevant Faculty Handbook.

There are also library services at other centres:

The Water Reference Library situated at Manly Vale (telephone 948 0261) which is closely associated with the Physical Sciences Library.

The University Union

The University Union provides the facilities students, staff and graduates require in their daily University life and thus an opportunity for them to know and understand one another through associations outside the lecture room, the library and other places of work.

The Union is housed in three buildings near the entrance to the Kensington Campus from Anzac Parade. These are the Roundhouse, the Blockhouse and the Squarehouse. Membership of the Union is compulsory for all registered students and is open to all members of staff and graduates of the University.

The control of the Union is vested in the Board of Management whose Chief Executive Officer is the Warden.

The full range of facilities provided by the Union includes a cafeteria service and other dining facilities, a large shopping centre, (including clothing shop and delicatessen); travel service; banking, pharmaceutical, optometrical and hairdressing facilities; showers; common, games, reading, meeting, music, practice, craft and dark rooms. The Union also has shops on Campus which cater for student needs, including art materials and calculators. Photocopying, sign printing, and stencil cutting services are also available. The Union also sponsors special concerts (including lunchtime concerts) and conducts courses in many facets of the arts including weaving, photography, creative dance and yoga. Full information concerning courses is contained in a booklet obtainable from the Union's program department.

The University Union should not be confused with the Students' Union or Students' Representative Council as it is known in some other universities. This latter body has a representative function and is the instrument whereby student attitudes and opinions are crystallized and presented to the University and the community.
Financial Assistance to Students

Tertiary Education Assistance Scheme

Under this scheme, which is financed by the Commonwealth Government, assistance is available for full-time study in approved courses, to students who are not bonded and who are permanent residents of Australia, subject to a means test on a non-competitive basis. The allowances paid are unlikely to be sufficient, even at the maximum rate, for all the living expenses of a student. Family help and/or incomes from vacation or spare-time work would also be needed.

Students in the following types of university courses are eligible for assistance:

- Undergraduate and graduate bachelor degree courses
- Graduate diplomas
- Approved combined bachelor degree courses
- Master’s qualifying courses (one year)

The rates of allowance and conditions for eligibility are set out in a booklet obtainable from the Commonwealth Department of Education.

Tertiary students receiving an allowance, and prospective tertiary students, will be sent application forms in January 1983. Forms are also available from the Admissions Section or the Careers and Employment Section, or from the Director, Department of Education, 59 Goulburn Street, Sydney, NSW 2000 (telephone 218 8800). Continuing students should submit applications as soon as examination results are available. New students should do so as soon as they are enrolled. All students should apply by 31 March 1983, otherwise benefits will not be paid for the earlier months of the year.

It is most important that students advise the TEAS office if at any time they change or discontinue their study programs, as their eligibility for benefits might be affected.

Other Financial Assistance

In addition to the Tertiary Education Assistance Scheme financed by the Australian Government the following forms of assistance are available:

1. **Deferment of Payment of Fees** Deferments may be granted for a short period, usually one month, without the imposition of a late fee penalty, provided the deferment is requested prior to the due date for fee payments.

2. **Short Term Cash Loans** Donations from various sources have made funds available for urgent cash loans not exceeding £100. These loans are normally repayable within one month.

3. Early in 1973 the Commonwealth Government made funds available to the University to provide loans to students in financial difficulty. The loans are to provide for living allowances and other approved expenses associated with attendance at university. Repayment usually commences after graduation or upon withdrawal from the course. Students are required to enter into a formal agreement with the University to repay the loan. The University is unable to provide from the fund amounts large enough for all or even a major part of the living expenses of a student.

From the same source students who are in extremely difficult financial circumstances may apply for assistance by way of a non-repayable grant. In order to qualify for a grant a student must generally show that the financial difficulty has arisen from exceptional misfortune. Grants are rarely made.

The University has also been the recipient of generous donations from the Arthur T. George Foundation, started by Sir Arthur George and his family, for the endowment of a student loan fund.

In all cases assistance is limited to students with reasonable academic records and whose financial circumstances warrant assistance.

Enquiries about all forms of financial assistance should be made at the office of the Deputy Registrar (Student Services), Room 148E, in the Chancellery.

Financial Assistance to Aboriginal Students

Financial assistance is available to help Aboriginal students from the Commonwealth Government’s Aboriginal Study Grant Scheme. Furthermore, the University may assist Aboriginal students with loans to meet some essential living expenses.

The University has also received a generous bequest from the estate of the late Alice Brooks Gange for the education of Australian aborigines within the University. The University is engaged in consultations with groups and individuals for advice on the most effective ways of using the funds and has established a committee to advise the Vice-Chancellor in the matter.

All enquiries relating to these matters should be made at the office of the Deputy Registrar (Student Services), Room 148E, in the Chancellery.

Fund for Physically Handicapped and Disabled Students

The University has a small fund (started by a generous gift from a member of staff who wishes to remain anonymous) available for projects of benefit to handicapped and disabled students. Enquiries should be made at the office of the Deputy Registrar (Student Services), Room 148E, in the Chancellery.
Rules and Procedures

The University, in common with other large organizations, has established rules and procedures which are designed for the benefit of all members of the University. In some cases there are penalties (e.g., fines or exclusion from examinations) for non-compliance. Any student who, after carefully reading the rules set out in the following pages, requires further information on their application should seek further advice, in the first instance, at the Enquiry Counter in the North Wing of the Chancellery Building.

General Conduct

The University has not considered it necessary to formulate a detailed code of rules relating to the general conduct of students. Enrolment as a student of the University, however, involves an undertaking to observe the regulations, by-laws and rules of the University, and to pay due regard to any instructions given by any officer of the University.

Appeals

Section 5(c) of Chapter III of the By-laws provides that 'Any person affected by a decision of any member of the Professorial Board (other than the Vice-Chancellor) in respect of breach of discipline or misconduct may appeal to the Vice-Chancellor, and in the case of disciplinary action by the Vice-Chancellor, whether on appeal or otherwise, to the Council'.

Admission and Enrolment

The Student Enquiry Counter, located near the Cashier in the Chancellery on the upper campus, provides information for students on admission requirements, undergraduate and graduate courses and enrolment procedures. Faculty handbooks and the Calendar may be purchased from the Cashier. The Enquiry Counter is open from 9 am to 5 pm, Monday to Friday. During enrolment it is also open for some part of the evening.

Information may be obtained here about special admission, admission with advanced standing and admission on overseas qualifications. Applications are also received from students who wish to transfer from one course to another, resume their studies after an absence of twelve months or more, or seek any concession in relation to a course in which they are enrolled. It is essential that the closing dates for lodgement of applications are adhered to. For further details see the section on Enrolment Procedures and Fees.

Applications for admission to undergraduate courses from students who do not satisfy the requirements for admission (see section on Admission Requirements) are referred by the Admissions Section to the Admissions Committee of the Professorial Board.

Students wishing to enrol as higher degree candidates should first consult the Head of the School in which they wish to study. An application is then lodged on a standard form and the Postgraduate Section, after obtaining a recommendation from the Head of School, refers the application to the appropriate Faculty or Board of Studies Higher Degree Committee.

Details of the procedure to be followed by students seeking entry to first year undergraduate degree courses at the University may be obtained from the Student Enquiry Counter or the Universities and Colleges Admissions Centre.

An Adviser for Prospective Students, Mrs. Fay Lindsay, is located in the Chancellery, and is available for personal interview with those who require additional information about the University.

First Year Entry

Those seeking entry to first year courses in one or more of eighteen institutions in the state including the three universities in the Sydney Metropolitan area (Macquarie University, the University of New South Wales and the University of Sydney) are required to lodge a single application form with the Universities and Colleges Admissions Centre, Challis House, 10 Martin Place, Sydney 2000 (GPO Box 7049, Sydney 2001). On the application form provision is made for applicants to indicate preferences for courses available in any one of the three universities and fifteen other tertiary institutions. Students are notified individually of the result of their applications and provided with information regarding the procedures to be followed in order to accept the offer of a place at this university.

Enrolment is completed at the Enrolment Bureau, Unilsearch House, 221 Anzac Parade, Kensington.

Deferment of First Year Enrolment

Students proceeding directly from school to University who have received an offer of a place may request deferment of enrolment for one year and will usually receive permission providing they do not enrol at another tertiary institution in that year.
Enrolment Procedures and Fees
Schedules 1983

1. Introduction
All students, except those enrolling in graduate research degree courses (see sections 5. and 6. below), must lodge an authorized enrolment form with the Cashier either on the day the enrolling officer signs the form or on the day any required General Studies electives are approved.

All students, except those enrolling in graduate research degree courses and those exempted as set out in section 17. below, should on that day also either pay the required fees or lodge an enrolment voucher or other appropriate authority.

Such vouchers and authorities are generally issued by the NSW Department of Education and the NSW Public Service. They are not always issued in time and students who expect to receive an enrolment voucher or other appropriate authority but have not done so should pay the student activities fees and arrange a refund later. Such vouchers and authorities are not the responsibility of the University and their late receipt is not to be assumed as automatically exempting a student from the requirements of enrolling and paying fees.

If a student is unable to pay the fees the enrolment form must still be lodged with the Cashier and the student will be issued with a 'nil' receipt. The student is then indebted to the University and must pay the fees by the end of the second week of the session for which enrolment is being effected.

Penalties apply if fees are paid after the time allowed (see section 16. below) unless the student has obtained an extension of time in which to pay fees from the office of the Deputy Registrar (Student Services) (Room 148E, the Chancellery). Such an application must be made before the fee is due. Payment may be made through the mail, in which case it is important that the student registration number be given accurately. Cash should not be sent through the mail.

2. New Undergraduate Enrolments
Persons who are applying for entry in 1983 must lodge an application for selection with the Universities and Colleges Admissions Centre, GPO Box 7049, Sydney 2001, by 1 October 1982.

Those who are selected will be required to complete enrolment at a specified time before the start of Session 1. Compulsory student activities fees should be paid on the day.

In special circumstances, however, and provided class places are still available, students may be allowed to complete enrolment after the prescribed time.

Application forms and details of the application procedures may be obtained from the Student Enquiries Counter, Ground Floor, North Wing of the Chancellery Building.

3. Re-enrolment
See also sections 4., 6. and 7. below.

Students who are continuing courses (or returning after approved leave of absence) should enrol through the appropriate school in accordance with the procedures set out in the current Enrolment Procedures booklet, available from the Student Enquiries Counter in the Chancellery and from School offices. Those who have completed part of a course and have been absent without leave need to apply for entry through the Universities and Colleges Admissions Centre, GPO Box 7049, Sydney 2001, by 1 October 1982.

4. Restrictions Upon Re-enrolling
Students who in 1982 have infringed the rules governing re-enrolment should not attempt to re-enrol in 1983 but should follow the written instructions they will receive from the Registrar.

5. New Research Students
Students enrolling for the first time in graduate research degree courses will receive an enrolment form by post. They have two weeks from the date of offer of registration in which to lodge the enrolment form with the Cashier. Completion of enrolment after this time will incur a penalty (see section 16. below).

6. Re-enrolling Research Students
Students undertaking purely research degree programs (course codes 0-2999) will be re-enrolled automatically each year and sent an account for any fees due.

7. Submission of Project Report
Students registered for formal masters degree programs (course codes 8000-9999) who at the commencement of Session 1 have completed all the work for a degree or diploma except for the submission of the relevant thesis or project report are required to re-enrol by the end of the second week of Session 1. Completion of enrolment after then will incur a penalty (see section 16. below).

Information about possible student activities fees exemption is set out in section 17. (10) below.

8. Enrolments by Miscellaneous Students
Enrolments by miscellaneous students are governed by the following rules:

(1) Enrolment in a particular subject or subjects as a miscellaneous student — ie as a student not proceeding to a degree or diploma — may be permitted provided that in every case the Head of School offering the subject considers that the student will benefit from the enrolment and provided also that accommodation is available and that the enrolment does not prevent a place in that subject being available to a student proceeding to a degree or diploma.

(2) A student who is under exclusion from any subject in the University may not be permitted to be enrolled as a miscellaneous student in that subject.

(3) A student who is under exclusion from any course in the University may not be permitted to enrol in any subject which forms a compulsory component of the course from which the student is excluded.

(4) A student who is subsequently admitted to a course of the University for which any subjects completed as a miscellaneous student form a part may receive standing for those subjects.
9. Final Dates for Completion of Enrolment

No enrolments for courses extending over the whole year or for Session 1 only will be accepted from new students after the end of the second week of Session 1 (18 March 1983) except with the express approval of the Deputy Registrar (Student Services) and the Heads of the Schools concerned; no later year enrolments for courses extending over the whole year or for Session 1 only will be accepted after the end of the fourth week of Session 1 (1 April 1983) except with the express approval of the Deputy Registrar (Student Services) and the Heads of the Schools concerned. No enrolments for courses in Session 2 only will be accepted after the end of the second week of Session 2 (5 August 1983) except with the express approval of the Deputy Registrar (Student Services) and the Heads of the Schools concerned.

10. University of New South Wales and University Union Membership Card

All students enrolled in degree or diploma courses or as miscellaneous students, except those exempt from University Union fees under provisions of section 17, below, are issued with a University of New South Wales and University Union Membership Card. This card must be carried during attendance at the University and shown on official request.

The number appearing on the front of the card above the student's name is the student registration number used in the University's records. This number should be quoted in all correspondence.

The card must be presented when borrowing from the University libraries, when applying for travel concessions, and when notifying a change of address. It must also be presented when paying fees on re-enrolment each year when it will be made valid for the year and returned. Failure to present the card could result in inconvenience in completing re-enrolment.

Life members of the University Union and those exempt from payment of University Union fees, if enrolled in degree or diploma courses or miscellaneous students use the University's fees receipt in place of the card when applying for travel concessions and when notifying a change of address. The University Library issues a library borrowing card on production of the fees receipt.

A student who loses a card must notify the University Union as soon as possible.

New students are issued with cards on enrolment if eligible.

New graduate students should complete an application for a card when they enrol unless they already possess one from previous study at the University. The card can be collected from the second floor of the University Union Blockhouse approximately three weeks after enrolment. The fees receipt may be used as necessary until the card is available.

11. Payment of Fees

The fees and charges which are payable include those charges raised to finance the expenses incurred in operating activities such as the University Union, the Students' Union, the Sports Association, and the Physical Education and Recreation Centre. Penalty payments are also incurred if a student fails to complete procedures as required. Charges may also be payable, sometimes in the form of a deposit, for the hiring of kits of equipment in certain subjects. Accommodation charges, costs of subsistence on excursions, field work, etc, and for hospital residence (medical students) are payable in appropriate circumstances.

12. Assisted Students

Scholarship holders and sponsored students who have not received an enrolment voucher or appropriate letter of authority from their sponsor at the time when they are enrolling should complete their enrolment by paying their own fees.

A refund of fees will be made when the enrolment voucher or letter of authority is subsequently lodged with the Cashier.

Those unable to pay their own fees in these circumstances can apply to the office of the Deputy Registrar (Student Services) (Room 148E, the Chancellery) for an extension of time in which to pay. Such an application must be made before the fees are due.

13. Extension of Time

Students who are unable to pay fees by the due date may apply to the office of the Deputy Registrar (Student Services) (Room 148E, the Chancellery) for an extension of time, which may be granted in extenuating circumstances. Such applications must be made before the due date.

14. Failure to Pay Fees and Other Debts

Students who fail to pay prescribed fees or charges or are otherwise indebted to the University and who fail either to make a satisfactory settlement of indebtedness upon receipt of due notice or to receive a special exemption ceases to be entitled to the use of University facilities. Such students are not permitted to register for a further session, to attend classes or examinations, or to be granted any official credentials. In the case of students enrolled for Session 1 only or for both Sessions 1 and 2 this disbarment applies if any portion of fees is outstanding after the end of the eighth week of Session 1 (29 April 1983). In the case of students enrolled for Session 2 only this disbarment applies if any portion of fees is outstanding after the end of the sixth week of Session 2 (2 September 1983). In special cases the Registrar may grant exemption from the disqualification referred to in the preceding paragraph upon receipt of a written statement setting out all relevant circumstances.
15. Fees

Fees and penalties quoted are current at the time of publication but may be amended by the University without notice.

University Union Entrance Fee
Payable on first enrolment $28
Students enrolling for only one session must pay the full University Union entrance fee.

Student Activities Fees
All students (with the exceptions set out in section 17. below) are required to pay the following fees if enrolling for a program involving two sessions. Those enrolling for only one session will pay the full University Union Entrance Fee, if applicable, and one half of any other fees due.

Students who consider themselves eligible for life membership of the University Union, the Sports Association, or the Students’ Union, should make enquiries about the matter at the offices of those bodies.

Students often seek exemption from some or all of the student activities fees for reasons other than those set out in section 17. below. It is stressed that the fees charged are a contribution by students towards services and amenities for the University community (both now and in the future) and exemption from them cannot be claimed because a student is unable or unwilling to make use of some of those services or amenities.

Student Activities Fees are adjusted annually by a system of indexation and those set out below are current in 1982 and are therefore subject to an increase in 1983.

University Union annual subscription $80
Sports Association annual subscription $17
Students’ Union Annual Subscription
Students enrolling in full-time courses $22
Students enrolling in part-time courses or as miscellaneous students $17
Miscellaneous Fund annual fee $28

This fee is used to finance expenses generally of a capital nature relating to student activities and amenities. Funds are allocated for projects recommended by the Student Affairs Committee and approved by the University Council.

Special Examination Fees
Examinations conducted in special circumstances for each subject $11
Review of examination results for each subject $11

Other Charges
In addition to the fees outlined above and depending on the subject being taken, students may be required to make a payment for equipment; money so paid is, in general, refunded if the equipment is returned in satisfactory condition.

16. Penalties

(1) Failure to lodge enrolment form according to enrolment procedure $20

(2) Payment of fees after end of second week of session $20

(3) Payment of fees after end of fourth week of session $40

Penalties (1) and (2) or (1) and (3) may accumulate.

17. Exemptions – Fees

Students often seek exemption from the fees for reasons other than those set out below. It is stressed that the fees charged are a contribution by students towards services and amenities for the University community (both now and in the future) and exemption from them cannot be claimed because a student is unable or unwilling to make use of some of those services or amenities.

(1) Life members of the University Union, the Sports Association, and Students’ Union are exempt from the relevant fee or fees.

(2) Students enrolled in courses classified as External are exempt from all Student Activities Fees and the University Union Entrance Fee.

(3) Students enrolled in courses at the W. S. and L. B. Robinson University College and in the Faculty of Military Studies are exempt from the student activities fees and the University Union Entrance Fee in section 15. above but shall pay such other fees and charges as the Council may from time to time determine.

(4) University Union fees and subscriptions may be waived by the Deputy Registrar (Student Services) for students enrolled in graduate courses in which the formal academic requirements are undertaken at a part of the University away from the Kensington campus.

(5) Students who while enrolled at and attending another university (or other tertiary institution as approved by the Vice-Chancellor) in a degree or diploma course are given approval to enrol at the University of New South Wales but only as miscellaneous students for subjects to be credited towards the degrees or diplomas for which they are enrolled elsewhere are exempt from all Student Activities Fees and the University Union Entrance Fee.

(6) Undergraduate students of a recognized university outside Australia who attend the University of New South Wales with the permission of the dean of the appropriate faculty and of the head of the appropriate school or department to take part as miscellaneous students in an academic program relevant to their regular studies and approved by the authorities of their own institution are exempt from all Student Activities Fees and the University Union Entrance Fee.

*Students who consider themselves eligible for life membership of the University Union, the Sports Association, or the Students’ Union, should make enquiries about the matter at the offices of those bodies, not at the office of the Deputy Registrar (Student Services) or at the Cashier’s office.

Institutions approved are: Australian Film and Television School, New South Wales Institute of Technology, Sydney College of Advanced Education and Sydney College of Chiropractic.
(7) Graduate students not in attendance at the University and who are enrolling in a project only other than for the first time, are exempt from all Student Activities Fees.

(8) Graduate students resubmitting a thesis or project only are exempt from all Student Activities Fees.

(9) All Student Activities Fees, for one or more sessions, may be waived by the Deputy Registrar (Student Services) for students who are given formal permission to pursue their studies at another institution for one or more sessions.

(10) Graduate students who have completed all work for a qualification for the commencement of Session 1, except for the submission of the relevant thesis or project report, may be exempted from payment of Student Activities Fees by the Deputy Registrar (Student Services) on production of an appropriate statement signed by the relevant Supervisor or Head of School.

(11) Students enrolled in a session or sessions devoted entirely to training or experience away from the campus and its associated laboratories, hospitals, centres, institutes, and field stations are exempt from all Student Activities Fees for that session or sessions.

(12) Students whose registration is cancelled or suspended by the University shall receive refunds of fees paid in accordance with the provisions of section 18. (5) below except that a refund of one half of the fees shall be made if such cancellation or suspension takes place between the end of the fourth week of Session 1 and the end of the fourth week of Session 2.

18. Variations in Enrolment (including Withdrawal)

(1) Students wishing to vary an enrolment program must make application on the form available from the appropriate Course Authority.

(2) Students withdrawing from courses (and see also information about withdrawal from subjects below) are required to notify the Registrar in writing. In some cases such students will be entitled to fee refunds (see below).

(3) Enrolment in additional subjects
Applications for enrolment in additional subjects must be submitted by:
31 March 1983 for Session 1 only and whole year subjects;
19 August 1983 for Session 2 only subjects.

(4) Withdrawal from subjects
Applications to withdraw from subjects may be submitted throughout the year but applications lodged after the following dates will result in students being regarded as having failed the subjects concerned, except in special circumstances:

(a) for one session subjects, the end of the seventh week of that session (22 April or 9 September)
(b) for whole year subjects, the end of the second week of Session 2 (5 August).

(5) Withdrawal from Course – Refunds – Student Activities Fees
Whether or not a student’s withdrawal entails academic penalties (covered in item (4) above) there are rules governing possible student activities fee refunds in the case of complete withdrawal from a course. Details of the refunds which may be available may be obtained from the Student Enquiry Counter, the Chancellery.

(6) Acknowledgements
The Student Records and Scholarships Office will acknowledge each application for a variation in enrolment (including withdrawals from subjects) as follows:

(a) variations lodged before the Friday of the seventh week of each session (22 April or 9 September) will be incorporated in the Confirmation of Enrolment Program notice forwarded to students on 2 May or 20 September as appropriate
(b) variations lodged after those dates will be acknowledged by letter
(c) withdrawals from a course are acknowledged individually whenever they are lodged.

(7) It is emphasized that failure to attend for any assessment procedure, or to lodge any material stipulated as part of an assessment procedure, in any subject in which a student is enrolled will be regarded as failure in that assessment procedure unless written approval to withdraw from the subject without failure has been obtained from the Student Records and Scholarships Office.

19. Exemption – Membership
The Registrar is empowered to grant exemption from membership of any or all of the University Union, the Students’ Union and the Sports Association to students who have a genuine conscientious objection to such membership, subject to payment of the prescribed fees to the Miscellaneous Fund.
Private Overseas Students

Private overseas students should visit the Commonwealth Department of Education immediately on first arrival in Australia. The address is Sydney Plaza Building, 59 Goulburn Street, Sydney.

Private overseas students continuing their studies should confirm their enrolment with the Commonwealth Department of Education as early as possible each year in order to ensure that arrangements for the extension of their temporary entry permits can be made.

All private overseas students must advise the Department if they change their term residential address during the year. Telephone enquiries should be directed to (02) 218 8979, and country students may reverse the charge for the call.

Students whose applications to transfer are successful, and who are transferring from one school to another are required to comply with the enrolment procedure laid down for new students with advanced standing. Students transferring from one course to another within the same school are required to attend the appropriate enrolment session for the course to which they have approval to transfer.

Students must present the approval to transfer to the enrolling officer, and those who have not received advice regarding their application to transfer before the date on which they are required to enrol should check with the office of the Admissions Section.

Students should also advise the enrolling officer in the school in which they were enrolled in 1982 of their intention to transfer.

Leave of Absence

Leave of absence from an undergraduate course of study may be granted to students other than those in the first year of a course. Leave of absence has generally been restricted to one year but in special circumstances two years have been granted.

To apply for such leave of absence, a letter should be submitted to the Registrar immediately following the release of annual examination results and must include the student's full name, registration number, the course and stage in which enrolled in the previous year and, most important, the reason why leave is being sought. The letter advising the result of the application will provide details about how to re-enrol.

Students who withdraw from the first year of their course are not granted leave of absence and must again apply for a place through the Universities and Colleges Admissions Centre.

Admission with Advanced Standing

Any person who makes application to register as a candidate for any degree or other award granted by the University may be admitted to the course of study leading to such degree or award with such standing on the basis of previous attainments as may be determined by the Professorial Board provided that:

1. the Board shall not grant such standing under these rules as is inconsistent with the rules governing progression to such degree or award as are operative at the time the application is determined;
2. where a student transfers from another university such student shall not in general be granted standing in this University which is superior to what he has in the University from which he transfers;
3. the standing granted by the Board in the case of any application based on any degree/s or other awards already held by the applicant, shall not be such as will permit the applicant to qualify for the degree or award for which he seeks to register without completing the courses of instruction and passing the examinations in at least those subjects comprising the latter half of the course, save that where such a program of studies would involve the applicant repeating courses of instruction in which the Board deems the applicant to have already qualified, the Board may prescribe an alternative program of studies in lieu thereof;
4. the standing granted by the Board in the case of any application based on partial completion of the requirements for any degree or other award of another institution shall not be such as will permit the applicant to qualify for
the degree or award for which he seeks to register by satisfactory completion of a program of study deemed by the Board to be less than that required of a student in full-time attendance in the final year of the course in which the applicant seeks to register;

5. the standing granted by the Board in the case of any application based on the partial completion of the requirements for any degree or other award of the University may be such as to give full credit in the course to which the applicant seeks to transfer for work done in the course from which the student transfers.

Where the identity between the requirements for any award of the University already held and that of any other award of the University is such that the requirements outstanding for the second award are less than half the requirements of that award, then a student who merely completes such outstanding requirements shall not thereby be entitled to receive the second award but shall be entitled to receive a statement over the hand of the Registrar in appropriate terms.

Resumption of Courses

Students who have had a leave of absence for twelve months and wish to resume their course should follow the instructions about re-enrolling given in the letter granting leave of absence. If these instructions are not fully understood or have been lost, students should contact the office of the Admissions Section before November in the year preceding the one in which they wish to resume their course.

If students have not obtained leave of absence from their course and have not been enrolled in the course over the past twelve months or more, they should apply for admission to the course through the Universities and Colleges Admissions Centre before 1 October in the year preceding that in which they wish to resume studies.

Examinations

Examinations are held in June/July and in November/December. Provisional timetables indicating the dates and times of examinations are posted on the University noticeboards. Students must advise the Examinations Section (the Chancellery) of any clash in examinations. Final timetables indicating the dates, times, locations, and authorized aids are available for students two weeks before the end of each session.

Misreading of the timetable is not an acceptable excuse for failure to attend an examination.

Assessment of Course Progress

In the assessment of a student's progress in a course, consideration may be given to work in laboratory and class exercises and to any term or other tests given throughout the year as well as to the results of written examinations.

Examination Results

Grading of Passes

Passes will be graded as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Distinction</td>
<td>an outstanding performance</td>
</tr>
<tr>
<td>Distinction</td>
<td>a superior performance</td>
</tr>
<tr>
<td>Credit</td>
<td>a good performance</td>
</tr>
<tr>
<td>Pass</td>
<td>an acceptable level of performance</td>
</tr>
<tr>
<td>Satisfactory</td>
<td>satisfactory completion of a subject for which graded passes are not available</td>
</tr>
</tbody>
</table>

Pass Conceded

A pass conceded may be granted to a student whose overall performance warrants consideration in a subject where the mark obtained is slightly below the standard required for a pass.

A pass conceded in a subject will normally allow progression to another subject for which the former subject is a prerequisite. In a particular subject, however, a subject authority may specify that a pass conceded is insufficient to meet a particular subject prerequisite. Such information is recorded in the appropriate faculty handbooks.

Availability of Results

Final examination results will be posted to a student's term address, or vacation address if requested. Forms requesting that results be posted to a vacation address are included in the examination timetable and change of address forms are obtainable at the Student Enquiry Counter, the Chancellery. Both forms can be accepted up to Friday 24 June for Session 1 results and Friday 25 November for Session 2 and whole year results. Results are also posted on School noticeboards and in the University Library. Results on noticeboards are listed by Student Registration Number.

No examination results are given by telephone.

Review of Results

A student may make application to the Registrar for the review of a result. The application form, accompanied by an appropriate fee, must be submitted not later than fifteen working days after the date of issue of the Notification of Result of Assessment form.

In reviewing a result, the subject authorities shall ensure that all components of the assessment have been assessed and a mark assigned.

A review of a result is not a detailed reassessment of a student's standard of knowledge and understanding of, and skills in, the subject. It is rather a search for arithmetic error in arriving at the composite mark and for gross and obvious error in assignment of marks in components of the final composite mark.

When a change in grade is recommended, the application fee will be refunded by the Registrar.
Special Consideration

Students who believe that their performance in a subject, either during session or in an examination, has been adversely affected by sickness or any other reason should inform the Registrar and ask for special consideration in the determination of their standing.

Such requests should be made as soon as practicable after the occurrence. Applications made more than seven days after the final examination in a subject will only be considered in exceptional circumstances.

When submitting a request for special consideration students should provide all possible supporting evidence (e.g. medical certificates) together with their registration number and enrolment details.

Physical Disabilities

Students suffering from a physical disability which puts them at a disadvantage in written examinations should advise Student Records (Ground Floor, the Chancellery) immediately their disability is known. If necessary, special arrangements will be made to meet the student’s requirements.

Students who are permanently disabled and need the Examinations Section to make special arrangements for their examinations, should contact Student Records as soon as the final timetable becomes available.

Use of Electronic Calculators

Where the use of electronic calculators has been approved by a faculty or school, examiners may permit their use in examinations. Authorized electronic calculators are battery operated with the minimum operations of addition, subtraction, multiplication and division and are of a type in common use by university students. They are not provided by the University, although some schools may make them available in special circumstances.

Examinations Held Away from the Campus

Except in the case of students enrolled in external courses, examinations will not be permitted away from the campus unless the candidate is engaged on compulsory industrial training. Candidates must advise the Officer-in-charge, Examinations Section, immediately the details of the industrial training are known. Special forms for this purpose are available at the Student Enquiry Counter in the north wing of the Chancellery.

Arrival at Examinations

Examination Rooms will be open to students twenty-five minutes before the commencement of the examination. Candidates are requested to be in their places at least fifteen minutes before the commencement to hear announcements. The examination paper will be available for reading ten minutes before commencement.

Use of Linguistic Dictionaries

The answers in all examinations and in all work submitted must be in English unless otherwise directed. Students may apply for permission to use standard linguistic dictionaries in the presentation of written work for assessment. Such applications should be made in writing to the Examinations Section not later than 14 days prior to the need to use the linguistic dictionary.

Academic Misconduct

Students are reminded that the University regards academic misconduct as a very serious matter. Students found guilty of academic misconduct are usually excluded from the University for two years. Because of the circumstances in individual cases the period of exclusion can range from one session to permanent exclusion from the University.

The following are some of the actions which have resulted in students being found guilty of academic misconduct in recent years: use of unauthorized aids in an examination; submitting work for assessment knowing it to be the work of another person; improperly obtaining prior knowledge of an examination paper and using that knowledge in the examination; failing to acknowledge the source of material in an assignment.

Conduct of Examinations

Examinations are conducted in accordance with the following rules and procedure:

1. Candidates are required to obey any instruction given by an examination supervisor for the proper conduct of the examination.

2. Candidates are required to be in their places in the examination room not less than fifteen minutes before the time for commencement.

3. No bag, writing paper, blotting paper, manuscript or book, other than a specified aid, is to be brought into the examination room.

4. Candidates shall not be admitted to an examination after thirty minutes from the time of commencement of the examination.

5. Candidates shall not be permitted to leave the examination room before the expiry of thirty minutes from the time the examination commences.

6. Candidates shall not be re-admitted to the examination room after they have left it unless, during the full period of their absence, they have been under approved supervision.

7. Candidates shall not by any improper means obtain, or endeavour to obtain, assistance in their work, give, or endeavour to give, assistance to any other candidate, or commit any breach of good order.
varied from time to time by the Professorial Board.

The prescribed minimum for each undergraduate course may be found in Schedule A* below; the schedule may be varied from time to time by the Professorial Board.

8. All answers must be in English unless otherwise stated. Foreign students who have the written approval of the Registrar may use standard linguistic dictionaries.

9. Smoking is not permitted during the course of examinations.

10. A candidate who commits any infringement of the rules governing examinations is liable to disqualification at the particular examination, to immediate expulsion from the examination room and to such further penalty as may be determined in accordance with the By-Laws.

Acknowledgement of Sources

Students are expected to acknowledge the source of ideas and expressions used in submitted work. To provide adequate documentation is not only an indication of academic honesty but also a courtesy enabling the marker to consult sources with ease. Failure to do so may constitute plagiarism, which is subject to a charge of academic misconduct.

Further Assessment

In special circumstances further assessment including assessment or further assessment on medical or compassionate grounds may be granted.

Further assessment may be given by the subject authority at his or her discretion at any time prior to the meeting of the relevant faculty assessment committee (normally the fourth week of the Midyear Recess and the second week of December). Further assessment may also be awarded at the faculty assessment committee and students affected may need to be free to undertake that further assessment in the last week in the Midyear Recess and in the period up to the end of the second week in January; students should consult their subject authority for details of further assessment immediately their results are known.

Restrictions upon Students Re-enrolling

The University Council has adopted the following rules governing re-enrolment with the object of requiring students with a record of failure to show cause why they should be allowed to re-enrol and retain valuable class places.

First Year Rule

1. Students enrolled in the first year of any undergraduate course of study in the University shall be required to show cause why they should be allowed to continue the course if they do not pass the minimum number of subjects, units or credits prescribed for this purpose by the relevant faculty or board of studies. The prescribed minimum for each undergraduate course may be found in Schedule A* below; the schedule may be varied from time to time by the Professorial Board.

Repeated Failure Rule

2. Students shall be required to show cause why they should be allowed to repeat a subject which they have failed more than once. Where the subject is prescribed as part of the course they shall also be required to show cause why they should be allowed to continue that course.

General Rule

3. (1) Students shall be required to show cause why they should be allowed to repeat a subject they have failed if the assessment committee of the faculty or board of studies so decides on the basis of previous failures in that subject or in a related subject. Where the subject is prescribed as part of the course they shall also be required to show cause why they should be allowed to continue their course.

(2) Students shall be required to show cause why they should be allowed to continue their course if the assessment committee of the faculty or board of studies so decides on the basis of their academic record.

The Session-Unit System

4. (1) Students who infringe the provisions of Rules 1, or 2, at the end of Session 1 of any year will be allowed to repeat the subject(s) (if offered) and/or continue the course in Session 2 of that year, subject to the rules of progression in the course.

(2) Such students will be required to show cause at the end of the year, except that students who infringe Rule 2, at the end of Session 1, and repeat the subjects in question in Session 2, and pass them, will not be required to show cause on account of any such subjects.

Exemption from Rules by Faculties

5. (1) A faculty or board of studies examinations committee may, in special circumstances, exempt students from some or all of the provisions of Rules 1 and 2.

(2) Such students will not be required to show cause under such provisions and will be notified accordingly by the Registrar.

Showing Cause

6. (1) Students wishing to show cause must apply for special permission to re-enrol. Application should be made on the form available from the Registrar and must be lodged with the Registrar by the dates published annually by the Registrar. A late application may be accepted at the discretion of the University.

(2) Each application shall be considered by the Admissions and Re-enrolment Committee of the relevant faculty or board of studies which shall determine whether the cause shown is adequate to justify the granting of permission to re-enrol.

*See Schedule A immediately below.
Appeal

7. (1) Students who are excluded by the Admissions and Re-enrolment Committee from a course and/or subject under the provisions of the Rules will have their applications to re-enrol reconsidered automatically by the Re-enrolment Committee of the Professorial Board.

(2) Students whose exclusion is upheld by the Re-enrolment Committee may appeal to an Appeal Committee constituted by Council for this purpose with the following membership:

A Pro-Vice-Chancellor, nominated by the Vice-Chancellor who shall be Chairman.

The Chairman of the Professorial Board, or if its chairman is unable to serve, a member of the Professorial Board, nominated by the Chairman of the Professorial Board, or when the Chairman of the Professorial Board is unable to make a nomination, nominated by the Vice-Chairman.

One of the category of members of the Council elected by the graduates of the University, nominated by the Vice-Chancellor.

The decision of the Committee shall be final.

(3) The notification to students of a decision which has been upheld by the Re-enrolment Committee of the Professorial Board to exclude them from re-enrolling in a course and/or subject shall indicate that they may appeal against that decision to the Appeal Committee. The appeal must be lodged with the Registrar within fourteen days of the date of notification of exclusion; in special circumstances a late appeal may be accepted at the discretion of the Chairman of the Appeal Committee. In lodging such an appeal with the Registrar students should provide a complete statement of all grounds on which the appeal is based.

(4) The Appeal Committee shall determine appeals after consideration of each appellant’s academic record, application for special permission to re-enrol, and stated grounds of appeal. In particular circumstances, the Appeal Committee may require students to appear in person.

Exclusion

8. (1) Students who are required to show cause under the provisions of Rules 1. or 3. and either do not attempt to show cause or do not receive special permission to re-enrol from the Admissions and Re-enrolment Committee (or the Re-enrolment Committee on appeal) shall be excluded, for a period not in excess of two years, from re-enrolling in any subject they have failed twice. Where the subjects failed are prescribed as part of a course they shall also be excluded from that course. Where the subjects failed are prescribed as part of any other course (or courses) they shall not be allowed to enrol in any such course.

(2) Students required to show cause under the provisions of Rule 2. who either do not attempt to show cause or do not receive special permission to re-enrol from the Admissions and Re-enrolment Committee (or the Re-enrolment Committee on appeal) shall be excluded, for a period not in excess of two years, from re-enrolling in any subject they have failed twice. Where the subjects failed are prescribed as part of a course they shall also be excluded from that course. Where the subjects failed are prescribed as part of any other course (or courses) they shall not be allowed to enrol in any such course.

Re-admission after Exclusion

9. (1) Excluded students may apply for re-admission after the period of exclusion has expired.

(2) (a) Applications for re-admission to a course should be made to the Universities and Colleges Admissions Centre before the closing date for normal applications in the year prior to that in which re-admission is sought. Such applications will be considered by the Admissions and Re-enrolment Committee of the relevant faculty or board of studies.

(b) Applications for re-admission to a subject should be made to the Registrar before 30 November in the year prior to that in which re-admission is sought. Such applications will be considered by the relevant subject authority.

(3) Applications should include evidence that the circumstances which were deemed to operate against satisfactory performance at the time of exclusion are no longer operative or are reduced in intensity and/or evidence of action taken (including enrolment in course/s) to improve capacity to resume studies.

(4) Students whose applications for re-admission to a course or subject that are unsuccessful (see 9. (2) (a), (b) respectively) will be invited to appeal to the Re-Enrolment Committee of the Professorial Board. The decision of the Re-Enrolment Committee will be final.

10. Students who fail a subject at the examinations in any year or session and re-enrol in the same course in the following year or session must include in their programs of studies for that year or session the subject which they failed. This requirement will not be applicable if the subject is not offered the following year or session, is not a compulsory component of a particular course, or if there is some other cause which is acceptable to the Professorial Board for not immediately repeating the failed subject.

Restrictions and Definitions

11. (1) These rules do not apply to students enrolled in programs leading to a higher degree or graduate diploma.

(2) A subject is defined as a unit of instruction identified by a distinctive subject number.
### Schedule A

(See First Year Rule 1. above)

Where the minimum requirement is half the program, this is defined as half the sum of the unit values of all the subjects in the program where the unit value for each subject in a course is defined as follows:

<table>
<thead>
<tr>
<th>Faculty/Board of Studies</th>
<th>Minimum Requirement</th>
<th>Course</th>
<th>Unit Values (UV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Science</td>
<td>Half the program</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3000-3220</td>
<td>4190-4220</td>
<td>One-session subjects: UV 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Two-session subjects: UV 2</td>
</tr>
<tr>
<td>Architecture</td>
<td>Half the program</td>
<td>3270, 3330</td>
<td>Elective subjects: UV 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>All other subjects: appropriate UV corresponding to credit points*</td>
</tr>
<tr>
<td>Arts</td>
<td>18 first-level credit points</td>
<td>3400, 3410</td>
<td></td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>2 subjects (or their Science unit or Arts credit-point equivalent)</td>
<td>3430</td>
<td></td>
</tr>
<tr>
<td>Commerce</td>
<td>Three subjects</td>
<td>3490-3595</td>
<td>One-session subjects: UV 1</td>
</tr>
<tr>
<td></td>
<td>FT in both sessions</td>
<td></td>
<td>Two-session subjects: UV 2</td>
</tr>
<tr>
<td></td>
<td>Two subjects</td>
<td>3490-3595</td>
<td>Elective subjects: UV 0</td>
</tr>
<tr>
<td></td>
<td>PT in either session</td>
<td></td>
<td>All other subjects: UV equal to the allocated hours*</td>
</tr>
<tr>
<td>Engineering</td>
<td>Half the program</td>
<td>3600-3750</td>
<td>One-session subjects: UV 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Two-session subjects: UV 2</td>
</tr>
<tr>
<td>Law</td>
<td>Half the program</td>
<td>4710-4790</td>
<td>One-session subjects: UV 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Two-session subjects: UV 2</td>
</tr>
<tr>
<td>Medicine</td>
<td>Half the program</td>
<td>3800</td>
<td>80.010: UV 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>81.001: UV 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>81.002: UV 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>70.001: UV 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>General Studies: UV 1</td>
</tr>
<tr>
<td>Military Studies</td>
<td>Half the program</td>
<td>BA, BSc</td>
<td>All subjects: UV 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>All subjects: appropriate weighted mark*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BE</td>
<td></td>
</tr>
</tbody>
</table>

### Admission to Degree or Diploma

Students whose current program will enable them to complete all requirements for the degree or diploma, including industrial training where necessary, should lodge with the Registrar the form Application for Admission to Degree/Diploma and return it to the Registrar by the second Monday in May for the October ceremonies, and the first Tuesday in October for all other ceremonies. The forms are available from the Student Enquiry Counter in the north wing of the Chancellery.

Students who have indicated on their enrolment form that they are potential graduands are forwarded an application form with their Enrolment Details form in September (or, in the case of students who expect to satisfy requirements at the end of Session 1, with the form issued in April). Students who do not complete an application form will not graduate; students who do not return their application form by the due date will graduate at a later series of ceremonies.

Students enrolled in courses 3400, 3910 and 3970 who have completed an application form to graduate at the pass level and who then decide to proceed to an honours year should advise the Registrar, in writing before 1 September for those completing requirements at the end of Session 1, or before 28 February for those completing requirements at the end of Session 2.

A list of graduands in Medicine who have applied for their degree is published in The Sydney Morning Herald in December.

A list of graduands other than Medicine who have applied for their degree/diploma and who expect to graduate in October is published in The Sydney Morning Herald on the second Wednesday in September.

A list of graduands other than Medicine who have applied for their degree/diploma and who expect to graduate in April/May the following year is published in The Sydney Morning Herald on the second Wednesday in March.

Students who are potential graduands and who wish to notify the Registrar of a change of address should submit

*For details see the appropriate Faculty Handbook.*
an additional form *Final Year Students' Graduation:
Change of Address*.

**Attendance at Classes**

Students are expected to be regular and punctual in attendance at all classes in the subjects in which they are enrolled. All applications for exemption from attendance at classes of any kind must be made in writing to the Registrar.

In the case of illness or of absence for some other unavoidable cause students may be excused by the Registrar for non-attendance at classes for a period of not more than one month or, on the recommendation of the Dean of the appropriate faculty, for a longer period.

**Absence from Classes**

Explanations of absences from classes, or requests for permission to be absent from forthcoming classes, should be addressed to the Registrar and, where applicable, should be accompanied by a medical certificate. If examinations or other forms of assessment have been missed, this should be stated in the application.

If students attend less than eighty per cent of their possible classes they may be refused final assessment.

**Student Records**

*Confirmation of Enrolment Program* notices are sent to all students on 2 May and 19 September. It is not necessary to return these forms unless any of the information recorded is incorrect. Amended forms must be returned to the Student Records and Scholarships Office within fourteen days. Amendments notified after the closing date will not be accepted unless exceptional circumstances exist and approval is obtained from the Registrar. Amended forms returned to the Registrar will be acknowledged in writing within fourteen days.

**Release of Information to Third Parties**

The University treats results of assessment and information it receives from a student as confidential and will not reveal such information to third parties without the permission of the student except at the discretion of senior officers in circumstances considered of benefit to the student and when it is either impossible or impracticable to gain the student’s prior permission. This happens rarely. This policy is considered so important that it often involves officers of the University in very difficult situations, for example, when they must refuse to reveal the address of a student to parents or other relatives.

In spite of the policy, all students should be aware that students’ addresses are eagerly sought by various commercial agents and that subterfuges of various kinds can be used to obtain them. From time to time, for example, people claiming to be from the University telephone students or their families and ask for information (usually another student’s address) which is often given, unsuspectingly. There is evidence that this is a technique used by some commercial agents.

It would be generally helpful if students (and their families and friends) are cautious in revealing information, making it a practice to ask the name, position, and telephone extension of any caller claiming to be from the University and, if suspicious, returning the call to the extension given.

**Change of Address**

The Student Records and Scholarships Office of the Registrar’s Division should be notified as soon as possible of any change of address. Failure to do this could lead to important correspondence (including results of assessment) going astray. The University cannot accept responsibility if official communications fail to reach students who have not given notice of their change of address. *Change of Address Advice* forms are available at Faculty and School offices and from the Student Enquiry Counter in the north wing of the Chancellery.

All communications from the University will be sent to the Session or Term address except when arrangements are made otherwise in the case of results of assessment (see *Examinations: Availability of Results*, earlier in this section). *Change of Address Advice* forms will be accepted up to Friday 25 November, except for final-year students wishing to change their *Application for Admission for Degree/Diploma* form. Changes to this form will be accepted up to a date four weeks before the student’s graduation ceremony.

**Ownership of Students’ Work**

The University reserves the right to retain at its own discretion the original or one copy of any drawings, models, designs, plans and specifications, essays, theses or other work executed by students as part of their courses, or submitted for any award or competition conducted by the University.

**Notices**

Official University notices are displayed on the noticeboards and students are expected to be acquainted with
the notices which concern them. These boards are in the Biological Sciences Building, the Mathews Building, the Chancellery (lower ground floor), Central Lecture Block, Dalton Building (Chemistry), Main Building (Physics and Mining) and in the Western Grounds Area.

Parking within the University Grounds

A limited amount of parking is available on campus. Copies of the University's parking rules may be obtained on application to Room 240, the Chancellery.

Academic Dress

Information about the University's academic dress requirements may be obtained from the Alumni and Ceremonials Section, Room 148E, the Chancellery (phone extension 2998).

Further Information

Lost Property

All enquiries concerning lost property should be made to the Superintendent on extension 3892 or to the Lost Property Office at the Union.

The Calendar

Please consult the Calendar for a more detailed account of the information contained in this section.

Vice-Chancellor's Official Welcome to New Students

All students initially enrolling in the University are officially welcomed by the Vice-Chancellor and Principal at the following times:

- **Full-time Students**
  - In the Faculties of Architecture, Arts, Biological Sciences, Commerce, Law:
    - **Thursday 3 March 1983**
      - 11 am in the Clancy Auditorium

- **In the Faculties of Applied Science, Engineering, Medicine, Professional Studies, Science, and the Board of Studies in Science and Mathematics**:
  - **Friday 4 March 1983**
    - 10 am in the Clancy Auditorium

- **Part-time Students**
  - **All courses**:
    - **Tuesday 8 March 1983**
      - 7.00 pm in the Clancy Auditorium

- **Meeting for Parents of New Students**
  - **Friday 4 March 1983**
    - 7.30 pm in the Clancy Auditorium


Foreword

This handbook aims to provide information concerning the requirements for admission, enrolment and conditions for the award of degrees and diplomas in the Faculty together with descriptions of the subjects available. It is important that each student in the Faculty becomes well acquainted with the information presented here. In addition to this Handbook, pamphlets and brochures issued in conjunction with the enrolment period and Orientation Week are available. These should be consulted, together with the University Calendar, for further information on problems associated with courses.

The Faculty of Engineering

The Faculty consists of five Schools: Civil Engineering, Electrical Engineering and Computer Science, Mechanical and Industrial Engineering, Nuclear Engineering, Surveying and the Centre for Biomedical Engineering. In addition, the Faculty of Engineering has joined with the Faculty of Applied Science in establishing the Centre for Remote Sensing.

The School of Civil Engineering consists of five departments: Civil Engineering Materials, Engineering Construction and Management, Structural Engineering, Transport Engineering and Water Engineering. The School conducts both part-time and full-time undergraduate courses in Civil Engineering. In addition, the School conducts graduate courses and carries out graduate research programs in many fields.

The Department of Civil Engineering Materials includes the fields of Soil Mechanics, Rock Mechanics, Concrete Technology, Plastics and Timber, Metals and Welding Technology, Pavement Engineering, and Continuum and Statistical Mechanics. The Materials Laboratories are located at Kensington.

The Department of Engineering Construction and Management is responsible for the fields of Civil Engineering Systems, Engineering Economy, Project Planning and Management and Civil Engineering Construction.

The Department of Structural Engineering covers the fields of Structural Analysis, Structural Design, Stress Analysis and Solid Mechanics. The Model Structures, Experimental Stress Analysis and Structural Dynamics Laboratories are at Kensington. The Structural Testing Laboratory is at King Street, Randwick.

The Department of Transport Engineering is concerned with the planning, design, construction and operation of transport systems by the application of engineering techniques, statistical analysis, land use and transport modelling, economic evaluations and environmental impact studies.

The Department of Water Engineering encompasses the fields of Hydraulics, Hydrology, Water Resources and Public Health Engineering. The Public Health Engineering Laboratory is located at Kensington and there is a pilot scale laboratory at Randwick for research and teaching. The Hydrology research centre is also at Kensington, but a substantial amount of investigation is carried out in the field. The Water Research Laboratory is located at Manly Vale and is the centre for instruction and research in hydraulics.
The School of Electrical Engineering and Computer Science comprises five departments — Communications, Computer Science, Electric Power Engineering, Electronics, and Systems and Control. The School also houses the Joint Microelectronics Research Centre.

Special laboratories are equipped for work in the areas of Microelectronics, Microwaves, Digital Systems, Power Systems, Computer Control, Machines and Acoustics. A Measurements Laboratory provides a calibrating service under certificate from the National Association of Testing Authorities.

The School offers undergraduate courses leading to the award of the degree of Bachelor of Engineering which may be taken either on a full-time basis, normally over four years, or on a part-time basis, normally over six years, or a combination of these. The School continues to offer the later stages of the six year part-time courses leading to the award of the degree of Bachelor of Science (Engineering) although no new enrolments are now being accepted. Students have considerable choice of subjects in the latter half of the courses so they may concentrate, if desired, on one of the main streams of modern electrical engineering, namely electronics (including microelectronics and communications), electric energy, or computers and systems.

A major in Computer Science is available in the three year BSc program in the Faculty of Science. There are also combined courses (normally five years full-time) which lead to the award of two degrees (BE and BSc, or BE and BA).

In addition to the supervision of programs of advanced study and research for candidates undertaking a research degree leading to the award of the degree of Master of Engineering, Master of Science or Doctor of Philosophy, the School offers formal graduate courses leading to the award of the degree of Master of Engineering Science or a Graduate Diploma in Engineering Developments.

Undergraduate courses leading to the award of the degree of Bachelor of Engineering are offered in Mechanical, Industrial, and Aeronautical Engineering, and in Naval Architecture. These courses may be taken either on a full-time basis, normally over four years or on a part-time basis, normally over six years, or on a combined full-time/part-time basis, subject to approval by the Head of School.

The first two years of the degree, taken full-time, or the first three years, taken part-time, are common to all four courses within the School. Thus a final decision on the discipline to be followed need not be made until the end of Year 2 for full-time and the end of Year 3 for part-time students.

The School continues to offer the later stages of six year part-time courses leading to the award of the degree of Bachelor of Science (Engineering) in the same four fields as offered for the BE degree course, though no new enrolments into these courses are now accepted.

Formal graduate courses of study, leading to the award of the degree of Master of Engineering Science or to the award of a Graduate Diploma in Engineering Developments, are available. The areas of specialization cover the major fields of Mechanical and Industrial Engineering.


Undergraduates who are interested in working for a research degree should consult the Head of School towards the end of their final year. Advice will be given to all students during their third year so that each can select the best possible combination of final year elective subjects.

The School of Nuclear Engineering operates at the graduate level in the Faculty of Engineering. A fourth year undergraduate subject in Nuclear Power Technology is provided as an elective for other Schools (23.051 Nuclear Power Technology).
In addition to the supervision of programs of advanced study and research for candidates undertaking a research degree leading to the award of Master of Engineering, Master of Science or Doctor of Philosophy, the School offers a formal graduate course leading to the award of the degree of Master of Engineering Science. This formal course aims specifically at the education of engineers for the detailed understanding, analysis and assessment of nuclear reactors and nuclear power systems. Particular attention is given to the mathematical, numerical and computational techniques which are relevant to nuclear engineering.

Special research interests in the School include the general field of fluctuation phenomena and noise in nuclear reactors, the coupled thermomechanical, fluid dynamics and nuclear aspects of reactor fuel elements and coolant channels, and the subject of reactor utilization and reactor strategy.

Special digital and analogue equipment for the analysis and recording of random signals has been acquired for experimental noise research. Through the Australian Institute of Nuclear Science and Engineering, the special facilities of the Australian Atomic Energy Commission's Research Establishment at Lucas Heights can be made available for research purposes. Close personal contact is maintained between members of the School and the Nuclear Technology Division at Lucas Heights.

The School of Surveying offers a full-time course of four years duration leading to the degree of Bachelor of Surveying. Alternatively, the course may be taken in a sandwich form in which a student may, after completing the first year of the course on a full-time basis, alternate his or her studies with periods of employment by taking leaves of absence of up to two consecutive sessions at a time thereafter. The course taken in this form requires a maximum period of seven years. (The part-time course is no longer available.) In addition to surveying, the course also includes studies in geodesy, photogrammetry and cartography, astronomy, computations and land studies.

The School also offers a full-time course of four years' duration leading to the degree of Bachelor of Surveying Science. It is designed to give an interested student the opportunity to obtain greater depth as an undergraduate in one or more of the several disciplines associated with surveying: land development, cartographic science, geodesy and geophysics, environmental studies, remote sensing and photogrammetry.

The School is located in the Geography and Surveying Building. Facilities include four photogrammetry laboratories with several equipment types, an observatory platform for positional astronomy and a comprehensive range of field equipment for surveying and geodesy. Computing facilities include a number of terminals to the University's time-shared central computer, a control minicomputer within the School's Image Data Analysis Centre, and several programmable desk calculators. A library of programs is maintained for use with the different computers.

Current research is in the fields of satellite geodesy and geodynamics, atmospheric refraction, photogrammetry, remote sensing, positional astronomy, advanced surveying, cadastral systems and land management.

The Centre was established in 1976 as an interdisciplinary unit to promote and co-ordinate biomedical engineering studies and research being conducted by a number of schools within the University and teaching hospitals. Biomedical engineering involves the application of engineering techniques to biomedical problems with particular emphasis on clinical medicine.

The Centre offers graduate programs leading to the award of the degree of Master of Biomedical Engineering and the degree of Doctor of Philosophy. The Master's degree is obtained primarily through course work but includes a research project which is supervised in one of the Centre's associated laboratories, either on campus or in affiliated teaching hospitals. The doctorate is primarily a research degree which normally involves some formal course work.
The MBiomedE degree course is designed to cater for students with either a medical or engineering/science background and involves eighteen months of full-time study. Part-time students are also catered for. Initially, students with a medical background study basic engineering subjects such as mathematics, mechanics, electronics and computing, whilst students with a non-medical background take courses in biology, physiology, anatomy, pathology and biochemistry. At a later stage, students from both backgrounds choose electives from biomechanics, biophysics, biomaterials, medical instrumentation and mass transfer in medicine, as well as undertaking a research project.

The Centre was established in 1981 as a joint enterprise of the Faculties of Engineering and Applied Science to promote and co-ordinate remote sensing studies and research being conducted by various schools within the University. Remote sensing is the science of obtaining information about the earth's surface (in particular) using electromagnetic imaging systems mounted on aircraft and space platforms.

The Centre offers graduate programs leading to the award of the degree of Master of Engineering Science or Master of Applied Science and supervision for the degree of Doctor of Philosophy. The Masters' programs encompass the fundamentals of remote sensing and remote sensing systems, ground investigations, concepts of data processing and pattern recognition, numerical analysis of data and information extraction leading to specific application studies. They are organized around a group of compulsory subjects, elective subjects and a project or research project which is supervised in one of the schools associated with the Centre.

Students from a wide variety of backgrounds can undertake the programs on a one year full-time or two year part-time basis and these may include engineering, geography, geology, surveying, planning, biology and agricultural or environmental sciences.

In 1983, the Faculty is introducing a graduate program leading to the award of the degree of Master of Safety Science. A Graduate Diploma program in Safety Science is also available. These courses are provided in conjunction with the Faculties of Medicine, Commerce, Law and Applied Science. They are organized around a group of introductory subjects, core subjects and Safety Engineering elective subjects. Students from a wide variety of backgrounds may undertake the programs on a full-time or part-time basis.

Courses in Chemical Engineering, Ceramic Engineering, Metallurgy, Metallurgical Process Engineering, Mining Engineering and Textile Engineering are taught by the Faculty of Applied Science. For further information on these courses students should consult the Calendar and Faculty of Applied Science Handbook.
Message from the Dean and the Chairman

A great deal of discussion has taken place within the Faculty in recent years concerning the type of education appropriate for an engineer and surveyor. Central to this discussion are the basic objectives which are implicit in the various engineering and surveying courses. These are to impart to and foster within its students the following:

- Technical and scientific and creative skills required to solve all aspects of engineering problems.
- An understanding of human interaction with the environment, so that the impact of engineering activity can be assessed.
- The ability to direct and manage engineering activities.
- The ability to communicate, with other members of the profession, with industrial personnel, administrators, and with members of the public.
- The desire and ability for continuing self-education and reappraisal of current practice, including the ability to innovate new ideas and practices.
- The ability to evaluate independently and to criticise constructively their own work and the work of other engineers.

We hope to do much more than merely impart a body of knowledge to our graduates. Appropriate attitudes and skills for professional engineers operating into the twenty-first century must also be developed. Technology has come under increasing criticism from other sectors of society. It is no longer accepted that advances in technology are necessarily synonymous with the betterment of society, and future engineers must be prepared not only to take account of the ramifications of their work, but also to vindicate them to an increasingly doubtful public.

It is also important for you, as a student, to join in the development of yourself as a professional engineer. Engineering is a co-operative profession where teamwork is very important. Whilst at university you should take as many opportunities as you can to join in the activities which help to develop the whole person. Student clubs and professional institutions provide many opportunities for gaining knowledge and experience which will be valuable in your work as an engineer.
The staff and students collectively create an atmosphere of scholarship and learning. Staff are involved in research as well as in teaching. This research is vital if the quality of teaching is to be kept at a high intellectual standard. In addition the interested student will find a very wide range of research activities. The common thread, however, will be the engineering method which is applied.

Students should take steps to ensure that the staff are fully aware of their problems and attitudes. There are committees in the schools which are concerned with student matters. The faculty has student representation on its education committee, the executive committee and Faculty. We seek for membership of these committees articulate students who are able to assist in the development of a true university spirit of learning and enquiry.

N. L. Svensson  
Dean  
Faculty of Engineering

C. A. Stapleton  
Chairman  
Faculty of Engineering
Faculty Information

Who to Contact

If you require advice about enrolment, degree requirements, progression within courses, subject content and requirements, contact the appropriate school representative listed below:

School of Civil Engineering: Mr R. W. Prior, Room 406, School of Civil Engineering

School of Electrical Engineering and Computer Science: Associate Professor C. A. Stapleton, Room G6, or Ms R. C. Horwood, School Office, School of Electrical Engineering and Computer Science

School of Mechanical & Industrial Engineering: Associate Professor J. Y. Harrison, Room 105, or Mr G. Dusan, Room 107, School of Mechanical & Industrial Engineering

School of Nuclear Engineering: Professor J. J. Thompson, Room 205, Mechanical Engineering Building

School of Surveying: Mr J. V. Fonseka, School Office, Room 529, Geography & Surveying Building

Centre for Biomedical Engineering: Associate Professor P. C. Farrell, 34-36 Botany Street, Randwick, NSW 2031

Centre for Remote Sensing: Dr J. A. Richards, Room 613, Geography and Surveying Building.

Important: As changes may be made to information provided in this handbook, students should frequently consult the noticeboards of the schools and the official noticeboards of the University.

Faculty of Engineering Enrolment Procedures

All students re-enrolling in 1983 or enrolling in graduate courses should obtain a copy of the free booklet Enrolment Procedures 1983 available from School Offices and the Admissions Office. This booklet provides detailed information on enrolment procedures and fees, enrolment timetables by Faculty and course, enrolment in miscellaneous subjects, locations and hours of Cashiers and late enrolments.

Faculty of Engineering Library Facilities

Although any of the university libraries may meet specific needs, the staff and students of the Faculty of Engineering are served mainly by the Physical Sciences Library and the Undergraduate Library.

The Physical Sciences Library

This library situated on Levels 6 and 7 of the Library tower, caters for the information needs of staff, graduate students and
senior undergraduate students in the pure and applied sciences, engineering and architecture. Details of the books, serials and microforms in the Physical Sciences Library are included in the central monograph and serial catalogues and the items themselves are identified by the prefix 'P'. Serials with the prefix 'PJ' are not for loan, but self-service photocopying facilities are available on Level 7. This library provides reference, reader assistance and reader education services and also, where appropriate, inter-library loan and literature-searching services. Trained staff are always available on Level 7 to assist readers with their enquiries.

Physical Sciences Librarian  Marian Bate

The Undergraduate Library

This library caters for the library needs of first and second year students and other groups where large numbers require mass teaching.

The Undergraduate Library provides a reader education program and reader assistance service aimed at teaching students the basic principles of finding information. Services of particular interest to undergraduates and academic staff are:

- The Open Reserve Section, housing books and other material which are required reading.
- The Audio Visual Section, containing cassette tapes, mainly lectures and other spoken word material. The Audio Visual Section has wired study carrels and cassette players for student use.

Undergraduate Librarian  Pat Howard

Student Clubs and Societies

Students have the opportunity of joining a wide range of clubs and societies. Many of these are affiliated with the Students' Union. There are numerous religious, social and cultural clubs and also many sporting clubs which are affiliated with the Sports Association.

Clubs and societies seeking to use the name of the University in their title, or seeking University recognition, must submit their constitutions either to the Students' Union or the Sports Association if they wish to be affiliated with either of these bodies, or to the Registrar for approval by the University Council.

The following societies serve the interests of students in the various courses in the Faculty of Engineering: Biomedical Engineering Society (BioEngSoc); Civil Engineering Society (CIVSOC); Computing Science Association (CSA); Electrical Engineering Society (ELSOC); Mechanical Engineering Society (MECHSOC); Naval Architecture Students' Association (NASA); Surveying Society (SURVSOC).

Students are encouraged to participate in the activities of their societies. Enquiries should be directed initially to the general offices of the respective Schools.

International Association for the Exchange of Students for Technical Experience — IAESTE

IAESTE is an organization to facilitate overseas work in technical areas in 53 different countries throughout the world for students or recent graduates. It organizes visas, work periods for as little as 6 weeks or up to 12 months, lodging and an initial welcome.

In Australia IAESTE has a National Committee in Melbourne and local committees in the capital cities including Sydney. The UNSW local committee is made up of interested students and is run in association with the Careers and Appointments Service at Sydney University.

For more information write to the local committee President, IAESTE (UNSW), Union Box 43, UNSW, PO Box 1, Kensington 2033, or contact the local committees through the Students' Union.
The Institution of Engineers, Australia

The Professional body for engineering in Australia is the Institution of Engineers, Australia, which has as its first object 'to promote the science and practice of engineering in all its branches'.

The Institution functions through a series of divisions, the local one being the Sydney Division. Within each division are branches representing the main interests within the profession, e.g. civil, mechanical, electrical, chemical and transportation.

Students of an approved school of engineering may join the institution as a student member (StudEAust).

Student members receive the fortnightly publication Engineers, Australia advising of site tours, conferences, technical meetings of all branches, harbour cruises, film nights etc. They also receive The Transactions which contains articles on a particular branch of engineering for a small fee.

Student members are also free to use the comprehensive library and reference facilities maintained by the Institution. The library is a handy place to obtain a rare book or periodical.

For more information and membership application forms, write to The Secretary, The Institution of Engineers, Australia, Sydney Division, PO Box 138, Milsons Point NSW 2061.

The Rupert H. Myers Award in Materials Engineering

The University, in conjunction with the Department of Civil Engineering Materials in the School of Civil Engineering, makes an award, known as the Rupert H. Myers Award in Materials Engineering, which recognizes contributions made by individual engineers and scientists of international repute to the science of materials engineering. The selected candidate receives a silver medal and delivers the Rupert H. Myers Lecture as a key feature of a symposium concerned with the most recent developments in this field.

The Institution of Surveyors, Australia

During their years as undergraduates, students in the surveying course are encouraged to take the first steps in joining in the activities of the professional body which represents surveyors, The Institution of Surveyors. The aims of the Institution are to promote scientific, technical and educational aspects of surveying and to maintain high professional standards of practice and conduct. Student members receive the quarterly journal of the Institution, The Australian Surveyor and The NSW Surveyors' Monthly Bulletin which is published by the New South Wales Division of the Institution. Membership also entitles the student to attend all meetings of the Institution and to attend the annual Congress at a special concessional rate. Membership application forms are available at the office of the School of Surveying and from the Institution office, Third Floor, Guild House, 363 Pitt Street, Sydney.
Undergraduate Study

The Faculty of Engineering consists of five Schools — Civil Engineering, Electrical Engineering and Computer Science, Mechanical and Industrial Engineering, Nuclear Engineering, Surveying, the Centre for Biomedical Engineering and the Centre for Remote Sensing. The Schools of Civil Engineering, Electrical Engineering and Computer Science, and Mechanical and Industrial Engineering offer full-time courses leading to the degree of Bachelor of Engineering, and part-time courses leading to the degree of Bachelor of Engineering or Bachelor of Science (Engineering). The School of Surveying offers full-time courses, which may also be taken in a sandwich form, leading to the degrees of Bachelor of Surveying and Bachelor of Surveying Science. The School of Nuclear Engineering, the Centre for Biomedical Engineering and the Centre for Remote Sensing offer graduate courses only.

All the graduate activities of the Faculty are co-ordinated under the Graduate School of Engineering. For details of the graduate activities of the Faculty please see Graduate Study section later in this book.

First Year Programs

A student who has completed the First Year of an undergraduate course in one school may apply for a transfer to a course in another school of the Faculty with credit for relevant subjects completed. However, as there are considerable differences in the various Year 1 programs, students are not granted complete exemption from Year 1 of the course to which the transfer is made.

General Rules for Progression

Progression in all undergraduate courses in the Faculty of Engineering is now permitted by subject. However:

1. Course programs will continue to be stated and timetabled by year or stage and it cannot be guaranteed that non-standard programs can be completed in the minimum number of years.

2. Students must satisfy the rules governing re-enrolment: in particular, these require students enrolled in the first year of a degree program to pass in at least half that program. Students are also required to show cause why they should be allowed to repeat a subject which has been failed more than once.

3. A student must satisfy the relevant prerequisite and co-requisite requirements. This will usually necessitate a student completing or attempting all subjects of a particular year or stage before proceeding to a subject in the next part of a course. Further details are available from the appropriate school.

4. Only in exceptional circumstances will a student be permitted to enrol in subjects extending over more than two years of the course or for more than twenty-eight hours of course work per week if a full-time student or fourteen hours per week if a part-time student. Students repeating subjects are required to choose a program which limits their hours of course work to twenty-two per week if a full-time student, and to eleven per week if a part-time student, unless they have the express permission of the Head of School to exceed these hours.

5. Notwithstanding the above, before a student can enrol in any non-standard program such program must meet with the approval of the Head of School. A non-standard program is one which involves enrolment in subjects from more than one year or stage, or comprises subjects which do not normally constitute a particular year’s course work.

Prerequisites and Co-requisites

- A prerequisite unit is one which must be completed prior to enrolment in the unit for which it is prescribed.

- A co-requisite unit is one which must either be completed successfully before or be studied concurrently with the unit for which it is prescribed.
Full-time Courses

Full-time courses of four-years' duration are offered in Civil, Electrical, Mechanical, Industrial, and Aeronautical Engineering, and in Naval Architecture: all of these lead to the award of the degree of Bachelor of Engineering. Four-year full-time courses in Surveying and Surveying Science are offered by the School of Surveying leading to the award of the degrees of Bachelor of Surveying and Bachelor of Surveying Science. The award of the degree of Bachelor of Engineering is recognized by the Institution of Engineers, Australia, as giving complete exemption from the examinations required for admission to the grade of Member. Substantial or complete recognition is accorded to these courses by overseas engineering institutions.

The award of the degree of Bachelor of Surveying is recognized by the Surveyors' Board of New South Wales as giving complete exemption from written examinations of the Board.

In the case of Bachelor of Surveying Science degree the New South Wales Surveyors' Board may require additional subjects for registration.

Industrial Training Requirements

All full-time engineering courses incorporate industrial training and reference should be made to the entries under each School heading for details of the arrangements applicable. All students are strongly recommended to gain further industrial experience in those long vacations where such training is not already prescribed.

The staff of the University will, where possible, assist students to obtain this employment, but it is emphasized that the primary responsibility for obtaining suitable industrial experience rests with each student. Progression to succeeding years of the course and the award of the degree are dependent on the completion of the requisite periods of industrial employment at a standard approved by the University.

Part-time Courses

Courses leading to the award of the degrees of Bachelor of Engineering in Civil, Electrical, Mechanical, Industrial and Aeronautical Engineering and Naval Architecture may be taken by part-time study over a period of six or seven years, depending upon the course, or by an approved combination of part-time and full-time study.

Part-time courses leading to the award of the degree of Bachelor of Science (Engineering) in these six fields may be taken over a period of six years, but these courses are being phased out and new enrolments in them are no longer accepted.

The award of the degree of BSc(Eng) is recognized at present by the Institution of Engineers, Australia, as giving complete exemption from the examinations required for admission to the grade of Member.

Recognition by overseas engineering institutions varies in the different branches of engineering, and enquiries on this matter should be addressed to the Head of the appropriate School.

A student completing the BSc(Eng) degree course and wishing to qualify for the corresponding BE degree may, on the recommendation of the Head of the School, transfer to the corresponding full-time BE course provided he does not take out the BSc(Eng) degree. Further, provided he continues as a registered student on transfer from one course to the other, he may retain any concession granted in the BSc(Eng) degree course.

Holders of the BSc(Eng) degree are eligible to proceed to the degree of Master of Engineering, Master of Engineering Science or Master of Surveying Science subject to the conditions for the award of these degrees set out in the Calendar.

Courses leading to the award of the BSc(Eng) degree are basically part-time and the prescribed industrial experience should be gained concurrently with the course of study (a minimum of three years of suitable engineering experience is required). Students transferring from full-time courses must, therefore, also satisfy these industrial experience requirements before being admitted to the degree of BSc(Eng).

The BSc(Eng) degree program may in some cases be accelerated by a student attending for one or more years full-time. For example, in all courses of the Faculty it is possible to take the equivalent of the first two part-time years in the full-time first year.

Conditions for the Award of the Degree of Bachelor of Science (Engineering)

The course leading to the award of the degree of Bachelor of Science (Engineering) is normally programmed over six years of part-time study in the University whilst the student is employed in industry. The regulations governing the award of this degree are as follows:

1. A candidate for the award of the degree of BSc(Eng) shall:
   (1) comply with the requirements for admission;
   (2) follow the prescribed course of study in the appropriate school and pass the necessary examinations;
(3) complete an approved program of industrial training over such period as is prescribed concurrently with attendance in the course. In general, this training must be completed before 31 January in the year in which the degree is to be recorded.

2. During each year a student shall perform laboratory, drawing office and field work, attend demonstrations and excursions to such an extent and in such a manner as is prescribed from time to time by the Professorial Board on the recommendation of the Faculty, and, in addition, undertake industrial training as approved by the Head of the School.

3. A student may be granted advanced standing by the Professorial Board on the recommendation of the appropriate Faculty but in each case a student must follow an approved course for at least three years with such period of approved industrial training as is prescribed before being eligible for admission to the degree.

4. The degree of BSc(Eng) shall be awarded in the pass grade only but in the case of superior performance throughout the course the degree shall be conferred 'with merit'.

5. Students shall be required to conform with the general rules relating to progression in University courses.

6. In special cases Faculty may approve the variation of any of the preceding conditions.

Note: No new enrolments are being accepted into this course.

**Conditions for the Award of the Degrees of Bachelor of Surveying and Bachelor of Surveying Science**

1. A candidate for the award of the degree of Bachelor of Surveying or Bachelor of Surveying Science shall:
   (1) comply with the requirements for admission;
   (2) follow the prescribed course of study in the School of Surveying and satisfy the examiners in the necessary subjects;
   (3) complete an approved program of industrial training for such periods as are prescribed. In general, this training must be completed before 31 January in the year in which the degree is to be awarded.

2. During each year a student shall perform laboratory, drawing office and field work, attend demonstrations and excursions to such an extent and in such a manner as is prescribed from time to time by the Professorial Board on the recommendation of the Faculty.

3. A student may be granted advanced standing by the Professorial Board on the recommendation of the appropriate Faculty. In addition to the above requirements a student coming from another institution must comply with the conditions laid down by the Professorial Board for admission with advanced standing.

4. The degrees shall be awarded in the pass or honours grade. Honours may be awarded in the following categories:
   Honours Class I
   Honours Class II, Division I
   Honours Class II, Division II

5. In special cases Faculty may approve the variation of any of the preceding conditions.
The School of Civil Engineering offers a course leading to the degree of Bachelor of Engineering (BE), at pass or honours level, which can be taken on a 4-year full-time basis, a 7-stage part-time basis or any approved combination of full-time and part-time study.

A five year full-time course leading to the award of the degrees of Bachelor of Engineering and Bachelor of Science (BE BSc) is offered.

The requirements for the award of the BE degree include a period of at least sixty working days of approved industrial training prior to enrolment in the final year.

The degree of Bachelor of Engineering may be conferred as a Pass degree or as an Honours degree. There are two classes of Honours, Class I, and Class II in two divisions, and the award and grade of Honours are made in recognition of superior performance throughout the course.
### Year 2

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>How</th>
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<tbody>
<tr>
<td><strong>S1</strong></td>
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</tr>
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<td>Structural Design IIA</td>
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<td>Civil Engineering Materials I</td>
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</tr>
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<td>Civil Engineering Materials II</td>
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<td></td>
</tr>
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</tr>
<tr>
<td>Systems Engineering II</td>
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<td>Hydraulics I</td>
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</tr>
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<td>Engineering Construction</td>
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</tr>
<tr>
<td>Engineering Mathematics II</td>
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<td>Surveying for Engineers</td>
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<tr>
<td>Survey Camp†</td>
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**Note:** See Electives on following page.

*Students are required to attend a one-week Survey Camp, which is equivalent to 3 class contact hours per week in a session.

### Year 3

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<th>Course</th>
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<td>Structural Analysis II</td>
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<td>Structural Design IIB</td>
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</tr>
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<td>Engineering Computations</td>
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</tr>
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<td>Transport Engineering I</td>
<td>0</td>
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</tr>
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<td>Hydraulics II</td>
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<td>Water Resources I;</td>
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**Note:** See Electives on following page.

†Includes 8 hours of Saturday fieldwork.

### Year 4

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<td>Industrial Training</td>
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<td>Structural Engineering</td>
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<td>Concrete Technology</td>
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<td>Metals Engineering</td>
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<td>Transport Engineering II</td>
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<td>Water Resources III</td>
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<td>Planning and Management II</td>
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**Note:** See this footnote below Year 1 (previous page).
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<td>29.441 Surveying for Engineers*</td>
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*Includes 28 hours of Saturday fieldwork as an essential part of the subject.
†Students are required to attend a one-week Survey Camp, equivalent to 3 class contact hours per week in a session.

### Stage 4

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<td>8.2731 Geotechnical Engineering I</td>
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<td>8.2733 Rock Engineering</td>
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<td>8.311 Systems Engineering I</td>
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<td>8.571 Hydraulics I</td>
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<td>8.671 Engineering Construction</td>
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<td>10.381 Statistics SC</td>
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***See Electives opposite.

### Stage 5

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<td>8.1812 Structural Design IB</td>
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<td>8.1821 Structural Design II A</td>
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<td>8.2732 Geotechnical Engineering II</td>
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<td>8.312 Systems Engineering II</td>
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<td>8.362 Engineering Computations</td>
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<td>8.400 Transport Engineering I</td>
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<td>8.672 Planning &amp; Management I</td>
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***See Electives opposite.

### Stage 6

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<td>8.191 Structural Engineering</td>
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<td>8.2741 Concrete Technology</td>
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### Electives

The requirements of the BE degree course include the completion of five Technical Electives, and three General Studies electives (56 hours each) or the equivalent. Students who have completed General Studies electives on the old basis (42 hours each) will be informed of their General Studies requirement by the School.

Approved technical electives are 6.851 Electronics and Instrumentation, 6.832 Industrial Electrical Machinery, 8.039 Computer Programming, 8.040 Advanced Engineering Geology, 36.411 Town Planning, 8.047 History of Civil Engineering.

8.015 Road Engineering, 8.018 Construction Engineering, 8.021 Environmental Aspects of Civil Engineering, 8.023 Hydrodynamics, 8.027 New Materials I, 8.029 Continuum Mechanics, 8.041 Geological Engineering, 8.081 Probability and Statistics for Civil Engineers, 15.501 Introduction to Industrial Relations.

8.011 Projects, 8.012 Elements of Architecture, 8.013 Bridge Engineering, 8.014 Computer Applications in Civil Engineering, 8.017 Transportation Engineering, 8.019 Railway Engineering, 8.020 Hydrology, 8.024 Foundation and Dam Engineering, 8.025 Structural Failures, 8.026 Systems Methods in Civil Engineering, 8.028 New Materials II, 8.030 Construction Management, 8.031 Construction Project...
Combined Course

**3730 Combined Course for BE BSc in Civil Engineering**

Students may seek permission to undertake a five year full-time combined course leading to the award of the degrees of Bachelor of Engineering and Bachelor of Science (BE BSc). The course is administered by the Faculty of Engineering.

Normally, students enrolled in the BE BSc course may be awarded their degrees at the conclusion of five years’ study. However, students who commence the course and do not complete the Civil Engineering component may take out a BSc degree on completion of one of the approved programs of the Science and Mathematics Course.

Similarly, students not wishing to complete the BSc degree course may revert to the Civil Engineering program (3620) with appropriate credit for subjects satisfactorily completed.

The combined course consists of the Civil Engineering program (3620), with four instead of eight electives, and at least fourteen units of the Science and Mathematics Course (3970) within an approved program.

There are six approved programs but additional ones may be approved if they are relevant.

<table>
<thead>
<tr>
<th>Physical Metallurgy and Chemistry</th>
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<tbody>
<tr>
<td><strong>Year 1</strong></td>
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<td>1.981*</td>
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<td>2.981**</td>
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<td>5.0102, 5.0201, 5.0301</td>
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<td>8.170, 8.171, 8.271, 8.360, 8.670</td>
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<table>
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<th>Geography and Environmental Chemistry</th>
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<td>1.981*</td>
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<td>2.981**</td>
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| **Year 2**                             |
| 2.002A, 2.042C                        |
| 4.402, 4.502                          |
| 8.172, 8.1811, 8.1812, 8.2721, 8.2722  |
| 10.022                                 |

1 General Studies elective†

| **Year 3**                             |
| 4.403, 4.703                           |
| 8.173, 8.174, 8.1821, 8.1822, 8.311, 8.312, 8.362, 8.400, 8.571 |
| 10.381                                 |
| 29.441, 29.491                         |

1 General Studies elective†

| **Year 4**                             |
| 2.003A, 2.003C, 2.013C                  |
| 4.503                                  |
| 8.2731, 8.2732, 8.2733, 8.572, 8.573, 8.581, 8.582, 8.671, 8.672 |
| 1 General Studies elective†            |

| **Year 5**                             |
| 1 Technical elective†                  |
| Choose 2 units from Table 1 in the Sciences Handbook at Level II or higher. |
| 8.001, 8.191, 8.2741, 8.2742, 8.401, 8.583, 8.673, 8.674, 8.051, 8.052, 8.053, 8.054 |

Note: All material not in italic typeface refers to the BE degree component of this combined course.

† † † † † † See footnotes below.
Year 3
2.043A
8.173, 8.174, 8.1821, 8.1822, 8.311, 8.312, 8.362, 8.400, 8.571
10.381
27.172
29.441, 29.491
1 General Studies elective†

Year 4
8.2731, 8.2732, 8.2733, 8.572, 8.573, 8.581, 8.582, 8.671, 8.672
27.153, 27.1711
2 General Studies electives†
At least 1½ units chosen from:
27.143, 27.183, 27.133, 27.862, 27.863, 27.1712

Year 5
1 Technical elective†
Choose 2 units from Table 1 in the Sciences Handbook at Level II or higher.
1.133, 1.3233, 1.0533, 1.0133, 1.0143
1.1331, 8.2731, 8.2732, 8.2733, 8.572, 8.573, 8.581, 8.582, 8.671, 8.672
1 General Studies elective†
Choose 2 Level II or Level III Mathematics units from Table 1 in the Sciences Handbook.

Year 4
1.1333
Choose 1 unit from:
1.133, 1.3233, 1.0533, 1.0133, 1.0143
8.2731, 8.2732, 8.2733, 8.572, 8.573, 8.581, 8.582, 8.671, 8.672
1 General Studies elective†
Choose 2 Level II or Level III Mathematics units from Table 1 in the Sciences Handbook.

Year 5
8.001, 8.191, 8.2741, 8.2742, 8.401, 8.583, 8.673, 8.674, 8.051, 8.052, 8.053, 8.054
1 Technical elective†
Choose 1 or 2 units from Table 1 in the Sciences Handbook at Level II or higher.
Note: All material not in italic typeface refers to the BE degree component of this combined course.
* * * * † See footnotes below
†Unit 1.002 will be implemented in 1984 in this program. For 1983 only this unit is replaced by 1.0143 and 1.0343, and the co-requisite specified for 1.0343 does not apply.

Physics with Mathematics

Year 1
1.001 or 1.011
2.981**
5.0102, 5.0201, 5.0301
8.170, 8.171, 8.271, 8.360, 8.670
10.001***

Year 2
1.012
1.022, 1.032
8.172, 8.1811, 8.1812, 8.2721, 8.2722
10.1113 or 10.1213,
10.1114 or 10.1214,
10.2111 or 10.2211,
10.2112 or 10.2212
2 General Studies electives†

Mathematics

Year 1
1.981†
2.981**
5.0102, 5.0201, 5.0301
8.170, 8.171, 8.271, 8.360, 8.670
10.001***

Year 2
8.172, 8.1811, 8.1812, 8.2721, 8.2722
10.111A or 10.121A,
10.1113 or 10.1213,
10.1114 or 10.1214,
10.2111 or 10.2211,
10.2112 or 10.2212
1 General Studies elective†
Choose either 1. or 2.;
1. 10.311A or 10.321A,
10.311B or 10.321B
2. Choose 3 units from:
10.411B or 10.421B,
10.411A or 10.421A,
10.331,
10.2113 (or 10.2213) and 10.2114 (or 10.2214),
10.111,
10.1112 or 10.121C

Year 3
8.173, 8.174, 8.1821, 8.1822, 8.311, 8.312, 8.362, 8.400,
8.571
10.381
29.441, 29.491
1 General Studies elective†
Choose 4 units from Mathematics from Table 1 of the Sciences Handbook (at least one must be Level III).

Year 4
8.2731, 8.2732, 8.2733, 8.572, 8.573, 8.581, 8.582,
8.671, 8.672
1 General Studies elective†
Choose 3 Level III (not Level II/III) Mathematics units from Table 1 of the Sciences Handbook.

Year 5
8.001, 8.191, 8.2741, 8.2742, 8.401, 8.583, 8.673, 8.674,
8.051, 8.052, 8.053, 8.054
1 Technical elective†
Choose 1 or 2 units from Tables 1 or 3 in the Sciences Handbook at Level II or higher.

Note: All material not in italic typeface refers to the BE degree component of this combined course.
* * * * * † See footnotes below.

Geology with some Mathematics

Year 1
1.981*
2.981**
5.0102, 5.0201, 5.0301
8.170, 8.171, 8.271, 8.360, 8.670
10.001***

Year 2
8.172, 8.1811, 8.1812, 8.2721, 8.2722
10.111A or 10.121A,
10.1113 or 10.1213,
10.1114 or 10.1214,
10.2111 or 10.2211,
10.2112 or 10.2212
25.110, 25.120
2 General Studies electives†

Year 3
2.022C
8.173, 8.174, 8.1821, 8.1822, 8.311, 8.312, 8.362, 8.400,
8.571
10.381
25.211, 25.221, 25.212
29.441, 29.491
1 General Studies elective†

Year 4
8.2731, 8.2732, 8.2733, 8.572, 8.573, 8.581, 8.582,
8.671, 8.672
Choose four subjects from the following:

Year 5
8.001, 8.191, 8.2741, 8.2742, 8.401, 8.583, 8.673, 8.674,
8.051, 8.052, 8.053, 8.054
1 Technical elective†
Choose 1 or 2 units from Table 1 in the Sciences Handbook at Level II or higher.

Note: All material not in italic typeface refers to the BE degree component of this combined course.
* * * * * † See footnotes below.

Computing with some Mathematics

Year 1
1.981*
2.981**
5.0102, 5.0201, 5.0301
8.170, 8.171, 8.271, 8.360, 8.670
10.001***
Year 2
6.621, 6.631, 6.641
8.172, 8.1811, 8.1812, 8.2721, 8.2722
10.111A or 10.121A,
10.1113 or 10.1213,
10.1114 or 10.1214
2 General Studies electives†

Year 3
6.642, 6.643
8.173, 8.174, 8.1821, 8.1822, 8.311, 8.312, 8.362, 8.400,
8.441, 8.491
8.571
10.1114 or 10.1214
6.642, 6.643
29.441, 29.491
10.1113 or 10.1213,

Year 4
Choose 10.381
8.2731, 8.2732, 8.2733, 8.572, 8.573, 8.581, 8.582,
8.671, 8.672
One of 6.613, 6.632, 6.633

Year 5
6.646, 6.647
One of 6.613, 6.632, 6.633
8.2731, 8.2732, 8.2733, 8.572, 8.573, 8.581, 8.582,
8.671, 8.672
1 General Studies elective†
Choose 1 Level II or Level III Mathematics unit from Table 1 in the Sciences Handbook.

Note: All material not in italic typeface refers to the BE degree component of this combined degree course.

*Students are advised to attempt 1.961 Physics 1CE but if time-tableing difficulties arise or other exceptional circumstances prevail permission will be given to attempt 1 1001 Physics I or 1.101 Higher Physics I. On successful completion of one of these latter subjects students will be exempted from one technical elective.

**Students who have not satisfied the science prerequisite for 2.961 Chemistry 1CE (or 2 unit Science including Physics or Chemistry or 4 unit Science (multistrand) in the percentile range 31-100) are advised to apply to enrol in two acceptable alternative subjects, 2.111 introductory Chemistry and 2.121 Chemistry 1A.

***Students who have achieved a certain standard may attempt 10.101 Higher Mathematics I.

† The combined degree program requires one Technical Elective, and three General Studies Electives (56 hours each) to be completed. Students who have completed General Studies electives on the old basis (42 hours) will be informed of their General Studies requirements by the School. The technical electives are listed after Stage 7 in course 3620. The choice of the Technical Elective must be approved by the Head of the School of Civil Engineering.

School of Electrical Engineering and Computer Science

Head of School
Professor N. W. Rees

Executive Assistant to Head of School
Associate Professor C. A. Stapleton

Senior Administrative Officer
Mr K. J. Flynn

Administrative Officer
Ms R. C. Harwood

Electrical Engineering has close links with the pure sciences and mathematics. Its technology is changing rapidly, and the School's teaching and research programs are constantly under review to meet the ever changing challenges of present and future needs.

The School offers undergraduate and graduate training in all branches of the profession of electrical engineering; there are Departments of Communications, Computer Science, Electric Power, Electronics, and Systems Control Engineering. A number of inter-departmental and specialized groups (such as Digital Systems, Acoustics, Biomedical Engineering, Measurements etc.) are also active.

Summary of Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Degree(s)</th>
<th>Usual Duration (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3640</td>
<td>BE</td>
<td>4 full-time Note 1</td>
</tr>
<tr>
<td>3640</td>
<td>BE</td>
<td>6 part-time Note 1</td>
</tr>
<tr>
<td>3650</td>
<td>BSc (Eng)</td>
<td>6 part-time Note 2</td>
</tr>
<tr>
<td>3720</td>
<td>BE and BA</td>
<td>5 full-time</td>
</tr>
<tr>
<td>3725</td>
<td>BE and BSc</td>
<td>5 full-time</td>
</tr>
<tr>
<td>3970*</td>
<td>BSc (pass)</td>
<td>3 full-time</td>
</tr>
<tr>
<td>3970*</td>
<td>BSc (honours)</td>
<td>4 full-time</td>
</tr>
</tbody>
</table>

Note 1 Course 3640 Full-time/Part-time
A student in course 3640 may with the approval of the Head of School complete the requirements by a combination of full-time and part-time study. To ensure that prerequisites are met and the program can be timetabled, students should consult with the School as early as possible when a change in attendance pattern is envisaged. A part-time student is expected to attend classes one afternoon per week. After Year 1 of the BE, a form of sandwich pattern is possible by arrangement with the Head of School.

Note 2 Course 3650
From 1983, no new enrolments are being accepted into course 3650. A student already enrolled in this course may complete it and graduate with a BSc (Eng) degree or may request to transfer to course 3640 and graduate with a BE degree.

Note 3 Course 3970
This course is operated by the Board of Studies in Science and Mathematics and is for students wishing to major in Computer Science in a Science and Mathematics context. For more details see the Sciences Handbook. Most of the course is available in evening classes but some day attendance is essential in Year 3.

The undergraduate curriculums are being progressively revised to provide a flexible training to suit the needs of today and tomorrow. Individual student needs can be further met by quite extensive substitution provisions within the course programs.

Note: All material not in italic typeface refers to the BE degree component of this combined degree course.

- Students are advised to attempt 1.961 Physics 1CE but if time-tableing difficulties arise or other exceptional circumstances prevail permission will be given to attempt 1 1001 Physics I or 1.101 Higher Physics I. On successful completion of one of these latter subjects students will be exempted from one technical elective.
- Students who have not satisfied the science prerequisite for 2.961 Chemistry 1CE (or 2 unit Science including Physics or Chemistry or 4 unit Science (multistrand) in the percentile range 31-100) are advised to apply to enrol in two acceptable alternative subjects, 2.111 introductory Chemistry and 2.121 Chemistry 1A.
- Students who have achieved a certain standard may attempt 10.101 Higher Mathematics I.
- The combined degree program requires one Technical Elective, and three General Studies Electives (56 hours each) to be completed. Students who have completed General Studies electives on the old basis (42 hours) will be informed of their General Studies requirements by the School. The technical electives are listed after Stage 7 in course 3620. The choice of the Technical Elective must be approved by the Head of the School of Civil Engineering.
Recognition

The degrees of Bachelor of Engineering and Bachelor of Science (Engineering) are recognized by the Institution of Engineers, Australia and the Institution of Radio and Electronics Engineers, Australia, as giving complete exemption from the examinations required for admission to Graduate or Corporate membership.

Honours

In the Bachelor of Engineering Course the same formal program is offered to both pass students and to those aiming at honours. Honours will be awarded for meritorious performance over the course; special attention is paid to a candidate's performance in the final year thesis project. A student with a creditable performance in the Bachelor of Science (Engineering) course may be awarded a degree with Merit.

The award of the BA or BSc degree at honours level requires two additional sessions of study. See the Arts and Sciences Handbooks for details.

Substitution of Subjects

To suit the special abilities or needs of individual students a limited amount of substitution is permitted within each course. Any such substitution must have prior approval of the Head of School who will ensure that:

1. The replacement subject is at least the same length and level as the prescribed subject it replaced; and,
2. The resulting overall program of study is suited to the award of the degree as applicable.

Substitution is not permitted in Year 1.

Examples

(i) Replacement of General Studies subjects by subjects approved (by the Head of the Department of General Studies) selected from areas such as Arts; Life Sciences; Earth Sciences; Accounting and Business Administration; Law; Economics; Industrial Management.

(ii) The normal Year 4 of the BE degree program includes 5 units of Electrical Engineering IV. Students may substitute for one of these units, a subject of suitable level and difficulty from an area outside the School of Electrical Engineering and Computer Science. A graduate subject of the School may also be substituted in this way.

(iii) Students proposing to concentrate on Computer Science within the BE degree program may substitute appropriate Computer Science units in Year 4 (for up to three professional electives).

(iv) Part-time BE students in full-time employment may request substitution of Industrial Electives (6.931, 6.932, 6.933) for up to three subjects in the BE course. See Industrial Elective subject descriptions for details.

Course Rules

It is the responsibility of students to meet the course requirements applicable at the date of application for the degree.

- Programs and timetables are arranged in preferred year or stage groupings. Progression is, however, by subject.

- In addition to the specific subject prerequisites a general understanding of the material in the preceding Year or Stage is assumed. Students are not normally permitted to enrol in subjects spread beyond two Years or Stages.

- Students who do not pass their full programs will be limited to 80% of a normal load in the following year.

- Previously failed subjects must be included, except that a failed elective may be replaced by another elective.

Course Revision

Following each course revision students will be assessed on the basis of the new program, but

- No student will lose credit for any subject completed, and
- No student will be liable for the increased requirements if they progress normally.

- It is the responsibility of students to enrol in a program consistent with the rules governing re-enrolment and admission to the degree.

Re-enrolment

Students must collect enrolment information from the School Office before the end of Session 2. Re-enrolment forms, giving details of students' proposed 1983 programs must be lodged with the School Office by Friday 7 January 1983. Enrolment at the University will not be authorized until the re-enrolment form has been checked and the program approved. Students not intending to re-enrol should advise the School. Leave of absence for up to one year is usually granted to students in good standing.

3640 Electrical Engineering — Full-time Course

Bachelor of Engineering

BE

Year 1

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.961 Physics I*</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>2.121 Chemistry</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>5.006 Engineering E</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>6.010 Electrical Engineering I</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>6.611 Computing I</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>10.001 Mathematics I*</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

26 26

*Students who have achieved a certain standard may attempt similar material at a higher level.
### Year 2†

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electromagnetism</td>
<td>S1  S2</td>
</tr>
<tr>
<td>1.972</td>
<td>0  4</td>
</tr>
<tr>
<td>1.982 Solid State Physics</td>
<td>4½ 0</td>
</tr>
<tr>
<td>10.111A Pure Mathematics II (Linear Algebra)*</td>
<td>2½ 2½</td>
</tr>
<tr>
<td>10.1113 Pure Mathematics II</td>
<td>2½ 0</td>
</tr>
<tr>
<td>10.1114 Pure Mathematics II — Complex Analysis*</td>
<td>0 2½</td>
</tr>
<tr>
<td>10.2111 Applied Mathematics II — Vector Calculus*</td>
<td>2½ 0</td>
</tr>
<tr>
<td>10.2112 Applied Mathematics II — Mathematical Methods for Differential Equations*</td>
<td>0 2½</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>4 0</td>
</tr>
</tbody>
</table>

**Electrical Engineering II**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.021A Circuit Theory I</td>
<td>4 0</td>
</tr>
<tr>
<td>6.021B Power</td>
<td>0  4</td>
</tr>
<tr>
<td>6.021C Electronics I</td>
<td>0  4</td>
</tr>
<tr>
<td>6.021D Computing</td>
<td>4  0</td>
</tr>
<tr>
<td>6.021E Digital Logic and Systems</td>
<td>0  4</td>
</tr>
</tbody>
</table>

### Year 4

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Studies Elective†</td>
<td>4  0</td>
</tr>
<tr>
<td>Technical Elective†</td>
<td>4  0</td>
</tr>
</tbody>
</table>

**Electrical Engineering IV**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Professional Electives*</td>
<td>15 10</td>
</tr>
<tr>
<td>6.911 Thesis**</td>
<td>2  21</td>
</tr>
<tr>
<td>6.903 Industrial Training‡</td>
<td>25 31</td>
</tr>
</tbody>
</table>

*Three electives are taken in Session 1 and two in Session 2. See list of Professional Electives later this section.

†Students are required to complete 168 hours of General Studies electives for the BE degree. If these have been completed by Year 4, no General Studies subject is required in that year's program.

** 6.911 Thesis is done in the last two sessions of a student's course. See subject description.

‡All students in the BE course must complete at least 60 days industrial experience.

### Year 3*

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.033 E.E. Mathematics III</td>
<td>2  2</td>
</tr>
<tr>
<td>10.361 Statistics SE</td>
<td>2  2</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>4  0</td>
</tr>
<tr>
<td>Technical Elective†</td>
<td>0  4</td>
</tr>
</tbody>
</table>

**Electrical Engineering III**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0311 Circuit Theory II</td>
<td>4  0</td>
</tr>
<tr>
<td>6.0312 Utilization of Electric Energy</td>
<td>4  0</td>
</tr>
<tr>
<td>6.0313 Electronics II</td>
<td>4  0</td>
</tr>
<tr>
<td>6.0314 Systems and Control I</td>
<td>0  4</td>
</tr>
<tr>
<td>6.0315 Electrical Energy</td>
<td>0  4</td>
</tr>
<tr>
<td>6.0316 Electronics III</td>
<td>0  4</td>
</tr>
<tr>
<td>6.0317 Communications Systems I</td>
<td>0  4</td>
</tr>
<tr>
<td>6.0318 Microprocessor Systems and Applications</td>
<td>4  0</td>
</tr>
</tbody>
</table>

### Year 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.001 Physics I</td>
<td>6  6</td>
</tr>
<tr>
<td>10.001 Mathematics I</td>
<td>6  6</td>
</tr>
<tr>
<td>5.006 Engineering E (or equivalent)</td>
<td>3  3</td>
</tr>
</tbody>
</table>

### Stage 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.121 Chemistry</td>
<td>0  6</td>
</tr>
<tr>
<td>6.010 Electrical Engineering I</td>
<td>6  0</td>
</tr>
<tr>
<td>6.021A Circuit Theory I</td>
<td>0  4</td>
</tr>
<tr>
<td>6.611 Computing I</td>
<td>6  0</td>
</tr>
<tr>
<td>10.2111 Applied Mathematics II — Vector Calculus</td>
<td>0 2½</td>
</tr>
<tr>
<td>10.2112 Applied Mathematics II — Mathematical Methods for Differential Equations</td>
<td>2½ 0</td>
</tr>
</tbody>
</table>

### Stage 2

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>14½ 12½</td>
<td></td>
</tr>
</tbody>
</table>

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*Students who plan to specialize in Computer Science or Physics in a BE/BSc course should consult the School before enrolling in Year 2.

*Students who have achieved a certain standard may attempt similar material at a higher level.

---

### Electrical Engineering — Part-time Course

### Bachelor of Engineering

BE

Compared with the full-time program above, three subjects (10.033, one Technical Elective and one Professional Elective) are assumed to have been substituted by three Industrial electives (see Industrial elective subject description for more details). Other subjects could be replaced in lieu of those above with approval of the Head of School.

### Stage 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.001 Physics I</td>
<td>6  6</td>
</tr>
<tr>
<td>10.001 Mathematics I</td>
<td>6  6</td>
</tr>
<tr>
<td>5.006 Engineering E (or equivalent)</td>
<td>3  3</td>
</tr>
</tbody>
</table>

### Stage 2

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.121 Chemistry</td>
<td>0  6</td>
</tr>
<tr>
<td>6.010 Electrical Engineering I</td>
<td>6  0</td>
</tr>
<tr>
<td>6.021A Circuit Theory I</td>
<td>0  4</td>
</tr>
<tr>
<td>6.611 Computing I</td>
<td>6  0</td>
</tr>
<tr>
<td>10.2111 Applied Mathematics II — Vector Calculus</td>
<td>0 2½</td>
</tr>
<tr>
<td>10.2112 Applied Mathematics II — Mathematical Methods for Differential Equations</td>
<td>2½ 0</td>
</tr>
</tbody>
</table>
Stage 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.972</td>
<td>Electromagnetism</td>
<td>S1 4 S2 0</td>
</tr>
<tr>
<td>1.982</td>
<td>Solid State Physics</td>
<td>S1 0 S2 4½</td>
</tr>
<tr>
<td>6.021B</td>
<td>Power</td>
<td>S1 4 S2 0</td>
</tr>
<tr>
<td>6.021D</td>
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<td>S1 0 S2 4</td>
</tr>
<tr>
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<td>Pure Mathematics II — Linear Algebra</td>
<td>S1 2½ S2 2½</td>
</tr>
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<td>10.111B</td>
<td>Pure Mathematics II — Multivariable Calculus</td>
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<tr>
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<td>Industrial Elective</td>
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Stage 4*

<table>
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<tbody>
<tr>
<td>6.021C</td>
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<td>6.021E</td>
<td>Digital Logic and Systems</td>
<td>S1 4 S2 0</td>
</tr>
<tr>
<td>6.0311</td>
<td>Circuit Theory II</td>
<td>S1 0 S2 4</td>
</tr>
<tr>
<td>6.0312</td>
<td>Utilization of Electrical Energy</td>
<td>S1 0 S2 4</td>
</tr>
<tr>
<td>6.0313</td>
<td>Electronics II</td>
<td>S1 0 S2 4</td>
</tr>
<tr>
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<td>Technical Elective†</td>
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<td>General Studies Elective</td>
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</tr>
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<td></td>
<td>Industrial Elective</td>
<td>S1 2 S2 2</td>
</tr>
<tr>
<td></td>
<td>**</td>
<td>S1 15 S2 14</td>
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Stage 5

<table>
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<tbody>
<tr>
<td>6.0314</td>
<td>Systems and Control I</td>
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</tr>
<tr>
<td>6.0315</td>
<td>Electrical Energy</td>
<td>S1 0 S2 4</td>
</tr>
<tr>
<td>6.0316</td>
<td>Electronics III</td>
<td>S1 4 S2 0</td>
</tr>
<tr>
<td>6.0317</td>
<td>Communication Systems I</td>
<td>S1 0 S2 4</td>
</tr>
<tr>
<td>6.0318</td>
<td>Microprocessor Systems and Applications</td>
<td>S1 0 S2 4</td>
</tr>
<tr>
<td>10.361</td>
<td>Statistics SE</td>
<td>S1 2 S2 2</td>
</tr>
<tr>
<td></td>
<td>Industrial Elective</td>
<td>S1 2 S2 2</td>
</tr>
<tr>
<td></td>
<td>**</td>
<td>S1 10 S2 14</td>
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Stage 6

<table>
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<tr>
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<tbody>
<tr>
<td></td>
<td>General Studies Elective</td>
<td>S1 2 S2 2</td>
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<tr>
<td></td>
<td>Four Professional Electives‡</td>
<td>S1 10 S2 10</td>
</tr>
<tr>
<td>6.903</td>
<td>Industrial Training**</td>
<td>S1 10 S2 10</td>
</tr>
<tr>
<td>6.911</td>
<td>Thesis††</td>
<td>S1 12 S2 12</td>
</tr>
</tbody>
</table>

*Students who intend to major in particular disciplines should note that certain subjects are prerequisites for the Professional Electives they choose in Stage 6.
‡See list of Technical Electives later this section.
§Two electives are taken in each session. See list of Professional Electives later this section.
**All students in the BE course must complete at least 60 days industrial experience.
††6.911 is done in the last sessions of a student's course. See subject description.

3650 Electrical Engineering

Bachelor of Science (Engineering) BSc(Eng)

Please note that from 1983, no new enrolments are being accepted into the BSc(Eng) course. However, a six-year part-time Bachelor of Engineering course is offered which is very similar to the old BSc(Eng) course.

Stage 1

<table>
<thead>
<tr>
<th>Course Code</th>
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</thead>
<tbody>
<tr>
<td>1.001</td>
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<td>S1 6 S2 6</td>
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<td>10.001</td>
<td>Mathematics I</td>
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<tr>
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<td>S1 12 S2 12</td>
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Stage 2

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<tbody>
<tr>
<td>2.121</td>
<td>Chemistry</td>
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<td>6.010</td>
<td>Electrical Engineering I</td>
<td>S1 6 S2 0</td>
</tr>
<tr>
<td>6.021A</td>
<td>Circuit Theory I</td>
<td>S1 0 S2 4</td>
</tr>
<tr>
<td>6.611</td>
<td>Computing</td>
<td>S1 6 S2 0</td>
</tr>
<tr>
<td>10.2111</td>
<td>Applied Mathematics II — Vector Calculus</td>
<td>S1 0 S2 2½</td>
</tr>
<tr>
<td></td>
<td>Mathematical Methods for Differential Equations</td>
<td>S1 2½ S2 0</td>
</tr>
<tr>
<td></td>
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<td>S1 14½ S2 12½</td>
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Stage 3

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<th>Hours per week</th>
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</thead>
<tbody>
<tr>
<td>1.972</td>
<td>Electromagnetism</td>
<td>S1 4 S2 0</td>
</tr>
<tr>
<td>1.982</td>
<td>Solid State Physics</td>
<td>S1 0 S2 4½</td>
</tr>
<tr>
<td>6.021B</td>
<td>Power</td>
<td>S1 4 S2 0</td>
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<tr>
<td>6.021D</td>
<td>Computing</td>
<td>S1 0 S2 4</td>
</tr>
<tr>
<td>10.111A</td>
<td>Pure Mathematics II — Linear Algebra</td>
<td>S1 2½ S2 2½</td>
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<td>10.111B</td>
<td>Pure Mathematics II — Multivariable Calculus</td>
<td>S1 0 S2 2½</td>
</tr>
<tr>
<td>10.111C</td>
<td>Pure Mathematics II — Complex Analysis</td>
<td>S1 2½ S2 0</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
<td>S1 2 S2 2</td>
</tr>
<tr>
<td></td>
<td>**</td>
<td>S1 15 S2 15½</td>
</tr>
</tbody>
</table>

Stage 4

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.021C</td>
<td>Electronics I</td>
<td>S1 4 S2 0</td>
</tr>
<tr>
<td>6.021E</td>
<td>Digital Logic and Systems</td>
<td>S1 4 S2 0</td>
</tr>
<tr>
<td>6.0311</td>
<td>Circuit Theory II</td>
<td>S1 0 S2 4</td>
</tr>
<tr>
<td>6.0312</td>
<td>Utilization of Electrical Energy</td>
<td>S1 0 S2 4</td>
</tr>
<tr>
<td>6.0313</td>
<td>Electronics II</td>
<td>S1 0 S2 4</td>
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<tr>
<td></td>
<td>Technical Elective†</td>
<td>S1 5 S2 0</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
<td>S1 2 S2 2</td>
</tr>
<tr>
<td></td>
<td>**</td>
<td>S1 15 S2 14</td>
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</tbody>
</table>

*See list of Technical Electives later this section.
### Stage 5

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0314</td>
<td>Systems and Control I</td>
<td>S1: 4, S2: 0</td>
</tr>
<tr>
<td>6.0315</td>
<td>Electrical Energy</td>
<td>S1: 0, S2: 4</td>
</tr>
<tr>
<td>6.0316</td>
<td>Electronics III</td>
<td>S1: 4, S2: 0</td>
</tr>
<tr>
<td>6.0317</td>
<td>Communication Systems I</td>
<td>S1: 0, S2: 4</td>
</tr>
<tr>
<td>6.0318</td>
<td>Microprocessor Systems and Applications*</td>
<td>S1: 0, S2: 4</td>
</tr>
<tr>
<td>10.361</td>
<td>Statistics SE</td>
<td>S1: 2, S2: 2</td>
</tr>
</tbody>
</table>

*Not required for students who have completed Stage 4 by the end of 1982.

### Stage 6

- **General Studies Elective**: 2 hours per week, 2 sessions
- **Four Professional Electives**†**: 10 hours per week, 2 sessions
- **6.902 Industrial Experience‡**: 2 hours per week, 2 sessions
- **6.921 Project****: 2 hours per week, 2 sessions

††Electrical Engineering Professional Electives

Each elective is 5 hours per week for one session.

- **6.041 Electrical Measurements**
- **6.042 Digital and Analogue Signals**
- **6.044 Electrical Product Design and Reliability**
- **6.045 Electrical and Electronics Engineering Materials**
- **6.202 Power Engineering I**
- **6.203 Power Engineering II**
- **6.212 Power Engineering—Utilization**
- **6.222 High Voltage and High Current Technology**
- **6.303 High Frequency Circuits and Electronics I**
- **6.313 High Frequency Circuits and Electronics II**
- **6.322 Electronics IV**
- **6.323 Communication Systems 2A**
- **6.333 Communication Systems 2B**
- **6.412 Systems and Control II**
- **6.413 Digital Control**
- **6.432 Computer Control and Instrumentation**
- **6.483 Biomedical Engineering**
- **6.512 Semiconductor Devices**
- **6.522 Transistor and Integrated Circuit Design**
- **6.607A Computer Hardware Architecture**
- **6.607B Advanced Software Technology**
- **6.612 Computer Systems Engineering**
- **6.622 Computer Application and Systems**

**Technical Electives available in 1983**

- **1.992 Mechanics and Thermal Physics**: 2 hours per week, 2 sessions
- **5.056 Mechanical Engineering**: 0 hours per week, 4 sessions
- **6.402 Biology and Physiology for Engineers**: 4 hours per week, 0 sessions
- **6.641 Programming I**: 5 hours per week, 5 sessions
- **8.113 Civil Engineering**: 4 hours per week, 0 sessions
- **18.091 Industrial Management**: 5 hours per week, 0 sessions
- **48.302 Fuels and Energy**: 0 hours per week, 4 sessions

A free choice may not be possible.

---

### Prerequisites and Co-requisites

**Arranged in order of full-time Bachelor of Engineering Degree Course**

<table>
<thead>
<tr>
<th>Year</th>
<th>Subject</th>
<th>Prerequisites</th>
<th>Co-requisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.961</td>
<td>See Matriculation and Admission Requirements</td>
<td>10.001</td>
</tr>
<tr>
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<td>The Electricity &amp; Magnetism section of 1.961</td>
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<td>6.010</td>
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<td>10.001</td>
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<td>6.611</td>
<td>See Matriculation and Admission Requirements</td>
<td>10.2111, 10.2112</td>
</tr>
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<td></td>
<td>10.001</td>
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<td>10.2111, 10.2112</td>
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<td>2</td>
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<td>10.2111, 10.2112</td>
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<td>10.001</td>
<td>10.2111, 10.2112</td>
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<td>10.111B</td>
<td>10.001</td>
<td>10.2111, 10.2112</td>
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<td>10.111C</td>
<td>10.001</td>
<td>10.2111, 10.2112</td>
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<td>10.001</td>
<td>10.2111, 10.2112</td>
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</tbody>
</table>
### Combined Courses

Students in Electrical Engineering who maintain a creditable performance may qualify for the award of two degrees in five years of combined full-time study in which the requirements of the degrees have been merged. Students wishing to enrol in a combined course may do so only on the recommendation of the Head of School of Electrical Engineering and Computer Science and with the approval of the Faculty of Engineering and either the Faculty of Arts or the Board of Studies in Science and Mathematics, as appropriate. Students wishing to enrol in, transfer into, or continue in a combined course shall have complied with all the requirements for prerequisite study, sequencing and academic attainment (a creditable performance is 65%) of both the Course Authorities concerned.

Students who commence a course but subsequently do not wish to proceed with both areas of study, or who fail to maintain a creditable performance, revert to a single degree.

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### Prerequisites and Co-requisites (continued)

**Arranged in order of full-time Bachelor of Engineering Degree Course**

<table>
<thead>
<tr>
<th>Year</th>
<th>Subject</th>
<th>Prerequisites</th>
<th>Co-requisites</th>
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<tr>
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<td>5.056</td>
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<td>10.033</td>
<td>10.111A, 10.1113, 10.1114, 10.2111, 10.2112</td>
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</tr>
<tr>
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<td>10.361</td>
<td>10.001</td>
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</tr>
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<td></td>
<td>6.0312</td>
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<td>6.021A, 6.021C</td>
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<td></td>
<td>6.0315</td>
<td>1.972, 6.0312 attempted**</td>
<td>6.021E, 6.0311</td>
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<td>6.0311</td>
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<td>6.620†† or 6.021D†† or 6.621††</td>
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<td>6.641</td>
<td>6.0311, 6.0313, 10.361 attempted*</td>
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</tr>
</tbody>
</table>

---

*Two of 10.1113, 10.1114, 10.2111, or 10.2112 may be taken as co-requisites

**At an acceptable level

† † One of 6.021B or 6.021C may be taken as a co-requisite.

† † † Pass Conceded not acceptable as prerequisite.
program with appropriate credit for subjects completed. Tertiary Education Assistance Scheme (TEAS) support is available for the five years of the combined degree programs.

Students may transfer into a combined course after partially completing the requirements for either degree provided suitable subjects have been studied. However, the choice of subjects and the time taken to complete the program can be seriously affected by this. Thus, students considering course 3725 or course 3720 should contact the Electrical Engineering School before completing their Year 2 enrolment. Application for transfer to a combined course must be made in writing to the Head of School by 7 January 1983.

Students wishing to gain a degree at honours level in Arts or Science as part of their combined degree program shall meet all the relevant requirements of the Faculty concerned and of the appropriate Schools. Such students may enrol for the Honours year only on the recommendation of the Head of School of Electrical Engineering and Computer Science and with the approval of the Faculty of Engineering and either the Faculty of Arts or the Board of Studies in Science and Mathematics, as appropriate.

Enrolment of students in Courses 3720 and 3725 each year is arranged by the School of Electrical Engineering and Computer Science.

3725
BE BSc in Electrical Engineering

Having completed Years 1 and 2 of course 3640 students in their third year complete a specific course of study consisting of four Level 3 Science units chosen from related disciplines, the appropriate General Studies electives and no less than four other Level 2 or Level 3 units, and otherwise accord with the rules of course 3970 leading to a major in Computer Science, Mathematics or Physics.

Students may open up a wider choice of subjects in their Science Year by including additional Computer Science (viz 6.641), Physics (viz 1.992) or Mathematics in their Year 2 Electrical Engineering program. Any subject omitted may be required to be taken later in the course. The extra subject in Year 2 may be credited towards either the BE or BSc requirements, but not both.

In their fourth and fifth years the students do Year 3 and Year 4 of course 3640. Depending on the program followed in their year of Science they may have already completed parts of the normal third and fourth year programs of the Electrical Engineering course, and they will be required to omit those from their program and to include an equivalent amount of other courses chosen with the approval of the Head of School. Thus students who choose to omit the General Studies elective from their Year 3 BE program on this ground must still do a full year's work: that is, they would be expected to include equivalent hours of other material in lieu of the General Studies elective omitted.

3720
BE BA in Electrical Engineering

The combined program should include:

- the requirements of a normal BE program in Electrical Engineering less the General Studies subjects and two other subjects approved by the Head of the School.
- subjects equivalent to 108 credit points in accordance with the regulations of the Faculty of Arts provided that this includes a major sequence of subjects available within the Faculty of Arts in addition to the studies in the School of Mathematics and the Department of Computer Science. These include the subjects in Table A or their equivalents.

Table A

<table>
<thead>
<tr>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.001 Mathematics I</td>
</tr>
<tr>
<td>10.111A Pure Mathematics II</td>
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<tr>
<td>10.1113 Pure Mathematics II</td>
</tr>
<tr>
<td>10.1114 Pure Mathematics II</td>
</tr>
<tr>
<td>10.2111 Applied Mathematics II</td>
</tr>
<tr>
<td>10.2112 Applied Mathematics II</td>
</tr>
<tr>
<td>1.951 Physics I</td>
</tr>
<tr>
<td>1.972 Electromagnetism</td>
</tr>
<tr>
<td>1.992 Solid-State Physics</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

Guidance should be sought from the School of Electrical Engineering and Computer Science, the relevant schools in the Faculty of Arts and the Arts Faculty office. After four years of study a student will normally have completed the BA requirements of study, together with subjects selected from course 3640 (in accord with an acceptable program loading) and in the fifth year will complete requirements for a BE.

It is necessary for each individual student entering the course to lodge for approval a complete program of study: changes in detail are usual from year to year. Students should choose their Arts Major early so as to start the sequence in Year 1 if possible.

Studies in Computer Science other than in BE Course 3640, BE BA 3720 and BE BSc 3725

Minor Study in BA Course 3400 or BSc course 3970

Some students will wish to include a small number of Computer Science units in courses leading to major studies in other disciplines. Level 1 units 6.611 and Level 2 units 6.621, 6.631, 6.641 are freely available to such students.
Students majoring in other disciplines may also seek entry, on a competitive merit basis, to a limited range of Level 3 units.

Major Study in BA Course 3400 or BSc course 3970

For studies in Computer Science to be regarded as being major studies, at least four Level 3 units of Computer Science must be included after completing Level 1 unit 6.611 and the three Level 2 units, 6.621, 6.631, 6.641.

Course 3400

For further details of major studies in Computer Science within the Bachelor of Arts degree course, please see the Arts Faculty Handbook.

Course 3970

Year 1 students in course 3970 who are not selected for direct entry into a Computer Science major enrol in program 6806:

for such students enrolment in Year 2 of a Computer Science program is based on academic performance in Year 1.

A total of 23 units is required for graduation at the pass level.

Year 1 must include 6.611 and 10.001 (or 10.011) and 5 other Level 1 units.

Year 2 must include 6.621, 6.631, 6.641 and 5 other Level 2 units plus one General Studies elective.

Year 3 must include 4 Computer Science Level 3 units and 3 other Level 2 or Level 3 units, plus two General Studies electives. Students intending to proceed to Honours should choose 8 Level 3 units including 6.613, 6632, 6.642 and 6.643.

Year 4 is 6.606.

For further details see the Sciences Handbook.

Computer Science Electives offered by the School

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Level</th>
<th>Prerequisites</th>
<th>Co-requisites</th>
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<td>I</td>
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<td>6.021D</td>
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<td>6.631</td>
<td>Computing IIIB</td>
<td>II</td>
<td>6.620†* or 6.021D*</td>
<td>or 6.621*</td>
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<tr>
<td>6.641</td>
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<td>II</td>
<td>6.620†* or 6.021D*</td>
<td>or 6.621*</td>
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<td>6.021E</td>
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<td>Design</td>
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<td>or 6.021D*</td>
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<tr>
<td>6.632</td>
<td>Operating Systems</td>
<td>III</td>
<td>6.631* or 6.021E*</td>
<td>6.641*</td>
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<td>6.633</td>
<td>Data Bases and Networks</td>
<td>III</td>
<td>6.641*</td>
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<td>Algorithms</td>
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<td>6.643</td>
<td>Compiling Techniques and</td>
<td>III</td>
<td>6.641*</td>
<td></td>
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<td>Programming Languages</td>
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<tr>
<td>6.646</td>
<td>Computer Applications</td>
<td>III</td>
<td>6.620†* or 6.021D*</td>
<td>6.622</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>or 6.621*</td>
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<td>one of 10.311A, 10.321A, 10.301, 10.331, 45.101 or equivalent</td>
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<td>Systems</td>
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<td></td>
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<td>14.605</td>
<td></td>
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</tbody>
</table>

*Pass Conceeded not acceptable as prerequisite.
†Students who have completed 6.590 at a grade of Credit or better, may be enabled to undertake this subject with permission
††Can only be counted with at least 3 other Computer Science Level III subjects.
School of Mechanical and Industrial Engineering

Head of School
Associate Professor G. de Vahl Davis

Executive Assistant to Head of School
Associate Professor J. Y. Harrison

Senior Administrative Officer
Mr G. Dusan

The courses in the School are planned to provide the appropriate academic training for the professional engineer in the fields of aeronautical, industrial and mechanical engineering, and for the naval architect. They may be taken either on a full-time basis, normally over four years, or on a part-time basis, normally over six years, or on a combined full-time/part-time basis, subject to the approval of the Head of School.

The courses lead to the award of the degree of Bachelor of Engineering (BE).


The courses of Mechanical, Industrial and Aeronautical Engineering and of Naval Architecture have common subjects for the first two years if taken full-time, and for the first three years if taken part-time. The latter halves of these four courses contain a number of common core subjects together with specific departmental requirements. In the final years, in addition to core subjects and departmental requirements, provision is made for a limited degree of specialization in one or more elective subjects. Students in the Mechanical Engineering Course may take, subject to the approval of the Head of School, up to six credits of graduate subjects per session offered by the School in lieu of an equivalent quantity of final year undergraduate electives. Each student is required to present a thesis at the end of his final year and to deliver a short paper on the subject of his thesis. General Studies form a regular part of all courses, in certain instances and with permission from the Head of the School students may substitute an Arts subject in lieu of two General Studies subjects.

Industrial experience is an integral part of the courses. All students enrolled in the School must complete forty working days of approved industrial training between Years 2 and 3, also between Years 3 and 4 if taking the course on a full-time basis, and irrespective of their specialization, are strongly recommended to gain as much industrial training as possible between Years 1 and 2.

Students taking the course on a part-time basis must complete a total of eighty working days of approved industrial training in the period following the end of Year 3 up to the beginning of Year 6.

All students will be considered for the award of Honours which will be granted for meritorious performance in the course with particular emphasis on the later years.

Part-time courses of six years' duration leading to the award of the degree of Bachelor of Science (Engineering) continue to be offered in the same four fields as the full-time courses, though no new enrolments are now accepted for these courses.

Students proceeding to the award of the BSc(Eng) degree whether by a combination of part-time and of full-time study, or by part-time study alone, are required to undergo a minimum period of three years approved concurrent industrial training. (See also Conditions for the Award of the Degree of Bachelor of Science (Engineering) earlier in this Handbook.)

Students should enrol in the subject 5.042 Industrial Experience in the year in which they expect to satisfy the requirement and, upon completion, submit to the School evidence from their employers of such industrial training.

The BSc(Eng) degree may be awarded 'With Merit' to students whose performance in the course is superior.

Students currently enrolled in the BSc(Eng) degree course may transfer, should they wish, to the corresponding BE degree course. Such students are given full credit for subjects they have already passed.

The award of the degree BE or BSc(Eng) in Mechanical Engineering is recognized by the Institution of Mechanical Engineers, London, as giving exemption from Parts I and II of the examinations required for admission to the grade of Member. Exemption from Part III (The Engineer in Society) of the examinations may also be granted, depending on the particular General Studies subjects taken. Exemption from Part III is considered on a case by case basis, and is not automatic. Specific enquiries on this matter should be addressed to the Head of the School.

The award of the degree of BE or BSc(Eng) in Industrial Engineering is similarly recognized by the Institution of Production Engineers, London.

The Institution of Engineers, Australia, grants full exemption from examinations for admission to the grade of Member to holders of the degree of BE or BSc(Eng) in any of the undergraduate courses offered by the School.
### Mechanical Engineering — Full-time Course

#### Bachelor of Engineering (BE)

**Year 1**

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
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<tbody>
<tr>
<td>1.951</td>
<td>Physics I (Mechanical Engineering)</td>
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<td>4</td>
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</tr>
<tr>
<td>2.951</td>
<td>Chemistry I (ME)</td>
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<td>0</td>
<td>6</td>
</tr>
<tr>
<td>5.0101</td>
<td>Statics</td>
<td></td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>5.061</td>
<td>Technical Orientation</td>
<td></td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>5.121</td>
<td>Mechanical Engineering Design I</td>
<td></td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>5.421</td>
<td>Mechanics of Solids I</td>
<td></td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>10.001</td>
<td>Mathematics I or</td>
<td></td>
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<td>6</td>
</tr>
<tr>
<td>10.011</td>
<td>Higher Mathematics I</td>
<td></td>
<td>24</td>
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</table>

An alternative 'science compatible' course which can be undertaken is as follows:

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.001</td>
<td>Physics I or</td>
<td></td>
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<td>6</td>
</tr>
<tr>
<td>1.011</td>
<td>Higher Physics I</td>
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<td>6</td>
<td>6</td>
</tr>
<tr>
<td>2.121</td>
<td>Chemistry IA</td>
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<tr>
<td>5.010</td>
<td>Engineering A</td>
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<tr>
<td>5.020</td>
<td>Engineering B</td>
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<td>6</td>
</tr>
<tr>
<td>5.030</td>
<td>Engineering C (Production Technology Option)</td>
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<td>0</td>
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</tr>
<tr>
<td>5.061</td>
<td>Technical Orientation</td>
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<td>2</td>
<td>0</td>
</tr>
<tr>
<td>10.001</td>
<td>Mathematics I or</td>
<td></td>
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**Year 3**

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<tbody>
<tr>
<td>5.034</td>
<td>Engineering Experimentation</td>
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<td>1½</td>
<td>1½</td>
</tr>
<tr>
<td>5.043</td>
<td>Industrial Training I</td>
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</tr>
<tr>
<td>5.073</td>
<td>Numerical Analysis/Mathematics</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5.123</td>
<td>Mechanical Engineering Design III</td>
<td></td>
<td>3</td>
<td>3</td>
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<tr>
<td>5.333</td>
<td>Dynamics of Machines</td>
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<tr>
<td>5.343</td>
<td>Linear Systems Analysis</td>
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<td>3</td>
<td>0</td>
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<tr>
<td>5.423</td>
<td>Mechanics of Solids III</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Two Fluid Mechanics/Thermodynamics Technical Electives</td>
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<td>3</td>
<td>3</td>
</tr>
<tr>
<td>6.854</td>
<td>Electrical Engineering</td>
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<td>4</td>
</tr>
<tr>
<td>18.603</td>
<td>Management/Economics</td>
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Note 1: A report to be submitted in Week 1 of Session 1 detailing involvement and experience gained prior to Year 3.

**Year 4**

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<th>S2</th>
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<tr>
<td>5.044</td>
<td>Industrial Training II</td>
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<td>5.051</td>
<td>Thesis</td>
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<tr>
<td>5.062</td>
<td>Communications</td>
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<td>5.344</td>
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**Year 2**

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<tr>
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<td>2</td>
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<tr>
<td>5.122</td>
<td>Mechanical Engineering Design II</td>
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<tr>
<td>5.330</td>
<td>Engineering Dynamics I</td>
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<tr>
<td>5.422</td>
<td>Mechanics of Solids II/ Materials</td>
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<td>5.622</td>
<td>Fluid Mechanics/Thermodynamics</td>
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Note 2: Only a limited number of Technical Electives is offered each year. The actual Technical Electives offered each year are decided on the basis of staff availability and student demand. Students are advised in September of each year which Technical Electives will be offered in the following year.

### Mechanical Engineering — Part-time (New Course)

#### Bachelor of Engineering (BE)

**Year 1**

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<td>2.951</td>
<td>Chemistry I (ME)</td>
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**3680**

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### Course Outlines

#### Year 6

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<td>5.061 Technical Orientation</td>
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<td>10.001 Mathematics I</td>
<td>6</td>
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### Year 2

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<td>8</td>
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<tr>
<td>5.421 Mechanics of Solids I</td>
<td>4</td>
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<tr>
<td>10.022 Engineering Mathematics II</td>
<td>2</td>
<td>5.330</td>
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<td>18.020 Industrial Orientation</td>
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### Year 3

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<td>5.072 Statistics/Computing</td>
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<td>5.122</td>
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</tr>
<tr>
<td>5.122 Mechanical Engineering Design II</td>
<td>3</td>
<td>5.422</td>
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</tr>
<tr>
<td>5.622 Fluid Mechanics/Thermodynamics I</td>
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### Year 4

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<th>Hours per week</th>
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<tr>
<td>5.073 Numerical Analysis/Mathematics</td>
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<td>5.123 Mechanical Engineering Design III</td>
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<td>5.343 Linear Systems Analysis</td>
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<td>5.423 Mechanics of Solids III</td>
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<td>6.854 Electrical Engineering</td>
<td>4</td>
<td>5.423</td>
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### Year 5

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<th>Hours per week</th>
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</tr>
<tr>
<td>5.043 Industrial Training I</td>
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</tr>
<tr>
<td>18.603 Management/Economics Two Fluid</td>
<td>4</td>
<td>5.030</td>
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</tr>
<tr>
<td>Mechanics/Thermodynamics Technical Electives</td>
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<td>Technical Electives</td>
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<td>General Studies Elective</td>
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<td>14½</td>
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</table>

### Note 1:
By the end of Year Six the equivalent of 10½ hours per week for a year of Technical Electives must have been completed. The equivalent of at least six hours per week of Technical Electives must be taken from the Mechanical Engineering Technical Elective list. The remaining Technical Electives may be taken from the Industrial Engineering Technical Elective List or from Years 3 or 4 of other courses in the School or suitable subjects outside the School. Students with good academic records may include some graduate subjects. A counseling service is provided to assist students to choose electives. The selection of certain subjects or combinations of subjects may require the approval of the Head of School.

### Note 2:
Only a limited number of Technical Electives is offered each year. The actual Technical Electives offered each year are decided on the basis of staff availability and student demand. Students are advised in September of each year which Technical Electives will be offered in the following year.

### 3680

**Mechanical Engineering — Part-time**

(New Course)

W.S. & L.B. Robinson College
Broken Hill

**Bachelor of Engineering**

BE

**Note:** No new enrolments are being accepted in this course.

#### Year 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>Year 1</th>
<th>Hours per week</th>
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<tr>
<td>5.034 Engineering Experimentation</td>
<td>1½</td>
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<td>5.043 Industrial Training I</td>
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<td>18.603 Management/Economics Two Fluid</td>
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### Year 2

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<tr>
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<td>Engineering IB</td>
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### Year 3

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<td>Engineering Dynamics</td>
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<tr>
<td>5.422</td>
<td>Mechanics of Solids II/Materials</td>
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<td>4½</td>
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<tr>
<td>6.851R</td>
<td>Electronics and Instrumentation</td>
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<td>0</td>
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<tr>
<td>6.852R</td>
<td>Electrical Machinery and Supply</td>
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<td>General Studies Elective</td>
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### Year 4

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<td>Statistics/Computing</td>
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<td>Numerical Analysis/Mathematics</td>
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<td>5.622</td>
<td>Fluid Mechanics/Thermodynamics I</td>
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<td>Engineering Experimentation</td>
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<td>Industrial Training I</td>
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<td>Dynamics of Machines</td>
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<td>7.214R</td>
<td>Mine Economics and Planning</td>
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<td>7.224R</td>
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<td>Fluid Dynamics/Thermodynamics Electives</td>
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<td>General Studies Elective</td>
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<td>Thesis</td>
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### 3690
**Mechanical Engineering — Part-time (Old Course)**

**Bachelor of Science (Engineering) BSc(Eng)**

This course is of six years' duration, and leads to the degree of Bachelor of Science (Engineering).

### Stage 1*

<table>
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<tr>
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<td>1.011</td>
<td>Higher Physics I</td>
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</tr>
<tr>
<td>10.001</td>
<td>Mathematics I or</td>
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</tr>
<tr>
<td>10.011</td>
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*Not offered in 1983
### Stage 2*

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<td>5.030 Engineering C</td>
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<td>5.040 Engineering D</td>
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*Not offered in 1983.

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>5.010 Engineering A</td>
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<td>5.030 Engineering C</td>
<td>6 0</td>
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<tr>
<td>5.040 Engineering D</td>
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### Mechanical Engineering Technical Electives

#### Applied Mechanics

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<tr>
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<td>3 3</td>
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<tr>
<td>5.334 Engineering Dynamics II</td>
<td>3 or 3</td>
</tr>
<tr>
<td>5.345G Analogue Control Systems</td>
<td>0 3</td>
</tr>
<tr>
<td>5.3541 Engineering Noise I</td>
<td>3 0</td>
</tr>
<tr>
<td>5.3542 Engineering Noise II</td>
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#### Mechanics of Solids

<table>
<thead>
<tr>
<th>Course</th>
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<tr>
<td>5.413 Mechanics of Solids IV</td>
<td>3 3</td>
</tr>
<tr>
<td>5.417G Mechanics of Fracture and Fatigue</td>
<td>3 or 3</td>
</tr>
<tr>
<td>5.424 General Mechanics of Solids</td>
<td>3 or 3</td>
</tr>
<tr>
<td>5.434 Plates and Shells</td>
<td>3 or 3</td>
</tr>
<tr>
<td>5.444 Theory of Elasticity</td>
<td>3 or 3</td>
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<tr>
<td>5.454 Theory of Plasticity</td>
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<td>5.464 Structural Instability</td>
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#### Mechanical Design

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>5.113 Mechanical Engineering Design III</td>
<td>6 6</td>
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<td>5.124 Mechanical Engineering Design IV</td>
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<tr>
<td>5.1241 Creative Design Project</td>
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<td>5.1242 Design Technology</td>
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<td>5.1244 Design Management</td>
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<td>5.1245 Computer-Based Engineering Design</td>
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#### Fluid Mechanics/Thermodynamics

<table>
<thead>
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<th>Course</th>
<th>Hours per week</th>
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<tr>
<td>5.623 Heat Transfer</td>
<td>3 or 3</td>
</tr>
<tr>
<td>5.624 Refrigeration and Air Conditioning</td>
<td>3 or 3</td>
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<tr>
<td>5.633 Turbomachines</td>
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<tr>
<td>5.6341 Viscous Flow Theory</td>
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<tr>
<td>5.6342 Lubrication</td>
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<tr>
<td>5.635 Convective Heat Transfer</td>
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<tr>
<td>5.643 Classical Thermodynamics and Combustion</td>
<td>3 or 3</td>
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<td>5.644 Solar Energy</td>
<td>3 or 3</td>
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<td>5.653 Compressible Flow</td>
<td>3 or 3</td>
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<tr>
<td>5.654 Hydraulic Transients</td>
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<td>5.663 Potential Flow Theory</td>
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<td>5.664 Multiphase Flow</td>
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<td>5.673 Special Fluid Mechanics Elective</td>
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<td>5.674 Special Thermodynamics</td>
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### Stage 3*

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<tr>
<td>5.330 Engineering Dynamics</td>
<td>2 2</td>
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<td>5.411 Mechanics of Solids II</td>
<td>2 2</td>
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<tr>
<td>8.259 Properties of Materials</td>
<td>3 3</td>
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<tr>
<td>10.022 Engineering Mathematics II</td>
<td>4 4</td>
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<td>General Studies Elective</td>
<td>1½ 1½</td>
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*Not offered in 1983.

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>5.330 Engineering Dynamics</td>
<td>2 2</td>
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<tr>
<td>5.411 Mechanics of Solids II</td>
<td>2 2</td>
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<tr>
<td>8.259 Properties of Materials</td>
<td>3 3</td>
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<tr>
<td>10.022 Engineering Mathematics II</td>
<td>4 4</td>
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<td>General Studies Elective</td>
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### Stage 4*

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<tr>
<td>5.032 Experimental Engineering II</td>
<td>2 2</td>
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<td>5.111 Mechanical Engineering Design I</td>
<td>3 3</td>
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<tr>
<td>5.611 Fluid Mechanics/Thermodynamics I</td>
<td>4 4</td>
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<td>6.801 Electrical Engineering</td>
<td>3 3</td>
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<td>General Studies Elective</td>
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*Not offered in 1983.

<table>
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<tr>
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<tr>
<td>5.032 Experimental Engineering II</td>
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<tr>
<td>5.111 Mechanical Engineering Design I</td>
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<tr>
<td>5.611 Fluid Mechanics/Thermodynamics I</td>
<td>4 4</td>
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<tr>
<td>6.801 Electrical Engineering</td>
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<td>General Studies Elective</td>
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### Stage 5

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<td>5.112 Mechanical Engineering Design II</td>
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<tr>
<td>5.331 Dynamics of Machines I</td>
<td>2 2</td>
</tr>
<tr>
<td>5.412 Mechanics of Solids III</td>
<td>2 2</td>
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<tr>
<td>5.612 Fluid Mechanics/Thermodynamics II</td>
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### Stage 6

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<tr>
<td>5.042 Industrial Experience*</td>
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<tr>
<td>5.113 Mechanical Engineering Design III</td>
<td>6 6</td>
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<tr>
<td>5.324 Automatic Control Engineering</td>
<td>3 3</td>
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### Plus one of the following technical electives:

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<tbody>
<tr>
<td>4.913 Materials Science or</td>
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<tr>
<td>5.392 Dynamics of Machines II or</td>
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<tr>
<td>5.413 Mechanics of Solids IV</td>
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*See the introduction of School of Mechanical and Industrial Engineering.

### Industrial Engineering

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<tr>
<td>18.004 Manufacturing Management</td>
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<tr>
<td>18.224 Numerical Control of Machine Tools</td>
<td>3 or 3</td>
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<tr>
<td>18.303 Methods Engineering</td>
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## Year 3

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<th>Course Title</th>
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<tbody>
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<td>5.034</td>
<td>Engineering Experimentation</td>
<td>1½ 1½</td>
</tr>
<tr>
<td>5.043</td>
<td>Industrial Training</td>
<td>0 0</td>
</tr>
<tr>
<td>5.073</td>
<td>Numerical Analysis/Mathematics</td>
<td>3 3</td>
</tr>
<tr>
<td>5.303</td>
<td>Mechanical Vibrations</td>
<td>0 1½</td>
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<td>5.343</td>
<td>Linear Systems Analysis</td>
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<td>5.423</td>
<td>Mechanics of Solids III</td>
<td>2 2</td>
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<tr>
<td>5.800</td>
<td>Aircraft Design I</td>
<td>3 3</td>
</tr>
<tr>
<td>5.811</td>
<td>Aerodynamics I</td>
<td>3 3</td>
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<td>5.822</td>
<td>Analysis of Aerospace Structures</td>
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<td>6.854</td>
<td>Electrical Engineering</td>
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<tr>
<td>18.603</td>
<td>Management/Economics</td>
<td>4 0</td>
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<td></td>
<td><strong>Total</strong></td>
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</table>

Note: The Technical Electives may be taken from the Mechanical Engineering Technical Elective List or from Years 3 or 4 of other courses in the School or suitable subjects outside the School (5.344 Feedback Control from Year 4 of the Mechanical Engineering degree course is recommended in this respect). Students with good academic records may include some graduate subjects. A counselling service is provided to assist students to choose electives. The selection of certain subjects or combinations of subjects may require the approval of the Head of School.

Note 2: Only a limited number of Technical Electives is offered each year. The actual Technical Electives offered each year are decided on the basis of staff availability and student demand. Students are advised in September of each year which Technical Electives will be offered in the following year.

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### 3610 Aeronautical Engineering — Full-time

**Bachelor of Engineering BE**

The first and second years of this course are identical with the first two years of the full-time course in Mechanical Engineering. Subject to the Head of the School of Mechanical and Industrial Engineering being satisfied that the present extent of equivalences is maintained, and on his recommendation, Faculty has approved an arrangement by which students who satisfy the requirements of the first two years of the Mechanical Engineering full-time degree course at any other Australian tertiary institution may be admitted to a two-year program leading to the Bachelor of Engineering degree in Aeronautical Engineering.

### Year 4

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<tr>
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<th>Course Title</th>
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<td>Industrial Training II</td>
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<td>5.051</td>
<td>Thesis</td>
<td>6 6</td>
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<td>5.062</td>
<td>Communications</td>
<td>2 2</td>
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<td>5.801</td>
<td>Aircraft Design II</td>
<td>3 3</td>
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<tr>
<td>5.812</td>
<td>Aerodynamics II</td>
<td>3 3</td>
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<td>5.823</td>
<td>Analysis of Aerospace Structures II</td>
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<td>5.831</td>
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### 3610 Aeronautical Engineering — Part-time (New Course)

**Bachelor of Engineering BE**

The first three years of this course are identical with the first three years of the part-time new course in Mechanical Engineering.

### Year 4

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<td>Mechanical Vibrations</td>
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</tr>
<tr>
<td>5.343</td>
<td>Linear Systems Analysis</td>
<td>3 0</td>
</tr>
<tr>
<td>5.423</td>
<td>Mechanics of Solids III</td>
<td>2 2</td>
</tr>
<tr>
<td>5.811</td>
<td>Aerodynamics I</td>
<td>3 3</td>
</tr>
<tr>
<td>6.854</td>
<td>Electrical Engineering</td>
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<tr>
<td></td>
<td>General Studies Elective</td>
<td>2 2</td>
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*Report to be submitted in Week 1 of Session 1 detailing involvement and experience gained prior to Year 3.*
### Year 5

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
</tr>
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<tbody>
<tr>
<td>5.034 Engineering Experimentation</td>
<td>1½ 1½</td>
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<tr>
<td>5.043 Industrial Training I</td>
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<tr>
<td>5.800 Aircraft Design I</td>
<td>3 3</td>
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<tr>
<td>5.822 Analysis of Aerospace</td>
<td>2 2</td>
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<td>5.831 Aircraft Propulsion</td>
<td>2 2</td>
</tr>
<tr>
<td>18.603 Management/Economics</td>
<td>4 0</td>
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<tr>
<td>Technical Electives</td>
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<tr>
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### Stage 6

<table>
<thead>
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<tbody>
<tr>
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<tr>
<td>5.801 Aircraft Design</td>
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<td>5.812 Aerodynamics II</td>
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<tr>
<td>5.823 Analysis of Aerospace</td>
<td>2 2</td>
</tr>
<tr>
<td>5.831 Aircraft Propulsion</td>
<td>2 2</td>
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<td>General Studies Elective</td>
<td>2 2</td>
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*See the introduction to School of Mechanical and Industrial Engineering

### Year 6

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>5.044 Industrial Training II</td>
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<td>5.051 Thesis</td>
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<tr>
<td>5.062 Communications</td>
<td>2 2</td>
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<td>5.801 Aircraft Design II</td>
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<td>5.812 Aerodynamics II</td>
<td>3 3</td>
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<td>Structures II</td>
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### 3700 Naval Architecture — Full-time

#### Bachelor of Engineering

**BE**

The first and second years of this course are identical with the first two years of the full-time course in Mechanical Engineering. Subject to the Head of the School of Mechanical and Industrial Engineering being satisfied that the present extent of equivalences is maintained, and on his recommendation, Faculty has approved an arrangement by which students who satisfy the requirements of the first two years of the Mechanical Engineering full-time degree course at any other Australian tertiary institution may be admitted to a two-year program leading to the Bachelor of Engineering degree in Naval Architecture.

### Year 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
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</thead>
<tbody>
<tr>
<td>5.034 Engineering Experimentation</td>
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<tr>
<td>5.043 Industrial Training II</td>
<td>0 0</td>
</tr>
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<td>5.073 Numerical Analysis/Mathematics</td>
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<td>5.901 Introduction to Mathematical Modelling and Decision Making</td>
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</tr>
<tr>
<td>5.902 Ship Management Economics</td>
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<td>5.911 Ship Hydrostatics</td>
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<td>0 3</td>
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*Report to be submitted in Week 1 of Session 1 detailing involvement and experience gained prior to Year 3.

---

Note 1: The Technical Electives may be taken from the Mechanical Engineering or Industrial Engineering Technical Electives Lists or from Years 3 or 4 of other courses in the School or suitable subjects outside the School (5.344 Feedback Control from Year 4 of the Mechanical Engineering degree course is recommended in this respect). Students with good academic records may include some graduate subjects. A counselling service is provided to assist students to choose electives. The selection of certain subjects or combinations of subjects may require the approval of the Head of School.

Note 2: Only a limited number of Technical Electives is offered each year. The actual Technical Electives offered each year are decided on the basis of staff availability and student demand. Students are advised in September of each year which Technical Electives will be offered in the following year.

### 3600 Aeronautical Engineering — Part-time (Old Course)

#### Bachelor of Science (Engineering)

**BSc(Eng)**

This course is of six years' duration, and leads to the degree of Bachelor of Science (Engineering). The first four stages are identical with the Mechanical Engineering part-time old course.

### Stage 5

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>5.071 Engineering Analysis</td>
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<td>5.811 Aerodynamics I</td>
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<tr>
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<td>Structures I</td>
<td></td>
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<td>5.303 Mechanical Vibrations</td>
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<td></td>
<td><strong>1½ 1½</strong></td>
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### Bachelor of Engineering BE

The first three years of this course are identical with the first three years of the part-time new course in Mechanical Engineering.

#### Year 4

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<tr>
<td>5.044 Industrial Training II</td>
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<tr>
<td>5.051 Thesis</td>
<td>S1 6 S2 6</td>
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<tr>
<td>5.062 Communications</td>
<td>S1 2 S2 2</td>
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<td>5.922 Ship Structures II</td>
<td>S1 2 S2 2</td>
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<td>5.932 Principles of Ship Design II</td>
<td>S1 4 S2 2</td>
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<tr>
<td>5.937 Ship Design Project</td>
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<td>5.941 Ship Propulsion and Systems</td>
<td>S1 4 S2 4</td>
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#### Year 5

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<td>5.034 Engineering Experimentation</td>
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<td>5.043 Industrial Training</td>
<td>S1 0 S2 0</td>
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<tr>
<td>5.901 Introduction to Mathematical Modelling and Decision Making</td>
<td>S1 3 S2 0</td>
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<td>5.303 Mechanical Vibrations</td>
<td>S1 0 S2 1½</td>
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<td>5.902 Ship Management Economics</td>
<td>S1 1½ S2 0</td>
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<td>5.922 Ship Structures II</td>
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<td>5.931 Principles of Ship Design I</td>
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<td>6.854 Electrical Engineering</td>
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#### Year 6

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<td>5.932 Principles of Ship Design II</td>
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<td>5.937 Ship Design Project</td>
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### 3710

**Naval Architecture — Part-time (Old Course)**

#### Bachelor of Science (Engineering) BSc(Eng)

This course is of six years' duration, and leads to the degree of Bachelor of Science (Engineering). The first four stages are identical with the Mechanical Engineering part-time old course.

#### Stage 5

<table>
<thead>
<tr>
<th>Course</th>
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<tr>
<td>5.071 Engineering Analysis</td>
<td>S1 3½ S2 3½</td>
</tr>
<tr>
<td>5.303 Mechanical Vibrations</td>
<td>S1 0 S2 1½</td>
</tr>
<tr>
<td>5.412 Mechanics of Solids II</td>
<td>S1 2 S2 2</td>
</tr>
<tr>
<td>5.911 Naval Architecture</td>
<td>S1 4 S2 4</td>
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<tr>
<td>5.921 Ships Structures I</td>
<td>S1 0 S2 4</td>
</tr>
<tr>
<td>5.931 Principles of Ship Design IA</td>
<td>S1 3 S2 0</td>
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#### Stage 6

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>5.042 Industrial Experience*</td>
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<td>5.922 Ship Structures II</td>
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<tr>
<td>5.933 Principles of Ship Design III</td>
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<td>5.934 Ship Design Project</td>
<td>S1 3 S2 4½</td>
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<td>5.941 Ship Propulsion and Systems</td>
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<tr>
<td>General Studies Elective</td>
<td>S1 2 S2 2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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</table>

*See the introduction of School of Mechanical and Industrial Engineering.*
The Department of Industrial Engineering offers a course in Industrial Engineering leading to the award of the degree of Bachelor of Engineering. This course is designed for students with engineering ability whose interests lie in the planning, developing and control of manufacturing or service operations. It may be taken either on a full-time basis, normally over four years or on a part-time basis, normally over six years, or on a combined full-time/part-time basis, subject to the approval of the Head of School.

The first two years of the degree course, taken full-time, or the first three years taken part-time provide the student with a sound foundation in the basic science and engineering subjects, and this knowledge is used and extended in the later years in the study of the industrial subjects in which the problems associated with the practical economics of manufacturing operations are stressed. The aim is to provide the student with the education necessary to carry out an industrial job and to examine it critically in the light of economic efficiency.

Traditional engineering courses do not embrace the problems which are characteristic of Industrial Engineering. These problems include the analysis of a product to ensure satisfactory functioning with regard to methods and sequence of manufacturing operations; the disposition of buildings and equipment within them to permit efficient handling of materials; the avoidance of bottlenecks; the related problems of quality and cost control, testing and inspection; labour and personnel relations; and, finally, the problem of distribution and sales.

The financial and economic aspects are studied as the problem in manufacturing has not been solved until the final translation of the product into money has been accomplished successfully. While it is not intended to develop an expert in accounting practice or economics, it is intended to produce an engineer with an appreciation of the problems of cost and one who can apply considerations of ultimate economy to all industrial problems. The techniques of operations research may be applied here, where mathematical models of real life situations are constructed and manipulated to yield optimal solutions as guides to management.

The Work of the Industrial Engineer

The industrial engineer may initially be employed in any of the following major areas of industrial activity:

1. Industrial Economic Analysis

One of the principal functions of industrial engineering is to analyse a product, project or process from the economic point of view to ensure an adequate profit can be obtained from it. A general working knowledge of economics and management skill has to be directed towards the making of decisions on how to operate an enterprise most efficiently. The basis for such decisions is furnished largely by the logical application of mathematics and statistics.

2. Planning and Control of Production

Manufacturing processes and operations must be planned in detail throughout an enterprise to ensure that they proceed smoothly and economically. Functions in this field include the establishment of production standards, the setting of production targets and, the control of quality.

The ultimate responsibility of those in charge of the planning and control of production is to ensure that the goods, as originally specified, perform satisfactorily and are produced when required at an optimum cost. Computer systems are increasingly being used to achieve this.

3. Product and Process Design

The design interest of the industrial engineer goes beyond normal mechanical design to develop a product that will not only function effectively but also have a pleasing appearance.

Further, the product has to be adapted to suit existing manufacturing equipment, or a manufacturing process has to be developed by means of which an existing product can be manufactured at the right price and of the right quality. The design work of the industrial engineer incorporates also problems of process selection and application for both economy and performance. Fundamental scientific studies of manufacturing processes such as metal machining, forming and casting are continually being made to improve their efficiency.

The principles for minimizing product cost can also be effectively applied to the provision of services.

4. Methods Engineering

Methods engineering is concerned with the design of systems to properly utilize and co-ordinate personnel, materials and machines so that an enterprise will run efficiently. A sound knowledge of engineering in general, together with an understanding of human factors and economics is necessary for this work. It includes the design of plant layouts and materials handling systems, job design and the setting of standard times for work.

5. Operations Research

This is the attack of modern science on complex problems arising in the direction and management of large systems of men, machines, materials and money in industry, business, government and defence. The distinctive approach is to develop a scientific model of the system, incorporating measurements of factors such as chance and risk, with which to predict and compare the outcomes of alternative decisions, strategies or controls. The purpose is to help management determine its policy and actions scientifically.

Employment in any of these fields may well lead to a position of responsibility in industrial management if the engineer is so inclined.
Bachelor of Engineering

The first and second years of this course are identical with the first two years of the full-time course in Mechanical Engineering.

Year 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>5.043 Industrial Training I</td>
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<td>5.042 Communications</td>
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<tr>
<td>18.004 Manufacturing Management</td>
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<td>18.005 Technical Electives</td>
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Note 1: By the end of Year Six, the equivalent of 10 hours per week for a year of Technical Electives must have been completed. The equivalent of at least 6 hours per week for a year of Technical Electives must be taken from the Mechanical Engineering Technical Elective List. The remaining Technical Electives may be taken from the Mechanical Engineering Technical Elective List or from Years 3 or 4 of other courses in the School or suitable subjects outside the School. Students with good academic records may include some graduate subjects. A counselling service is provided to assist students to choose electives. The selection of certain subjects or combinations of subjects may require the approval of the Head of School.

Note 2: Only a limited number of Technical Electives is offered each year. The actual Technical Electives offered each year are decided on the basis of staff availability and student demand. Students are advised in September of each year which Technical Electives will be offered in the following year.

Year 4

<table>
<thead>
<tr>
<th>Course</th>
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<td>18.403 Production Design and Technology</td>
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<td>18.413 Design for Industrial Engineers</td>
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<td>18.503 Operations Research A</td>
<td>3 3</td>
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<tr>
<td>18.603 Management/Economics</td>
<td>4 0</td>
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<td>18.803 Optimization</td>
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Year 5

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<tr>
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<td>14.002 Introduction to Accounting B</td>
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<td>18.004 Manufacturing Management</td>
<td>2 2</td>
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<td>18.303 Methods Engineering</td>
<td>2 2</td>
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<td>18.603 Management/Economics</td>
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Year 6

<table>
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<tr>
<td>5.044 Industrial Training II</td>
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<td>5.051 Thesis</td>
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<tr>
<td>5.062 Communications</td>
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<td>18.004 Technical Electives</td>
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<td>General Studies Elective</td>
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</table>

Note 1: Only a limited number of Technical Electives is offered each year. The actual Technical Electives offered each year are decided on the basis of staff availability and student demand. Students are advised in September of each year which Technical Electives will be offered in the following year.
Bachelor of Science (Engineering)  
BSc(Eng)

This course is of six years' duration, and leads to the degree of Bachelor of Science (Engineering). For outline of the first four stages see the Mechanical Engineering part-time old course.

**Stage 5**

<table>
<thead>
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<td>5.112 Mechanical Engineering Design II</td>
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<td>5.331 Dynamics of Machines I</td>
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<td>18.011 Industrial Engineering IA</td>
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**Stage 6**

<table>
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<tr>
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<tr>
<td>5.042 Industrial Experience*</td>
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<td>18.022 Industrial Engineering IIIB</td>
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*See the introduction of School of Mechanical and Industrial Engineering.

### Operations Research

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<td>18.671G Decision Theory</td>
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<td>18.673G Energy Modelling, Optimization and Energy Accounting</td>
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<td>18.777G Time Series and Forecasting</td>
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<td>18.874G Dynamic Programming</td>
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Note: The graduate subjects listed are of particular interest to undergraduate students, with approval, other graduate subjects from this and other Schools may be taken.

### School of Surveying

**Head of School**  
Professor P. V. Angus-Leppan

**Administrative Officer**  
Mr J. V. Fonseka

The School of Surveying offers a full-time course of four years' duration leading to the award of the degree of Bachelor of Surveying. Alternatively, the course may be taken in a sandwich form in which a student may, after completing the first year of the course on a full-time basis, alternate his or her studies with periods of employment by taking leaves of absence of up to two consecutive sessions at a time thereafter. The course taken in this form requires a maximum period of seven years. The part-time course is no longer available.

The Bachelor of Surveying is a well-rounded course with a strong surveying base, aimed at preparing the graduate for a broad range of career opportunities, including land boundary Surveying, engineering surveying, photogrammetry, cartography, mining surveying, hydrographic surveying, geodesy and geodetic Surveying, computing and systems development, management and development of land, land information systems, resource assessment systems and remote sensing. The course recognizes the diversity of possible roles of a graduate who may be called on during his career to act as practitioner, consultant, manager, teacher or researcher.
The course has undergone comprehensive revision recently. Features of the revision include: retention of the course on a session basis for all subjects lectured within the School; integration of the sandwich course with the full-time course as a result of the more flexible University policy towards leave of absence for students; elimination of the formally assessed professional training period in the earlier course; greater numbers of technical electives in the fourth year of study; further development of the Land Studies area: land development, inventory, law, tenure, and utilization, in continuing recognition of the growing importance of this area to surveyors; development of a formal strand to improve students' written and spoken communication skills.

Throughout the course the theoretical studies are complemented by practical exercises in the field and the laboratory. Students make use of the most modern measuring instruments and computing equipment.

The School also offers a full-time course of four years' duration leading to the award of the degree of Bachelor of Surveying Science. The course is designed to give an interested student the opportunity to obtain greater depth as an undergraduate in one or more of the several disciplines associated with surveying: land development, cartographic science, geodesy and geophysics, environmental studies, remote sensing and photogrammetry. It is so structured that:

1. All students must take a core consisting of 104 contact hours made up from some of the subjects of the Bachelor of Surveying course. These core subjects include the formal strands in Mathematics, Physics, Physical Geography, Surveying, written and spoken communication, and 12 hours of General Studies.

2. The balance, totalling 76 hours, must comprise:
   a) at least 18 hours taken from elective subjects of the final year of the Bachelor of Surveying course,
   b) the remainder made up from any subjects required as prerequisites for a) above and any combination of subjects offered by the University and approved by the Head of School for the individual program of study. Such approval would require that the student follow a particular sequence of subjects offered by the University of Sydney and Macquarie University may also be taken subject to approval by the Head of School.

3. Resolution of class scheduling problems is the responsibility of the student.

Bachelor of Surveying students in their later years of study may elect to transfer to the new course if they so desire.

The Bachelor of Surveying or the Bachelor of Surveying Science degree may be awarded as a Pass degree, Honours Class I, or Honours Class II in two divisions. Honours are awarded in recognition of superior performance throughout the course.

Students wishing to become Registered Surveyors after graduation are advised to gain practical experience under a Registered Surveyor. Some reduction in the period of practical experience required before registration may be granted because of practical experience gained during the University course, provided the New South Wales Surveyors' Board is informed in the prescribed manner. Details are obtainable from the Registrar, Surveyors' Board, Department of Lands, Bridge Street, Sydney 2000. The degree of Bachelor of Surveying confers exemption from all written examinations of the Surveyors' Board. In the case of the Bachelor of Surveying Science degree, the New South Wales Surveyor's Board may require additional subjects for registration.

Students enrolled in either course are required to equip themselves with an electronic calculator. Advice on the purchase of this equipment is given to students at the commencement of their course.

3740 Surveying

Bachelor of Surveying
BSurv

Year 1

<table>
<thead>
<tr>
<th>Session 1</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.971 Physics I</td>
<td>6</td>
</tr>
<tr>
<td>5.0102 Introduction to Engineering Design</td>
<td>2</td>
</tr>
<tr>
<td>10.001 Mathematics I</td>
<td>6</td>
</tr>
<tr>
<td>29.001 Surveying I</td>
<td>4½</td>
</tr>
<tr>
<td>29.800 Survey Draughting</td>
<td>3</td>
</tr>
<tr>
<td>29.700 Professional Orientation*</td>
<td>1½</td>
</tr>
<tr>
<td>29.191 Survey Camp †</td>
<td>1½</td>
</tr>
</tbody>
</table>

* Three half-day excursions are an essential part of this subject.
† Students are required to attend a one-week Survey Camp equivalent to 1½ class contact hours per week in each session.

Session 2

<table>
<thead>
<tr>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.971 Physics I</td>
</tr>
<tr>
<td>5.0302 Engineering Drawing and Descriptive Geometry</td>
</tr>
<tr>
<td>10.001 Mathematics I</td>
</tr>
<tr>
<td>29.002 Surveying II</td>
</tr>
<tr>
<td>29.150 Introduction to Computer Programming</td>
</tr>
<tr>
<td>29.191 Survey Camp †</td>
</tr>
</tbody>
</table>

† Students are required to attend a one-week Survey Camp equivalent to 1½ class contact hours per week in each session.
### Year 2

#### Session 1

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Hpw</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.962 Physics of Measurement</td>
<td>3</td>
</tr>
<tr>
<td>10.022 Engineering Mathematics II (1st part)</td>
<td>4</td>
</tr>
<tr>
<td>10.341 Statistics</td>
<td>2</td>
</tr>
<tr>
<td>27.295 Physical Geography for Surveyors†</td>
<td>4</td>
</tr>
<tr>
<td>29.003 Surveying</td>
<td>5</td>
</tr>
<tr>
<td>29.151 Survey Computations I</td>
<td>4</td>
</tr>
<tr>
<td>29.192 Survey Camp II*</td>
<td>1½</td>
</tr>
</tbody>
</table>

Total: 23½

#### Session 2

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Hpw</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.711 Engineering for Surveyors I</td>
<td>3</td>
</tr>
<tr>
<td>10.022 Engineering Mathematics II (2nd part)</td>
<td>4</td>
</tr>
<tr>
<td>10.341 Statistics</td>
<td>2</td>
</tr>
<tr>
<td>29.004 Surveying IV</td>
<td>4½</td>
</tr>
<tr>
<td>29.801 Cartography I</td>
<td>3</td>
</tr>
<tr>
<td>29.701 Seminar I</td>
<td>1</td>
</tr>
<tr>
<td>29.121 Electronics for Surveyors</td>
<td>2</td>
</tr>
<tr>
<td>29.192 Survey Camp II*</td>
<td>1½</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td></td>
</tr>
</tbody>
</table>

Total: 25

*Students are required to attend a one-week survey camp, which is equivalent to 1½ class contact hours per week in each session.

### Year 3

#### Session 1

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Hpw</th>
</tr>
</thead>
<tbody>
<tr>
<td>29.005 Surveying V</td>
<td>5</td>
</tr>
<tr>
<td>29.152 Survey Computations II</td>
<td>4</td>
</tr>
<tr>
<td>29.631 Land Inventory I</td>
<td>2</td>
</tr>
<tr>
<td>29.651 Land Development I</td>
<td>3</td>
</tr>
<tr>
<td>29.661 Cadastral Surveying and Land Law I</td>
<td>2</td>
</tr>
<tr>
<td>36.411 Town Planning</td>
<td>2</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>4</td>
</tr>
</tbody>
</table>

Total: 22

#### Session 2

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Hpw</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.712 Engineering for Surveyors II</td>
<td>3</td>
</tr>
<tr>
<td>29.006 Surveying VI</td>
<td>3</td>
</tr>
<tr>
<td>29.211 Geodesy I</td>
<td>4</td>
</tr>
<tr>
<td>29.311 Astronomy I</td>
<td>3</td>
</tr>
<tr>
<td>29.511 Photogrammetry I</td>
<td>4</td>
</tr>
<tr>
<td>29.652 Land Development II</td>
<td>3</td>
</tr>
<tr>
<td>29.662 Cadastral Surveying and Land Law II</td>
<td>3</td>
</tr>
<tr>
<td>29.195 Survey Camp III**</td>
<td>6</td>
</tr>
</tbody>
</table>

Total: 29

*Students are required to attend a two-week survey camp, which is equivalent to 6 class contact hours per week.

### Year 4

#### Session 1

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Hpw</th>
</tr>
</thead>
<tbody>
<tr>
<td>29.212 Geodesy II</td>
<td>3</td>
</tr>
<tr>
<td>29.312 Astronomy II</td>
<td>2</td>
</tr>
<tr>
<td>29.512 Photogrammetry II</td>
<td>3</td>
</tr>
<tr>
<td>29.653 Land Development III†</td>
<td>3</td>
</tr>
<tr>
<td>29.704 Management I</td>
<td>2</td>
</tr>
<tr>
<td>29.702 Seminar II</td>
<td>1</td>
</tr>
<tr>
<td>Electives*</td>
<td>6</td>
</tr>
<tr>
<td>29.196 Survey Camp IV**</td>
<td>6</td>
</tr>
</tbody>
</table>

Total: 26

*See Year 4: Electives, below.

#### Session 2

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Hpw</th>
</tr>
</thead>
<tbody>
<tr>
<td>29.705 Management II</td>
<td>2</td>
</tr>
<tr>
<td>29.703 Seminar III</td>
<td>1</td>
</tr>
<tr>
<td>Electives*</td>
<td>15</td>
</tr>
</tbody>
</table>

Total: 18

*See Year 4: Electives, below.

### Year 4: Electives

Total of two General Studies Electives (see note below) and five technical electives in any combination which results in 6 hours for Session 1 and 15 hours for Session 2. Technical electives (of 3 hours per week each, except 29.174) are chosen from:

- 29.031 Electronic Distance Measurement
- 29.032 Precise Surveying in Industry and Engineering
- 29.033 Characteristics of Modern Theodolites and Levels
- 29.034 Mine Surveying
- 29.035 History of Surveying
- 29.153 Adjustment of Control Surveys
- 29.161 Hydrographic Surveying I
- 29.162 Hydrographic Surveying II
- 29.173 Project
- 29.174 Major Project (6 hours per week)
- 29.213 Geodesy III
- 29.231 Geophysics for Surveyors
- 29.232 Atmospheric Effects on Geodetic Measurement
- 29.313 Astronomy III
- 29.513 Photogrammetry III
- 29.514 Remote Sensing Principles
- 27.173 Remote Sensing Applications
- 29.654 Land Development IV
- 29.632 Land Inventory II
- 29.663 Cadastral Surveying and Land Law III
- 29.664 Modern Title Concepts
- 29.802 Cartography II
- 29.803 Mapping Technology

Not all electives are offered in any one year. Subjects from other Schools and Faculties may be substituted with the approval of the Head of School.
Note on General Studies

The General Studies program has been restructured. From 1983, a full elective is expanded to 56 hours and a half-elective to 28 hours. Students who are re-enrolling in 1983 are required to take no greater than 168 hours of General Studies electives in the entire course to fulfill the requirements for the award of the BSurv degree.

General Studies Program

This program consists normally of 3 General Studies subjects of 4 hours each per week over a single session (or their equivalent) and may be undertaken at any time during Years 2-4 of the Course, subject to the total load for a session, which, as a rule, should not exceed 24 hours.

Elective Program

This program consists of at least 18 hours (or 6 technical electives) selected from elective subjects of the final year of the BSurv course plus any subjects required as prerequisites for these electives and any combination of subjects offered by this University, the University of Sydney or Macquarie University provided that they are approved by the Head of School for the individual program of study. Such approval would require that a student follows a particular sequence of subjects within a selected area. This prescription means in effect that the elective component of the course can be varied to enable the student to choose the specialization that best suits his individual requirements so long as such specialization falls within the general disciplines associated with Surveying. Electives for such specialization may be chosen, for instance, from subject areas such as:

Cartography and Mapping Technology
Geography, Geographic Data Analysis, Mathematical Methods for Spatial Analysis
Town, Urban and Neighbourhood Planning
Geodesy, Geology, Earth Physics, Oceanography and Marine Science
Astronomy
Photogrammetry, Remote Sensing
Land Law, Title Concepts, Cadastral Surveying
Land Inventory
Land Development and Management
Building Economics
Accounting and Computer Applications

Illustrative examples of programs that could be taken are available from the School.

Mandatory Program

The mandatory program consists of the following subjects:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.971 Physics I</td>
<td>12</td>
</tr>
<tr>
<td>10.001 Mathematics I</td>
<td>12</td>
</tr>
<tr>
<td>29.001 Surveying I</td>
<td>4 1/2</td>
</tr>
<tr>
<td>29.002 Surveying II</td>
<td>5</td>
</tr>
<tr>
<td>29.191 Survey Camp I</td>
<td>3</td>
</tr>
<tr>
<td>29.700 Professional Orientation</td>
<td>1 1/2</td>
</tr>
<tr>
<td>1.962 Physics of Measurement**</td>
<td>3</td>
</tr>
<tr>
<td>10.022 Engineering Mathematics II**</td>
<td>8</td>
</tr>
<tr>
<td>10.341 Statistics SU**</td>
<td>4</td>
</tr>
<tr>
<td>27.295 Physical Geography for Surveyors**</td>
<td>4</td>
</tr>
<tr>
<td>29.003 Surveying III</td>
<td>5</td>
</tr>
<tr>
<td>29.121 Electronics for Surveyors**</td>
<td>2</td>
</tr>
<tr>
<td>29.151 Survey Computations I</td>
<td>4</td>
</tr>
<tr>
<td>29.701 Seminar I</td>
<td>1</td>
</tr>
<tr>
<td>29.801 Cartography I</td>
<td>3</td>
</tr>
<tr>
<td>29.152 Survey Computations II</td>
<td>4</td>
</tr>
<tr>
<td>29.211 Geodesy I</td>
<td>4</td>
</tr>
<tr>
<td>29.511 Photogrammetry I</td>
<td>4</td>
</tr>
<tr>
<td>29.702 Seminar II</td>
<td>1</td>
</tr>
<tr>
<td>29.703 Seminar III</td>
<td>1</td>
</tr>
<tr>
<td>6.611 Computing I</td>
<td>6</td>
</tr>
</tbody>
</table>

Total: 92 hours

*Offered in Year 1 of the BSurv Course (3740).
†Offered in Year 2 of the BSurv Course (3740).
‡Offered in Year 3 of the BSurv Course (3740).
§Offered in Year 4 of the BSurv Course (3740).
**May be replaced by a similar subject at least equal in coverage of the topic. Any resulting additional contact hours may be used in satisfying the Elective Program.

3760
Surveying Science

Bachelor of Surveying Science
BSurvSc

The course consists of a mandatory program of 104 class contact hours including a General Studies program of 12 hours and an Elective Program of at least 76 hours. A student may undertake in any one session a load generally not exceeding 24 hours, comprising subjects from one or more of these programs, provided they are taken in sequence within each subject area and in accordance with their prerequisite and/or co-requisite requirements.

Illustrative examples of programs that could be taken are available from the School.
Graduate Study

Faculty of Engineering
Enrolment Procedures

All students re-enrolling in 1983 or enrolling in graduate courses should obtain a copy of the free booklet *Enrolment Procedures 1983* available from School Offices and the Admissions Office. This booklet provides detailed information on enrolment procedures and fees, enrolment timetables by Faculty and course, enrolment in miscellaneous subjects, locations and hours of Cashiers and late enrolments.

Graduate School of Engineering

In November 1964 Council approved the establishment of the Graduate School of Engineering to coordinate and develop the graduate activities of the Faculty. For full details of such activities see brochures prepared by the Schools.

Research Degrees

The Faculty of Engineering provides facilities for well-qualified graduates to engage in advanced studies and research in all five schools and the Centre for Biomedical Engineering, leading to the award of the degrees of Doctor of Philosophy, Master of Engineering, Master of Science or Master of Surveying.

Course Work Degrees

The Master of Engineering Science/Master of Surveying Science are faculty-wide degrees, and allow for flexibility of choice between formal course work and research. A degree may be awarded through formal course work, a combination of formal course work and the completion of a report on a project or completion of a thesis only. The number of credits for a project report are 9 or 18, and for a thesis 36.

Students are encouraged to develop interdisciplinary attitudes and, with the approval of the Heads of the Schools, may take subjects from other schools of the Faculty, other faculties of the University and other universities or institutions. By means of this system, a student, with approval of the Head of School, is able to select a program of studies best suited to his or her needs.

A minimum of thirty-six credits is required for the award of the Master of Engineering Science and Master of Surveying Science degrees in the Faculty.

Part-time candidates may be required to attend lectures on one half day per week in addition to the evenings.

The Master's degree program in Remote Sensing is offered in both the Faculty of Engineering and the Faculty of Applied Science and leads to the award of the degree of Master of Engineering Science or Master of Applied Science respectively. Entry into either Faculty depends on the background of the applicant and the orientation of the proposed program.

The degree of Master of Biomedical Engineering is primarily obtained through course work but includes a project report conducted in either a hospital or other appropriate institution.
The program of study, including the preparation of a thesis, normally total 60 credit points. Students with advanced standing may be given limited exemption by the Higher Degree Committee of the Faculty of Engineering.

The degree of Master of Safety Science is offered by the Faculty of Engineering in association with other faculties. The program of study, including a 9 credit project, involves a total of 54 credits. The program is oriented towards the field of Safety Engineering.

More details about the nature of the course work Master’s program can be found in the Foreword earlier in this Handbook.

**Graduate Diploma**

The Faculty of Engineering also offers courses leading to the award of a graduate diploma in several areas. Currently these are Graduate Diplomas in Engineering Developments; in Human Communication; in Surveying; and in Transport. Candidates must complete a program totalling 30 credits. Forty percent of the credits may consist of approved undergraduate subjects and the program may contain subjects from other schools of the Faculty, other faculties of the University, and other universities or institutions. The Faculty also offers a Graduate Diploma program in Safety Science.

Before enrolment, an applicant must submit his intended program for approval by the head of the school or division which will offer the majority of the credits and ensure that he has the necessary prerequisite background for any subjects taken in other schools, faculties or institutions.

The program may be taken full-time, part-time or externally by tape correspondence or by a combination of these.

The purpose of offering these graduate diplomas is to provide engineers with the opportunity to update their professional knowledge in their own speciality, and to have access to a program of study in other areas which are relevant to their professional activities by virtue of changes and developments that are occurring. The subjects offered have been specially chosen for these purposes and many of them are available by radio and television broadcasts in the Sydney metropolitan area from year to year.

The graduate diploma courses in Engineering Developments are intended for those who wish to take a more general program in several areas of interest. They may contain subjects from the Schools in the Faculty, the Centre for Biomedical Engineering, the Division of Postgraduate Extension Studies and elsewhere. Subjects offered by tape correspondence are listed in this handbook under the Division of Postgraduate Extension Studies. (Subjects from other schools to be offered in any year by the Division of Postgraduate and Extension Studies are determined after consultation with that school and examination will be through that school.)

**Graduate Programs in Arid Lands Management**

The Faculty of Engineering offers programs in arid lands management leading to the research degrees of Doctor of Philosophy or Master of Engineering, the course work degree of Master of Engineering Science, or the Graduate Diploma in Engineering Developments. The areas of study are Water Resources Assessment, Water Resources Planning and Management, Hydrological Design and Hydrogeology. Full details of these programs, including other areas of study offered by the Faculty of Applied Science, are available in a separate brochure.

**Graduate Subjects**

The subjects which may be available for a candidate proceeding to the award of the degree of Master of Engineering Science, Master of Safety Science, Master of Surveying Science, Master of Biomedical Engineering and Graduate Diploma are listed below under the various schools. Not all electives are necessarily offered in any particular year.

Under the credit system in operation in the Faculty, one credit is normally equal to one hour’s attendance per week for one session. The qualification ‘normally’ is required because of the varying ways in which credits are distributed for course work, design, critical review or research in the different schools.

**Faculty of Engineering**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>47.051G</td>
<td>Principles of Solid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>47.052G</td>
<td>Introduction to Safety Engineering</td>
<td>3</td>
</tr>
<tr>
<td>47.054G</td>
<td>Machines and Structures Safety</td>
<td>3</td>
</tr>
<tr>
<td>47.060G</td>
<td>Electrical Safety</td>
<td>3</td>
</tr>
<tr>
<td>47.070G</td>
<td>Ventilation</td>
<td>3</td>
</tr>
<tr>
<td>47.120G</td>
<td>Human Behaviour and Safety Science</td>
<td>3</td>
</tr>
<tr>
<td>47.180G</td>
<td>Management for Safety</td>
<td>3</td>
</tr>
<tr>
<td>47.230G</td>
<td>Radiation Protection</td>
<td>3</td>
</tr>
<tr>
<td>47.330G</td>
<td>The Accident Phenomenon</td>
<td>3</td>
</tr>
<tr>
<td>47.390G</td>
<td>Noise and Vibration Control</td>
<td>3</td>
</tr>
<tr>
<td>47.480G</td>
<td>Fire and Explosion</td>
<td>2</td>
</tr>
<tr>
<td>47.481G</td>
<td>Management of Dangerous Materials</td>
<td>3</td>
</tr>
<tr>
<td>47.900G</td>
<td>Introductory law</td>
<td>2</td>
</tr>
</tbody>
</table>
School of Civil Engineering

8.401G Human Factors in Transport 3
8.402G Transport, Environment, Community 6
8.403G Theory of Land Use/Transport Interaction 3
8.404G Local Area Transport Planning 3
8.405G Urban Transport Planning 3
8.406G Regional Transport Planning 3
8.407G Transport System Design (Non-Urban) 3
8.408G Transport System Design (Urban) 3
8.409G Interchange Design 3
8.410G Highway Engineering Practice Part I 3
8.411G Highway Engineering Practice Part II 3
8.412G Economics for Transport Studies 3
8.413G Transport Economics 3
8.414G Transport Systems Part I 3
8.415G Transport Systems Part II 3
8.416G Traffic Engineering 6
8.417G Transport and Traffic Flow Theory 6
8.418G Statistics for Transport Studies Part I 3
8.419G Statistics for Transport Studies Part II 3
8.420G Transport Engineering Elective 3

These subjects were offered previously by the School of Transport and Highways with the prefix 24.
### School of Electrical Engineering and Computer Science

Each subject (except 6.909G, 6.918G, 6.936G and 6.339G) counts as three credits. (6.339G* is 6 credits.)

<table>
<thead>
<tr>
<th>Subject Number</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.050G</td>
<td>Occasional Elective — Digital Signal Processing</td>
<td></td>
</tr>
<tr>
<td>6.053G</td>
<td>Advanced Mathematics II</td>
<td></td>
</tr>
<tr>
<td>6.054G</td>
<td>Numerical Computation</td>
<td></td>
</tr>
<tr>
<td>6.071G</td>
<td>Electrical Measurements</td>
<td></td>
</tr>
<tr>
<td>6.073G</td>
<td>Precise Electrical Measurements</td>
<td></td>
</tr>
<tr>
<td>6.074G</td>
<td>Superconductivity</td>
<td></td>
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<tr>
<td>6.075G</td>
<td>Electric Contacts</td>
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</tr>
<tr>
<td>6.150G</td>
<td>Communication Elective — Applied Optoelectronics</td>
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</tr>
<tr>
<td>6.160G</td>
<td>Field Theory in Electrical Engineering</td>
<td></td>
</tr>
<tr>
<td>6.161G</td>
<td>Field Mapping</td>
<td></td>
</tr>
<tr>
<td>6.164G</td>
<td>Microwave Antenna Theory and Applications</td>
<td></td>
</tr>
<tr>
<td>6.165G</td>
<td>Microwave Circuits: Theory and Techniques</td>
<td></td>
</tr>
<tr>
<td>6.170G</td>
<td>Microwave Electronics</td>
<td></td>
</tr>
<tr>
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†Nine credit projects are not normally approved by the School of Electrical Engineering and Computer Science.
### School of Mechanical and Industrial Engineering

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*Candidates wishing to specialize in Refrigeration and Air Conditioning should select this subject.

‡Candidates wishing to specialize in Industrial Automation should select this subject.

§A 36 credit thesis is not normally approved in the School of Mechanical and Industrial Engineering.

### Department of Industrial Engineering

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Note 1: Candidates taking their Project in Industrial Management are generally required to take 18.074G, 18.370G, 18.571G, 18.675G and 14.062G Accounting for Engineers. Before enrolment in the Project they must have had one year's relevant industrial experience and have access to industry for their Project topic.

Note 2: Candidates taking their Project in Operations Research are generally required to take 18.671G, 18.674G, 18.874G and 18.062G Accounting for Engineers.

Note 3: All Master of Engineering Science candidates in the Department of Industrial Engineering must include 18.909G or 18.918G in their program.

A 36 credit Thesis is not normally approved in the School of Mechanical and Industrial Engineering.

### School of Nuclear Engineering

**Head of School**
Professor J. J. Thompson

Each subject counts as three credits.

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### School of Surveying

**Director**
Associate Professor P. C. Farrell

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### Centre for Biomedical Engineering

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Associate Professor P. C. Farrell

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### Graduate Study: Graduate School of Engineering

**Division of Postgraduate Extension Studies**

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<td>97.003G Human Transinformation</td>
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<td>97.008G Body in Communication</td>
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</tr>
<tr>
<td>97.014G Project Report</td>
<td>16</td>
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<tr>
<td>97.016G Project Report</td>
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<td><em>Half-session only.</em></td>
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**Graduate Diplomas**

Graduate Diploma programs in all schools of the Faculty may include subjects from the above list, subject to the approval of the Head of School responsible for the subject.

In addition the following subjects are offered specifically for Graduate Diploma students. Not all electives are necessarily offered in any particular year.

**School of Electrical Engineering and Computer Science**

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<tr>
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<td>Microprocessor Systems</td>
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<tr>
<td>6.167G</td>
<td>Propagation and Transmission of Electrical Waves</td>
</tr>
<tr>
<td>6.340G</td>
<td>Communications Electronics</td>
</tr>
<tr>
<td>6.341G</td>
<td>Signal Analysis</td>
</tr>
<tr>
<td>6.343G</td>
<td>Digital and Analogue Communications</td>
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**School of Mechanical and Industrial Engineering**

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</tr>
<tr>
<td>18.580G</td>
<td>Operations Research</td>
</tr>
<tr>
<td>18.681G</td>
<td>Engineering Economic Analysis</td>
</tr>
<tr>
<td>18.780G</td>
<td>Production Control</td>
</tr>
<tr>
<td>14.001</td>
<td>Introduction to Accounting A</td>
</tr>
<tr>
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<td>Introduction to Accounting B</td>
</tr>
<tr>
<td>14.042G</td>
<td>Industrial Law</td>
</tr>
<tr>
<td>14.062G</td>
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**School of Mechanical and Industrial Engineering**

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**Division of Postgraduate Extension Studies**

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<tr>
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<td>Basic Information Theory</td>
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<tr>
<td>97.003G</td>
<td>Human Transinformation</td>
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<tr>
<td>97.004G</td>
<td>Psychology of Communication</td>
</tr>
<tr>
<td>97.005G</td>
<td>Audio and Video Equipment — Capabilities and Applications</td>
</tr>
<tr>
<td>97.007G</td>
<td>Audio and Visual Signals in Communication</td>
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<tr>
<td>97.008G*</td>
<td>Body in Communication</td>
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<tr>
<td>97.010G</td>
<td>Basic Fortran</td>
</tr>
<tr>
<td>97.012G</td>
<td>Project</td>
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<td>97.013G</td>
<td>Presentation of Information</td>
</tr>
<tr>
<td>97.015G</td>
<td>Programming in Basic</td>
</tr>
<tr>
<td>97.048G</td>
<td>Introduction to Microprocessor Systems</td>
</tr>
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*See the Calendar for further information on the Division of Postgraduate Extension Studies.

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<thead>
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<tbody>
<tr>
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<td>5.076G</td>
<td>Computational Methods in Mechanical Engineering, Part II</td>
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<td>Semiconductor Devices</td>
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<td>Reliability Engineering</td>
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<td>Integrated Circuit Design</td>
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<td>6.378G</td>
<td>Solar Energy Conversion</td>
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<td>6.379G</td>
<td>Solar Cells — Operating Principles, Technology and System Applications</td>
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<tr>
<td>6.490G</td>
<td>Using Microprocessors in Real-time Applications</td>
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### Subjects offered by Tape Correspondence

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<td>Computational Methods in Mechanical Engineering, Part II</td>
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<td>6.376G</td>
<td>Reliability Engineering</td>
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<td>6.377G</td>
<td>Integrated Circuit Design</td>
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<tr>
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<td>Solar Energy Conversion</td>
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<tr>
<td>6.379G</td>
<td>Solar Cells — Operating Principles, Technology and System Applications</td>
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<tr>
<td>6.490G</td>
<td>Using Microprocessors in Real-time Applications</td>
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Engineering

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<td>97.032G</td>
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<td>97.034G</td>
<td>Psychology of Communication</td>
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<td>97.035G</td>
<td>Audio Video Equipment</td>
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<td>97.037G</td>
<td>Audio Video Signals in Communication</td>
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<td>97.038G</td>
<td>Body in Communication</td>
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<td>97.043G</td>
<td>Presentation of Information</td>
<td>1</td>
</tr>
<tr>
<td>97.345G</td>
<td>Active and Adaptive Circuits for Integrated Systems</td>
<td>3</td>
</tr>
<tr>
<td>97.346G</td>
<td>Introduction to Microprocessor Systems</td>
<td>2</td>
</tr>
</tbody>
</table>


Groundwater

Hydrology

Hydraulics

Prestressed Concrete Structures
Partially prestressed concrete beams. Analysis and design of end blocks for post-tensioned beams.

Public Health Engineering

Reinforced Concrete Structures

Project Reports and Theses
Supervision of project reports and theses will generally be available in areas of research interest in the Schools of the Faculty. Alternatively, design and other topics may be chosen by arrangement.

Civil Engineering

Engineering Construction and Management

Engineering Materials
Application of finite element techniques to analysis of raft foundations, pile foundations, layered soils, and rigid retaining structures, marine structures, reinforced earth.
Structural Analysis
Development of computer methods for analysis of multistorey flat plate structures.
Development and application of finite element techniques.
Investigation of elastic stability.
Analysis of dynamic response of highway bridges and buildings.

Transport Engineering
Problems of land use and transport interaction.
Theories of traffic structure and flow.
Measurements, planning and control of traffic.
Transport systems analysis.
Investigation of human factors.
Economic evaluation of transport investments.
Transport planning — urban systems.
Investigations into transport economics and policy.
Design of information systems.
Investigations of the geometric shape of the road alignment on the driver’s view of the road.
Study of road alignment design in three dimensions.
The testing of aggregates.
The properties of pavement materials subjected to repeated loading.
The surface texture of aggregates.
The stability of bituminous mixes.
The testing of full scale pavement systems.
The effects of porosity on the properties of rocks and road making aggregates.

Water Resources Engineering
Multi-objective water resources planning.
Hydro-economic studies.
Optimization problems in water resource systems design.
Drought studies.
Flood plain management.
Arid Lands Management.

Electrical Engineering and Computer Science

Communications
Communication theory and system theory.
Digital communication systems.
Digital signal processing and filtering.
Active and adaptive circuits.
Computer modelling for system design.
Microprocessor applications.
Microwave integrated circuits.
Adaptive antenna arrays.
Optical communications, optical fibre studies and measurements.

Systems and Control
Analysis and design of non-linear systems.
Structural problems in identification, especially feedback problems.
Numerical methods of optimization including large scale systems.
Deterministic and stochastic control, self tuning regulators.
Cybernetic Engineering: Robotics, pattern and image recognition and understanding; vision processing and automated assembly.
Computer aided design including linear and non-linear simulations, MIMO frequency domain design.
Biological signal analysis and system modelling.
Application of the above ideas including: control of a cement kiln; boiler identification and control; reactor boiling channel identification; gait analysis; pattern recognition; fermentation process control; computer control and instrumentation; microprocessors; electric car control.

Electric Power
The stability, dynamics and control of electric power systems.
Instrumentation and protection in power systems.
Power system security and on-line security analysis.
Data acquisition and transmission and switching control.
Applications of field theory.
Electrical measurements.
High voltage and heavy current phenomena.
Electrical discharges and their uses.
Insulation research including partial discharges.
Superconductivity.
Electrical machines and thyristor control schemes.
Special Electrical machines.
Power electronics.
Electric vehicles.

Computer Science
Extensible Computer systems.
Real time incremental computing systems.
Observable computer systems.
Algorithms for industrial scheduling.
Artificial intelligence.
Digital systems description, specification and design.
Commercial software engineering.
Operating systems.
Microprocessor development systems.
VLSI Systems

Electronics
Semiconductor device physics.
Integrated circuit design.
Integrated circuit technology.
Surface elastic wave devices.
Reliability engineering.
Photovoltaic solar energy conversion.
Ultrasonic holography.
Optoelectronic devices.
Periodically parametric systems.
Mechanical and Industrial Engineering

Agricultural Engineering

Mechanical harvesting of fruit and vegetables.
Mechanical handling, grading and processing of agricultural produce.
Development of shearing equipment.
Metering and placement of seed and fertilizer.

Applied Mechanics

Biomechanics.
Mechanics of solids, stress analysis.
Impact mechanics.
Adaptive control systems.
Process stimulation and control.
Spatial mechanisms.
Dynamics of machines.
Multi-mode vibrations.
Lubrication and wear.
Computer aided design.
Plastic deformation.

Fluid Mechanics/Thermodynamics — including Aeronautical Engineering and Naval Architecture

Two-phase flow with and without heat transfer. Slurries.
Conveying of solid dusts by gases.
Hydraulic transients.
Hydrodynamics, water hammer. Fluidics.
Conduction, convection and radiation. Natural convection.
Computational fluid dynamics and heat transfer.
Refrigeration and air conditioning.
Energy conversion and conservation.
Solar energy and systems.
Engine performance and emissions.
Gas dynamics. Transonic flow. Shock waves.
Large scale structures.
Light aircraft design and performance.
Development of a ship structure optimization system.
Analysis and design of plated grillages.
Vortex shedding in aeronautical and maritime engineering.
Economic studies relative to ship industry.
Hydrodynamics of planing surfaces.
Problems in wave resistance.

Industrial Engineering — including Operations Research and Production Engineering

Engineering economic analysis.
Efficiency of production lines.
Optimum shearing policies for rolled bars.
Application of probability theory in the allocation of engineering tolerance.

Computer generation of timetables.
Job shop scheduling.
Least-cost tolerance.
Optimum reject allowance.
Operational simulation.
Variety reduction.
Probabilistic networks.
Optimization techniques relevant to information processing systems.
Statistical decision theory.
Production scheduling for variable demand.
Inventory and production control.
Optimum control.
Mathematical programming.
Dynamic programming.
Geometric programming.
Integer programming.
Large scale optimization.
Applications of operations research to real-world problems.
Stochastic processes.
Applications of optimization techniques.
Experimental and theoretical investigations of the following processes: machining, extrusion, indentation, compression, rolling, drawing.
Performance of single and multipoint cutting tools including tool life and economics of machining.
Properties of materials at high rates of strain.
Materials handling studies.
Factory design and location studies.
Plant layout by computer.
Ergonomics.
Occupational safety and health.
Production design studies.
Engineering design analysis and tolerance technology.
Metrology studies.
Group technology studies.

Nuclear Engineering

Neutron transport and diffusion theory.
Thermal and thermo-mechanical analysis of reactor components.
Nuclear reactor noise theory and analysis.
Reactor channel hydrodynamics.
Boiling and two-phase flow.
Nuclear reactor dynamics, stability and control.
Graduate Study: Graduate School of Engineering

Numerical methods for reactor analysis and simulation.
Nuclear power planning and reactor strategy.
Structural mechanics in reactor technology.
Risk assessment.

Design of analytical plotter software.
Aerotriangulation, computer applications, block adjustment, independent model triangulation.
Digital terrain models.

Land Studies

History and development of the Torrens Systems of title registration.
Land tenure, land registration and cadastral surveying systems.
Strata and cluster developments.
Land and spatial information systems.
Remote sensing techniques particularly in urban areas.
Land development and management.
Environmental assessment.

Surveying

Deformation and settlement of structures.
Industrial applications of surveying.
Electronic distance measurements: high precision applications, calibrations.
Gyrotheodolite theory and applications.
Development of instrumentation.
Modern optical instrument testing.
Computation systems for desk top computers.

Biomedical Engineering

Modelling of respiratory function, cardiovascular function, nervous system, artificial kidney therapy, extracorporeal heart-lung support, endocrine system and other body systems.
Microprocessor control of medical equipment.
Limb and joint dynamics studies.
Development of implantable electrodes.
Development of rehabilitation devices.
Development and evaluation of new hospital equipment and treatment procedures.
Signal analyses of wave forms from medical diagnostic equipment.
Implants for fracture support and joint replacement.
Improved drug administration.
Remote Sensing

Director
Dr J. A. Richards

Development of majority vote and related classifier algorithms for use with multitemporal data.
Application of label relaxation techniques to remotely sensed data.
Incorporation of auxiliary data into classification procedures.
Application of satellite data to Urban Area Studies.
Monitoring land use change using remotely sensed data.
Determining the characteristics of surface reflectance.
Analysis of image quality.
Application of satellite imagery to small scale mapping.
Multispectral linear transformations.
Graduate Study

Conditions for the Award of Higher Degrees

Rules, regulations and conditions for the award of first degrees are set out in the appropriate Faculty Handbooks.

For the list of undergraduate courses and degrees offered see Disciplines of the University: Faculty Table (Undergraduate Study) in the Calendar.

The following is the list of higher degrees and graduate diplomas of the University, together with the publication in which the conditions for the award appear.

For the list of graduate degrees by research and course work, arranged in faculty order, see Disciplines of the University: Table of Courses (by faculty): Graduate Study in the Calendar.

For the statements Preparations and Submissions of Project Reports and Theses for Higher Degrees and Policy with respect to the Use of Higher Degree Theses see the Calendar.

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<td>Doctor of Letters</td>
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<tr>
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<tr>
<td>Master of Science (Building)</td>
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*Faculty of Science
†Faculty of Biological Sciences
‡Faculty of Science

### 1. The degree of Doctor of Philosophy may be granted by the Council on the recommendation of the Professorial Board to a candidate who has made an original and significant contribution to knowledge and who has satisfied the following requirements:

### 2. A candidate for registration for the degree of Doctor of Philosophy shall:

1. hold an honours degree from the University of New South Wales; or
2. hold an honours degree of equivalent standing from another approved university; or
3. if the candidate holds a degree without honours from the University of New South Wales or other approved university, have achieved by subsequent work and study a standard recognized by the higher degree committee of the appropriate faculty or board of studies (hereinafter referred to as the Committee) as equivalent to honours; or
4. in exceptional cases, submit such other evidence of general and professional qualifications as may be approved by the Professorial Board on the recommendation of the Committee.

### 3. When the Committee is not satisfied with the qualifications submitted by a candidate, the Committee may require the candidate, before being permitted to register, to undergo such examination or carry out such work as the Committee may prescribe.

### 4. A candidate for registration for a course of study leading to the degree of Doctor of Philosophy shall apply to the Registrar on the prescribed form at least one calendar month before the commencement of the session in which registration is to begin.

### 5. Subsequent to registration the candidate shall pursue a program of advanced study and research for at least six academic sessions, save that:

1. a candidate fully engaged in advanced study and research for the degree, who before registration was engaged upon research to the satisfaction of the Committee, may be exempted from not more than two academic sessions;
2. in special circumstances the Committee may grant permission for the candidate to spend not more than one calendar year of the program in advanced study and research at another institution provided that the work can be supervised in a manner satisfactory to the Committee;
3. in exceptional cases, the Professorial Board on the recommendation of the Committee may grant permission for a candidate to be exempted from not more than two academic sessions.
6. A candidate who is fully engaged in research for the degree shall present for examination not later than ten academic sessions from the date of registration. A candidate not fully engaged in research shall present for examination not later than twelve academic sessions from the date of registration. In special cases an extension of these times may be granted by the Committee.

7. The candidate shall be fully engaged in advanced study and research, save that:

(1) the Committee may permit a candidate to undertake a limited amount of University teaching or outside work which in its judgement will not interfere with the continuous pursuit of the proposed course of advanced study and research;

(2) a member of the full-time staff of the University may be accepted as a part-time candidate for the degree, in which case the Committee shall prescribe a minimum period for the duration of the program;

(3) in special circumstances, the Committee may, with the concurrence of the Professional Board, accept as a part-time candidate for the degree a person who is not a member of the full-time staff of the University and is engaged in an occupation which, in its opinion, leaves the candidate substantially free to pursue a program in a School* of the University. In such a case the Committee shall prescribe for the duration of the program a minimum period which, in its opinion, having regard to the proportion of the time which the candidate is able to devote to the program in the appropriate University School* is equivalent to the six sessions ordinarily required.

8. Every candidate shall pursue a program under the direction of a supervisor appointed by the Committee from the full-time members of the University staff. The work, other than field work, shall be carried out in a School* of the University save that in special cases the Committee may permit a candidate to conduct the work at other places where special facilities not possessed by the University may be available. Such permission will be granted only if the direction of the work remains wholly under the control of the supervisor.

9. Not later than two academic sessions after registration the candidate shall submit the topic of research for approval by the Committee. After the topic has been approved it may not be changed except with the permission of the Committee.

10. A candidate may be required by the Committee to attend a formal course of appropriate study.

Thesis

11. On completing the course of study every candidate must submit a thesis which complies with the following requirements:

(1) the greater proportion of the work described must have been completed subsequent to registration for the Ph.D. degree;

(2) it must be an original and significant contribution to the knowledge of the subject;

(3) it must be written in English except that a candidate in the Faculty of Arts may be required by the Faculty on the recommendation of the supervisor to write the thesis in an appropriate foreign language;

(4) it must reach a satisfactory standard of expression and presentation.

12. The thesis must present the candidate's own account of the research. In special cases work done conjointly with other persons may be accepted, provided the Committee is satisfied on the candidate's part in the joint research.

13. Every candidate shall be required to submit with the thesis a short abstract of the thesis comprising not more than 350 words.

The abstract shall indicate:

(1) the problem investigated;

(2) the procedures followed;

(3) the general results obtained;

(4) the major conclusions reached;

but shall not contain any illustrative matter, such as tables, graphs or charts.

14. A candidate may not submit as the main content of the thesis any work or material which has previously been submitted for a university degree or other similar award.

*Or department where a department is not within a school.
15. The candidate shall give in writing two months' notice of intention to submit the thesis.

16. Four copies of the thesis shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses. The candidate may also submit any work previously published whether or not such work is related to the thesis.

17. It shall be understood that the University retains the four copies of the thesis submitted for examination, and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act, 1968, the University may issue the thesis in whole or in part, in photostat or microfilm or other copying medium.

18. There shall normally be three examiners of the thesis, appointed by the Professorial Board on the recommendation of the Committee, at least two of whom shall be external to the University.

19. At the conclusion of the examination each examiner shall submit to the Committee a concise report on the merits of the thesis and shall recommend to the Committee that:

(1) The candidate be awarded the degree without further examination; or
(2) the candidate be awarded the degree without further examination subject to minor corrections as listed being made to the satisfaction of the head of the school*; or
(3) the candidate be awarded the degree subject to a further examination on questions posed in the report, performance in this further examination being to the satisfaction of the Committee; or
(4) the candidate be not awarded the degree but be permitted to resubmit the thesis in a revised form after a further period of study and/or research; or
(5) the candidate be not awarded the degree and be not permitted to resubmit the thesis.

20. If the performance at the further examination recommended under Rule 19. (3) is not to the satisfaction of the Committee the Committee may permit the candidate to re-present the same thesis and submit to a further oral, practical or written examination within a period specified by them but not exceeding eighteen months.

21. The Committee shall, after consideration of the examiners' reports and the reports of any oral or written or practical examination, recommend whether or not the candidate may be admitted to the degree.

22. A candidate shall be required to pay such fees as may be determined from time to time by the Council.

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Entry for Examination

I. The degree of Master of Biomedical Engineering may be awarded by the Council on the recommendation of the Higher Degree Committee of the Faculty of Engineering (hereinafter referred to as the Committee) to a candidate who has satisfactorily completed an approved program of advanced study.

2. (1) An applicant for registration for the degree shall have been admitted to an appropriate Bachelor degree in the University of New South Wales or other university or tertiary institution at a standard acceptable to the Committee.
(2) In exceptional cases an applicant may be registered as a candidate for the degree by submitting evidence of such academic and professional attainments as may be approved by the Committee.
(3) Notwithstanding any other provisions of these conditions, the Committee may require an applicant to demonstrate fitness for registration by completing a qualifying program as determined by the Committee.

* Or department where a department is not within a School.
Registration

3. (1) An application to register as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Registrar two months before commencement of the session in which the candidate desires to commence.

(2) An approved candidate shall register in one of the following categories:

(a) student in full-time attendance at the University;

(b) student in part-time attendance at the University.

(3) A candidate for the degree shall be required to undertake such formal courses of study and pass such examinations as may be prescribed by the Committee and shall undertake a specified project, the satisfactory completion of which shall be regarded as part of the examination.

(4) The progress of a candidate shall be reviewed at least once annually by the Committee and as a result of its review the Committee may terminate candidature or take such other action as it considers appropriate.

(5) Unless otherwise recommended by the Committee, no candidate shall be awarded the degree until the lapse of two full-time sessions after registration, or the equivalent in part-time study.

(6) The program of advanced study, including the preparation of a project report, shall normally total 60 credits. The number of credits allocated to each subject shall be determined by the Committee on the recommendation of the Director of the Centre for Biomedical Engineering. Students with advanced standing may be given limited exemptions by the Committee on the recommendation of the Director of the Centre.

(7) The project report will normally carry 18 credits weighting except in special cases, approved by the Director of the Centre, where a more detailed project report may carry a weighting of 30 credits towards the award of the degree.

Thesis

4. (1) The project forming the basis of the report shall be conducted under a supervisor(s) approved by the Committee on the recommendation of the Director of the Centre for Biomedical Engineering.

(2) Every candidate who submits a project report as provided in paragraph 3. (3) shall submit three copies in a form which complies with the requirements of the University for the preparation and submission of higher degree theses and project reports. The candidate may also submit any work the candidate has published whether or not such work is related to the project report.

(3) For each candidate who submits a project report as provided in paragraph 3. (3) there shall be at least two examiners appointed by the Professorial Board on the recommendation of the Committee, one of whom shall, if possible, be an external examiner.

(4) It shall be understood that the University retains the three copies of the project report submitted for examination and is free to allow the report to be consulted or borrowed. Subject to the provisions of the Copyright Act, 1968, the University may issue the project report in whole or in part, in photostat or microfilm or other copying medium.

Recommendation for Admission to Degree

5. Having considered the examiners' reports and the candidate's other results in the prescribed course of study, the Committee shall recommend whether the candidate may be admitted to the degree.

Fees

6. An approved candidate shall pay such fees as may be determined from time to time by the Council.
1. The degree of Master of Engineering may be awarded by the Council on the recommendation of the Higher Degree Committee of the appropriate Faculty (hereinafter referred to as the Committee) to a candidate who has demonstrated ability to undertake research by the submission of a thesis embodying the results of an investigation, or design or engineering development, which in each case is original.

2. (1) An applicant for registration for the degree shall have been admitted to the degree of Bachelor in the University of New South Wales, or other approved university, in an appropriate school or department at a standard acceptable to the Committee.

   (2) In exceptional cases a person may be permitted to register as a candidate for the degree if the person submits evidence of such academic and professional attainment as may be approved by the Professorial Board on the recommendation of the appropriate Committee.

   (3) Notwithstanding any other provisions of these conditions, the Committee may require an applicant to demonstrate fitness for registration by carrying out such work and sitting for such examinations as the Committee may determine.

3. (1) An application to register as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least one full calendar month before the commencement of the session in which the candidate desires to register.

   (2) In every case, before permitting an applicant to register as a candidate, the Committee shall be satisfied that adequate supervision* and facilities are available.

   (3) An approved applicant shall register in one of the following categories:

   (a) student in full-time attendance at the University

   (b) student in part-time attendance at the University

   (c) student working externally to the University

4. (1) Every candidate for the degree shall be required to carry out a program of advanced study to take such examinations and perform such other work as may be prescribed by the Committee which shall include the preparation and submission of a thesis embodying the results of an original investigation. The work shall be carried out under the direction of a supervisor appointed by the Committee or under such conditions as the Committee may determine. At least once a year and at any other time that the Committee sees fit, the candidate's supervisor shall present to the head of the school in which the candidate is registered, a report on the progress of the candidate. The Committee shall review the report and may, if it decides as a result of its review that the progress of the candidate is unsatisfactory, cancel registration or take such other action as it considers appropriate.

5. No candidate shall be considered for the award of the degree until the lapse of four complete sessions from the date from which registration becomes effective save that, in the case of a candidate who obtained the degree of Bachelor with Honours or who has had previous research experience, this period may, with the approval of the Committee be reduced by up to two sessions.

4. (1) A candidate for the degree shall be required to submit three copies of the thesis referred to in paragraph 3. (4) which shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses. The candidate may submit any work the candidate has published whether or not such work is related to the thesis.

(2) For each candidate there shall be at least two examiners, appointed by the Professorial Board on the recommendation of the Committee one of whom shall, if possible, be an external examiner.

(3) It shall be understood that the University retains the three copies of the thesis submitted for examination and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act, 1968 the University may issue the thesis in whole or in part, in photostat or microfilm or other copying medium.

5. Having considered the examiners' reports the Committee shall recommend whether or not the candidate should be admitted to the degree.

6. An approved candidate shall pay such fees as may be determined from time to time by the Council.

*Attention is drawn to the conditions for the award of the Degree of Master of Science, Master of Engineering or Master of Surveying without Supervision which appears elsewhere in this section.
Master of Engineering Science (MEngSc) and Master of Surveying Science (MSurvSc)

1. The degrees of Master of Engineering Science and Master of Surveying Science may be awarded by the Council on the recommendation of the Higher Degree Committee of the Faculty of Engineering (hereinafter referred to as the Committee) to a candidate who has satisfactorily completed an approved program of advanced study.

Qualifications

2. (1) An applicant for registration for the degree shall have been admitted to the degree of Bachelor with Honours in the University of New South Wales or other approved university or tertiary education institution of acceptable standing in an appropriate school or department.

(2) The Committee may also admit a graduate with a pass degree of good standing from an appropriate degree course whose record is at a standard acceptable to the Committee.

(3) In special circumstances a person may be permitted to register as a candidate for the degree by submitting evidence of such academic and professional attainments as may be approved by the Committee.

(4) Notwithstanding any other provisions of these conditions the Committee may require an applicant to demonstrate fitness for registration by carrying out such work and sitting for such examinations as the Committee may determine.

Registration

3. (1) An application to register for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least two full calendar months before the commencement of the course.

(2) An approved candidate shall register in one of the following categories:

(a) student in full-time attendance at the University

(b) student in part-time attendance at the University

(3) A candidate for the degree shall

(a) complete a program of advanced study which may include the submission of a report on a project based upon a design or a critical review; or

(b) demonstrate ability to carry out research by the submission of a thesis embodying the results of an original investigation; or

(c) complete an approved combination of the above.

(4) An applicant for registration shall indicate the proposed project area or major field of study in order that the responsibility for the supervision of the program may be determined.

(5) The approval of the appropriate Head of School for the proposed program must be obtained by the candidate prior to enrolment. For the purpose of this regulation the Head of School shall normally be the Head of the School providing supervision of the project or research or if there is no project the major field of study. Should the appropriate school be the School of Surveying the degree awarded shall be Master of Surveying Science.

(6) The program of advanced study including the preparation of a thesis or report on a project to be completed by each candidate shall total a minimum of 36 credits, the number of credits allocated for each subject being determined by the Committee on the recommendation of Heads of Schools. Where the formal course work comprises no more than 50% of the total study, or where the formal work comprises 50% or more but less than 100% the candidate shall be required to submit a report on a project. With the approval of the Head of School, candidates may take subjects from other Schools of the Faculty, other Faculties of the University and other universities or institutions.

(7) The project forming the basis for the report or thesis shall be conducted under a supervisor appointed by the Committee or under such conditions as the Committee may determine, to the satisfaction of the Head of School.

(8) No full-time candidate shall be considered for the award of the degree until the lapse of two sessions from the date from which registration becomes effective. No part-time candidate shall be considered for the award of the degree until the lapse of four sessions from the date from which registration becomes effective.
4. (1) Every candidate who submits a thesis (36 credits) as provided in paragraph 3. (3) (b) shall submit three copies in a form which complies with the requirements of the University for the preparation and submission of higher degree theses. The candidate may also submit any published work whether or not such work is related to the thesis. The format of the report on a project as provided in paragraph 3. (3) (a) shall comply with the requirements of the Faculty for the preparation and submission of project reports.

(2) For each candidate who submits a thesis or 18 credit project report there shall be at least two examiners appointed by the Professorial Board on the recommendation of the Committee, one of whom shall, if possible, be an external examiner.

(3) It shall be understood that the University retains the three copies of the thesis or 18 credit project report submitted for examination and is free to allow it to be consulted or borrowed. Subject to the provisions of the Copyright Act, 1968 the University may issue it in whole or in part, in photostat or microfilm or other copying medium.

(4) The report on the project (9 credits) provided in paragraph 3. (3) (a) shall be under the supervision of a member of the academic staff and shall be examined by two examiners. The satisfactory completion of the project shall be regarded as part of the annual examinations.

5. Having considered the examiners' reports and the candidate's other work in the prescribed course of study the Committee shall recommend whether or not the candidate should be admitted to the degree.

6. An approved candidate shall pay such fees as may be determined from time to time by the Council.
(3) A candidate for the degree shall be required to undertake such formal courses of study and pass such examinations as may be prescribed by the Committee including the submission of a report on a project based on a design or a critical review, the satisfactory completion of which shall be regarded as part of the examination.

(4) The progress of a candidate shall be reviewed at least once annually by the Committee and as a result of its review the Committee may terminate candidature or take such other action as it considers appropriate.

(5) Unless otherwise recommended by the Committee, no candidate shall be awarded the degree until the lapse of two full-time sessions after registration, or the equivalent in part-time study.

(6) The program of advanced study, including the preparation of a report on a project shall normally total 54 credits. The number of credits allocated to each subject shall be determined by the Committee on the recommendation of the Course Director. Students with advanced standing may be given limited exemption by the Committee on the recommendation of the Course Director.

Project

4. (1) The report on the project (9 credits) provided in paragraph 3. (3) shall be under the supervision of a member of the academic staff recommended by the Course Director and shall be examined by two examiners. The satisfactory completion of the project shall be regarded as part of the annual examinations.

Recommendation for Admission to Degree

5. Having considered the examiners' reports and the candidate's other results in the prescribed course of study, the Committee shall recommend whether the candidate should be admitted to the degree.

Fees

6. An approved candidate shall pay such fees as may be determined from time to time by the Council.

Master of Science (MSc)

1. The degree of Master of Science may be awarded by the Council on the recommendation of the Higher Degree Committee of the appropriate Faculty or Board of Studies (hereinafter referred to as the Committee) to a candidate who has demonstrated ability to undertake research by the submission of a thesis embodying the results of an original investigation.

Qualifications

2. (1) An applicant for registration for the degree shall have been admitted to the degree of Bachelor in the University of New South Wales, or other approved university in an appropriate School or Department and have passed all necessary examinations for the degree at a standard acceptable to the Committee.

(2) In exceptional cases a person may be permitted to register as a candidate for the degree if the person submits evidence of such academic and professional attainments as may be approved by the Professorial Board on the recommendation of the appropriate Committee.

(3) Notwithstanding any other provisions of these conditions the Committee may require an applicant to demonstrate fitness for registration by carrying out such work and sitting for such examinations as the Committee may determine.

Registration

3. (1) An application to register as a candidate for the degree of Master of Science shall be made on the prescribed form which shall be lodged with the Registrar at least one full calendar month before the commencement of the session in which the candidate desires to register.

(2) In every case before permitting an applicant to register as a candidate the Committee shall be satisfied that adequate supervision and facilities are available.
(3) An approved applicant shall register in one of the following categories:
(a) student in full-time attendance at the University
(b) student in part-time attendance at the University
(c) student working externally to the University

(4) Every candidate for the degree shall be required to submit three copies of a thesis embodying the results of an original investigation or design, to take such examinations and to perform such other work as may be prescribed by the Committee. This work shall be carried out under the direction of a supervisor appointed by the Committee or under such conditions as the Committee may determine.

(5) At least once a year and at any other time that the Committee sees fit the candidate’s supervisor shall present to the Head of School in which the candidate is registered a report on the progress of the candidate. The Committee shall review the report and may, if it decides as a result of its review that the progress of the candidate is unsatisfactory cancel registration or take such other action as it considers appropriate.

(6) Unless otherwise recommended by the Committee, no candidate shall be awarded the degree until the lapse of four complete sessions from the date of registration, save that the case of a candidate who obtained the degree of Bachelor with Honours or who has had previous research experience, this period may be reduced by up to two sessions with the approval of the Committee. A candidate who is fully engaged in research for the degree shall present for examination not later than six academic sessions from the date of registration. A candidate not fully engaged in research shall present for examination not later than twelve academic sessions from the date of registration. In special cases an extension of these times may be granted by the Committee.

4. (1) A candidate for the degree shall be required to submit three copies of the thesis referred to in paragraph 3.(4) which shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses. The candidate may submit also for examination any work the candidate has published whether or not such work is related to the thesis.

(2) For each candidate there shall be at least two examiners, appointed by the Professorial Board on the recommendation of the Committee, one of whom, if possible shall be external to the University.

(3) It shall be understood that the University retains the three copies of the thesis submitted for examination and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act, 1968 the University may issue the thesis in whole or in part in photostat or microfilm or other copying medium.

5. Having considered the examiners’ reports the Committee shall recommend whether or not the candidate should be admitted to the degree.

6. An approved candidate shall pay such fees as may be determined from time to time by the Council.

1. Where it is not possible for candidates to register under the normal conditions for the degree of Master of Science, Master of Engineering or Master of Surveying by reason of their location at centres which are distant from University Schools or where effective supervision is not practicable registration may be granted in these categories under the following conditions:

2. An applicant for registration shall have been admitted to a degree of Bachelor in the University of New South Wales at a standard acceptable to the Committee.
Registration

3. (1) An application to register as an external candidate for the degree of Master of Science, Master of Engineering or Master of Surveying without supervision shall be lodged with the Registrar for recommendation by the Head of School and consideration by the Higher Degree Committee of the appropriate Faculty (hereinafter referred to as the Committee) not less than six months before the intended date of submission of the thesis. A graduate who intends to apply in this way would find it advantageous to seek, at an early stage, the advice of the appropriate School with regard to the adequacy of the subject matter for the degree. A synopsis of the work should be enclosed.

(2) A candidate shall not be considered for the award of the degree until the lapse of six sessions in the case of honours graduates and eight sessions in the case of pass graduates from the date of graduation.

Thesis

4. (1) (a) Every candidate for the degree shall be required to submit three copies of a thesis embodying the results of an investigation or design or engineering development which in each case is original. The thesis shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses. A candidate may submit also for examination any work the candidate has published, whether or not such work is related to the thesis.

(b) Every candidate shall submit with the thesis a statutory declaration that the material contained therein is the candidate’s own work, except where otherwise stated in the thesis.

(2) For each candidate there shall be at least two examiners appointed by the Professorial Board on the recommendation of the Committee, one of who shall be an internal examiner.

(3) If the thesis reaches the required standard, the candidate shall be required to attend for an oral examination at a time and place nominated by the Committee. The examiners may also arrange at their discretion for the examination of the candidate by written and/or practical examinations on the subject of the thesis and/or subjects related thereto.

(4) It shall be understood that the University retains the three copies of the thesis submitted for examination and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act, 1968 the University may issue the thesis in whole or in part, in photostat or microfilm or other copying medium.

Recommendation for Admission to Degree

5. Having considered the examiners’ reports the Committee shall recommend whether the candidate should be admitted to the degree.

Fees

6. An approved candidate shall pay such fees as may be determined from time to time by the Council.

Master of Surveying (MSurv)

1. The degree of Master of Surveying may be awarded by the Council on the recommendation of the Higher Degree Committee of the Faculty of Engineering (hereinafter referred to as the Committee) to a candidate who has demonstrated ability to carry out research by the submission of a thesis embodying the results of an original investigation.

Qualifications

2. (1) An applicant for registration for the degree shall have been admitted to the degree of Bachelor with Honours in the University of New South Wales or other approved university or tertiary education institution of acceptable standing in an appropriate school or department.

(2) The Committee may also admit a graduate with a pass degree of good standing from an appropriate degree course whose record is at a standard acceptable to the Committee.

(3) In special circumstances a person may be permitted to register as a candidate for the degree if the person submits evidence of such academic and professional attainments as may be approved by the Committee.

(4) Notwithstanding any other provisions of these conditions the Committee may require an applicant to demonstrate fitness for registration by carrying out such work and sitting for such examinations as the Committee may determine.
Graduate Study: Conditions for the Award of Higher Degrees

Registration

3. (1) An application to register as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least one full calendar month before the commencement of the session in which the candidate desires to register.
(2) In every case before permitting an applicant to register as a candidate the Committee shall be satisfied that adequate supervision and facilities are available.
(3) An approved applicant shall register in one of the following categories:
(a) student in full-time attendance at the University;
(b) student in part-time attendance at the University;
(c) student working externally to the University.
(4) Every candidate for the degree shall be required to carry out a program of advanced study, to take such examinations and perform such other work as may be prescribed by the Committee which shall include the preparation and submission of a thesis embodying the results of an original investigation. The work shall be carried out under the direction of a supervisor appointed by the Committee or under such conditions as the Committee may determine.
(5) No candidate shall be considered for the award of the degree until a lapse of four complete sessions from the date from which registration becomes effective save that, in the case of a candidate who obtained the degree of Bachelor with Honours or who has had previous research experience, this period may with the approval of the Committee be reduced by up to two sessions.

Thesis

4. (1) A candidate for the degree shall be required to submit three copies of the thesis referred to in paragraph 3. (4) which shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses. The candidate may submit any work the candidate has published whether or not such work is related to the thesis.
(2) For each candidate there shall be at least two examiners appointed by the Professorial Board, on the recommendation of the Committee, one of whom shall, if possible, be an external examiner.
(3) It shall be understood that the University retains the three copies of the thesis submitted for examination and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act, 1968 the University may issue the thesis in whole or in part, in photostat or microfilm or other copying medium.

Recommendation for Admission to Degree

5. Having considered the examiners' reports the Committee shall recommend whether or not the candidate should be admitted to the degree.

Fees

6. An approved candidate shall pay such fees as may be determined from time to time by the Council.

Graduate Diploma (GradDip)

1. An application for admission to a graduate diploma course shall be made on the prescribed form which should be lodged with the Registrar at least two full calendar months before the commencement of the course.
2. An applicant for admission to a graduate diploma course shall be:
   (1) a graduate of the University of New South Wales or other approved university.
   (2) a person with other qualifications as may be approved by Faculty.
3. Notwithstanding clause 2. above, Faculty may require an applicant to take such other prerequisite or concurrent studies and/or examinations as it may prescribe.
4. Every candidate for a graduate diploma shall be required to undertake the appropriate course of study, to pass any prescribed examinations, and if so laid down in the course, to complete a project or assignment specified by the Head of the School. The format of the report on such project or assignment shall accord with the instructions laid down by the Head of the School.
5. An approved applicant shall be required to pay the fee for the course in which the applicant desires to register. Fees shall be paid in advance.
Subject Descriptions

Identification of Subjects by Numbers

A subject is defined by the Professorial Board as 'a unit of instruction approved by the University as being a discrete part of the requirements for a course offered by the University'.

Each approved subject of the University is identifiable both by number and by name as this is a check against nomination of subject other than the one intended.

Subject numbers are allocated by the Registrar and the system of allocation is based on the following guidelines:

1. The authority offering the subject, normally a School of the University, is indicated by the number before the decimal point.

2. Each subject number is unique and is not used for more than one subject title.

3. Subject numbers which have not been used for some time are not used for new subject titles.

4. Graduate subjects are indicated by a suffix 'G' to a number with three digits after the decimal point. In other subjects three or four digits are used after the decimal point.

Subjects taught are listed in full in the handbook of the faculty or board of studies responsible for the particular course within which the subjects are taken. Subject descriptions are contained in the appropriate section in the handbooks.

Servicing Subjects are those taught by a School or Department outside its own faculty and are listed at the end of Undergraduate Study and Graduate Study of the relevant subject. Their subject descriptions are published in the handbook of the faculty in which the subject is taught.

The identifying numerical prefixes for each subject authority are set out below.

For General Studies subjects see the Board of Studies in General Education Handbook, which is available free of charge.

Information Key

The following is the key to the information supplied about each subject listed below: S1 (Session 1); S2 (Session 2); F (Session 1 plus Session 2, ie full year); S1 or S2 (Session 1 or Session 2, ie choice of either session); SS (single session, ie which session taught not known at time of publication); L (Lecture, followed by hours per week); T (Laboratory/Tutorial, followed by hours per week); C (Credit units); CR (Credit Level); R (after subject number) Broken Hill syllabus.

HSC Exam Prerequisites

Subjects which require prerequisites for enrolment in terms of the HSC Examination percentile range refer to the 1978 and subsequent Examinations.

Candidates for enrolment who obtained the HSC in previous years or hold other high school matriculation should check with the appropriate School on what matriculation status is required for admission to a subject.
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*Offers subjects for courses outlined in this handbook.
Physics

Undergraduate Study

The School of Physics has introduced the specialized units 1.951, 1.961, 1.971, 1.981, 1.962, 1.972 and 1.982 for students in the Faculty of Engineering. The first-year units 1.951, 1.961, 1.971 and 1.981 are not available at night. Part-time students will be catered for by the Science Course unit 1.001.

All first year full-time students, including repeat students, should enrol in 1.951, 1.961, 1.971, 1.981 according to their schools. However, full-time Electrical Engineering students may substitute 1.011 for 1.961, subject to the approval of the School of Physics.

All first year part-time students, including repeats, should enrol in 1.001.

Physics Level I Units

1.001 Physics I  F L3T3

Prerequisites:

- HSC Exam Percentile
- Range Required

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<tr>
<td>2 unit</td>
<td>3 unit</td>
<td>4 unit</td>
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1.011 Higher Physics I  F L3T3

Prerequisite: As for 1.001. Co-requisite: 10.001 or 10.011.

For students of all Faculties except Medicine, Engineering and Architecture who have a good secondary school record and who wish to do a more challenging course. Full-time Electrical Engineering students may be admitted after consultation with the School of Physics.

1.951 Physics I (Mechanical Engineering)  F L2T2

Prerequisites: As for 1.001 Physics I.

A basic course on physics for students in the School of Mechanical Engineering.


1.961 Physics I (Electrical Engineering)  F L3T3

Prerequisite: As for 1.001 Physics I.

For students in the School of Electrical Engineering.

Electrostatics in vacuum, electrostatics in dielectrics, steady state currents, magnetostatics in vacuum, ferromagnetism, electromagnetic induction, transient currents. Vectors, motion in one dimension, motion in a plane, particle dynamics, work and energy, the conservation of energy, conservation of linear momentum, collisions, rotational kinematics, rotational dynamics, simple harmonic motion, gravitation. Temperature, heat and the first law of thermodynamics. Electric field, electric potential, capacity, dielectric materials, electric current and resistance. Electric circuits: magnetic field, field due to a current, electromagnetic induction, inductance, magnetic materials, transformers. AC circuits, electronics, diode, rectifier circuit, sample power supplies, electronic amplifier systems, signal processing circuits using operational amplifiers.

1.971 Physics I (Surveying)  F L3T3

Prerequisite: As for 1.001 Physics I.

Aims and nature of physics, linear and rotational mechanics, hydrostatics, elasticity, gravitation, temperature, electricity and magnetism, wave motion, optical instruments, interference and diffraction, lasers and atomic clocks. The importance in surveying of precise frequency, time, speed and distance measurements.

1.981 Physics I (Civil Engineering)  S1 L2T3 and S2 L2T1

Prerequisite: As for 1.001 Physics I.

Aims of physics and its relation to civil engineering. Simple harmonic motion and its relation to wave motion. Electrical and magnetic forces,
Physics Level II Units

1.962 Physics of Measurement (Surveying)  
Prerequisite: 1.971.


1.972 Electromagnetism (Electrical Engineering)  
Prerequisite: 1.961 or 1.001 or 1.011, 10.001. Corequisites: 10.2111, 10.2112.

Electrostatics in vacuum, Electrostatics in Dielectrics, electric currents, magnetostatics in vacuum, magnetic scalar potential, magnetostatics in magnetic media, time varying fields, Maxwell’s equations.

1.982 Solid State Physics (Electrical Engineering)  
Prerequisite: 1.961 or 1.001 or 1.011, 10.001. Corequisites: 10.2111, 10.2112.

The concepts of waves and particles, introductory quantum mechanics, atomic structure, optical spectra and atomic structure, structural properties of solids, band theory and its applications, uniform electronic semiconductors in equilibrium, excess carriers in semiconductors.

1.992 Mechanics and Thermal Physics (Electrical Engineering)  
Prerequisite: 1.961, 10.001 or 10.011. Corequisites: 10.2111.

Particle mechanics, harmonic motion, central force problems, systems of particles, Lagrange’s equations with applications, coupled oscillations, wave equation. Thermodynamic laws, entropy, kinetic theory, M-B distribution, microscopic processes, Maxwell’s relations, chemical potential, phase diagrams, multicomponent systems, electrochemical potential, statistics of defects in solids.

Chemistry

Undergraduate Study

2.111 Introductory Chemistry  
Prerequisite: Nil.

Classification of matter and the language of chemistry. The gas laws and the ideal Gas Equation, gas mixtures and partial pressure. The structure of atoms, cations and anions, chemical bonding, properties of ionic and covalent compounds. The Periodic classification of elements, oxides, hydrides, halides of selected elements. Acids, bases, salts, neutralization, Stoichiometry, the mole concept. Electron transfer reaction. Qualitative treatment of reversibility and chemical equilibrium, the pH scale. Introduction to the diversity of carbon compounds.

2.121 Chemistry IA†  
Prerequisites: 
- 2 unit Mathematics or
- 3 unit Mathematics or
- 4 unit Mathematics and
- 2 unit Science (Physics or Chemistry) or
- 4 unit Science (multistrand) or
- 2 unit Science (other than Physics or Chemistry) or
- 2.111

Stoichiometry and solution stoichiometry. Structure of matter, solids, liquids, gases. Thermochemistry. Equilibria and equilibrium constants, entropy changes, free energy changes, the relationship between equilibrium and standard free energy changes, ideal solutions, colligative properties. Equilibrium in electrolyte solutions, acid-base equilibria, solubility equilibria and redox equilibria. The rate of a chemical change and chemical kinetics.

2.951 Chemistry IME  
Prerequisite: Nil.

A treatment of chemistry which illustrates the application of the principles of chemistry to problems of concern to mechanical engineers. Topics: Chemistry of materials, thermochemistry, chemical kinetics and equilibrium, radioactivity and nuclear power, electrochemistry and corrosion of metals. Introduction to organic chemistry, structure and properties of polymers, fuels and lubricants. Surface chemistry.

†Students who have passed 2.121 may not subsequently enrol in 2.111 or 2.141. Students meeting the 2.121 or 2.141 prerequisite are not permitted to enrol in 2.111 without the permission of the Head of the School of Chemistry. Students who enrol in 2.111 must pass 2.111 before they can proceed to 2.121 or 2.131 or 2.141.
Mechanical and Industrial Engineering

Undergraduate Study

5.006 Engineering E

Prerequisites: As for 5.010.


Introduction to Design: Engineering method, problem identification, creative thinking, mathematical modelling, computer-aided design, materials and processes, communication of ideas, the place of engineering in society.

5.010 Engineering A**

Prerequisite: HSC Exam Percentile Range Required

S1 or S2 L4T2

Either

- 2 unit Science (Physics) 31-100
- 4 unit Science (multistrand) 31-100
- 2 unit Industrial Arts 31-100
- 3 unit Industrial Arts 11-100

Introduction to Engineering Design: Engineering method, problem identification, creative thinking, mathematical modelling, computer-aided design, materials and processes, communication of ideas, the place of engineering in society.

Introduction to Materials Science: The structure and properties of the main types of engineering materials, with emphasis on the way in which properties may be controlled by controlling structure.

*Students may also meet the prerequisites for this subject by taking 2.111 Introductory Chemistry as part of their first year program

**Students who wish to enrol in this subject in courses other than the full-time courses in Aeronautical Engineering, Civil Engineering, Industrial Engineering, Mechanical Engineering and Naval Architecture can make up for the lack of the prerequisite by work taken in Physics in the first half of the first year.
5.0101 Statics  
S1 or S2 L2T2  
**Prerequisites:** As for 5.010.  


5.0102 Introduction to Engineering Design  
SS L1T1  

Engineering method, problem identification, creative thinking, mathematical modelling, computer-aided design; materials and processes, communication of ideas, the place of engineering in society.

5.020 Engineering B  
S2 L4T2 or L/T6  

**Prerequisite:** 5.0101 or equivalent.  

Engineering Dynamics: Kinematics of a particle in the plane: rectilinear and curvilinear motion; motion relative to a translating frame of reference. Kinetics of a particle in the plane: Newton's second law; D'Alembert's principle; work, power and energy; belt and rope drives; gear trains. Virtual work. Kinetics of a system of particles: impulse and momentum; moment of momentum; impact. Fixed-axis rotation of a rigid body: angular momentum; equation of motion; moment of inertia; energy; centre of percussion. Steady mass flow: theoretical principles; Pelton wheel.


5.0201 Engineering Dynamics  
S2 L/T3  

**Prerequisite:** 8.170 or equivalent.  

Kinematics of a particle in the plane: rectilinear and curvilinear motion; motion relative to a translating frame of reference. Kinetics of a particle in the plane: Newton's second law; D'Alembert's principle; work, power and energy; belt and rope drives; gear trains. Virtual work. Kinetics of a system of particles: impulse and momentum; moment of momentum; impact. Fixed-axis rotation of a rigid body: angular momentum; equation of motion; moment of inertia; energy; centre of percussion. Steady mass flow: theoretical principles; Pelton wheel.

5.030 Engineering C  
S1 or S2 L2T4 or L/T6  

**Engineering Drawing:** Graphic communication. First and third angle orthographic projection and isometric projection. Descriptive geometry fundamentals and their application to engineering problems with special emphasis on visualization of problems and development of methods for their solution. Australian standard engineering drawing practice. Applications involving detail and assembly drawings, functional dimensioning and tolerancing.

and, one of the following options (determined by the course of study):

1. Production Technology  
(Mechanical, Industrial and Aeronautical Engineering and Naval Architecture students must take this option) Description and appraisal of the processes classified as: forming from liquid or solid, material removal, material joining, Machines. Analysis of the primary functions of the machine tools and an appraisal of their limitations. Principles of operation of common machine tools and illustrations of their use.

2. Introduction to Chemical Industry  
(Chemical Engineering and Industrial Chemistry students must take this option) The chemical industry in Australia. The role of professional societies. Special topics on the engineering and chemical aspects of the industry ie pollution control, energy sources, food and biochemicals and polymers, mineral processing, safety, etc. A visit to a factory in the Sydney area and the preparation of a short report after an introduction to information retrieval by university librarians.

3. Introduction to Metallurgical Engineering  
(Metallurgy students must take this option) History and significance of the exploitation of metals. Ores, mineral economics, mineral processing, and metal extraction and processing methods illustrated by reference to the Australian mineral and metal industries. Properties, uses and applications of metallic materials. The role of the metallurgist in industry and in processing and materials research, and in relation to conservation and the environment.

4. Introduction to Mining Engineering  
(Mining Engineering students must take this option) Mineral deposits; metallic, non-metallic and fuels. Elements of prospecting and exploration. Basic mining techniques. Mining phases; development, exploitation, beneficiation and withdrawal. Mining and the environment. Mining services. Relevance of basic science and engineering subjects to mining design and operations.

5. Introduction to Ceramic Engineering  
(Ceramic Engineering students take this option) The classification of materials. The nature of ceramics. The materials science approach. The scope of the ceramic industry. The origin, classification, physical properties and uses of clay minerals and other non-clay raw materials. Principal unit operations used in the ceramic industry. Drying and firing of ceramics, melt forming, pot forming and other forming procedures.

5.0301 Engineering Drawing  
S1 or S2 L/T3  

Fundamental concepts of descriptive geometry, including reference systems, representation of point, line and plane, fundamental problems of position and measurement. Application of descriptive geometry to certain problems arising in engineering practice. Special emphasis on ability to visualize problems and processes involved in their solution. Instruction in the correct use of drawing instruments and the application of drawing standards. Measurements and dimensioning. Orthographic and isometric projections.

5.0302 Engineering Drawing and Descriptive Geometry  
S1 or S2 L1/T3  

**Engineering Drawing:** Graphic communication. First and third angle orthographic projection and isometric projection. Descriptive geometry fundamentals and their application to engineering problems with special emphasis on visualization of problems and development of methods for their solution. Australian standard engineering drawing practice. Applications involving detail and assembly drawings, functional dimensioning and tolerancing.
5.034 Engineering Experimentation  F L'TI
Prerequisites: 5.072 (Statistics Strand).


5.042 Industrial Experience  L'T0
A minimum of three years of satisfactory industrial experience must be obtained concurrently with attendance in all BSc(Eng) courses. Students are required to submit to the School evidence from their employers confirming completion of the prescribed period of industrial training.

5.043 Industrial Training I  SS L'TO
Practical work in industry at the professional level to gain experience of people, industrial problems and relations, and process equipment. (Report submitted in Week 1 of session detailing involvement and experience gained prior to Year 3.)

For details contact Mr G. Crawford, Industrial Training Officer.

5.044 Industrial Training II  SS L'TO
Practical work in industry at the professional level to gain experience in design, development, investigation or management control systems areas in collaboration with professional engineers. (Report submitted in Week 1 of session detailing responsibilities and experience gained in vacation period between years 3 and 4.)

For details contact Mr G. Crawford, Industrial Training Officer.

5.051 Thesis  F L'T6
To be taken in year of completion of course.

For students in the full-time and part-time BE degree courses in the School of Mechanical and Industrial Engineering.

5.056 Mechanical Engineering  S2 L'T4
Prerequisites: 1.961 or equivalent, 10.2111, 10.2112.


Analyses of real systems: flow in adiabatic ducts, rotary machinery, steam plant, internal combustion engines, refrigeration, direct and unconventional energy conversion (fuel cells, thermoelectric power generation).

5.061 Technical Orientation  S1 L'T0
A series of lectures on technical topics arranged to provide an introductory background to engineering and its profession. Students are encouraged to develop their skill in observing and reporting on technical matters.

5.062 Communications  F L'T0

5.071 Engineering Analysis  F L'TI
Prerequisite: 10.022.


5.072 Statistics/Computing  S1 L'TS S2 L'T1
Prerequisites: 10.001 or 10.011.

Statistics: An introduction to probability theory. Random variables and distribution functions; the binomial, Poisson and normal distributions in particular. Standard sampling distributions, including those of \( X^2 \), \( t \) and \( F \). Estimation by moments and maximum likelihood; confidence interval estimation. The standard tests of significance based on the above distributions, with a discussion of power where appropriate. An introduction to linear regression.


5.073 Numerical Analysis/ Mathematics  F L'T1
Prerequisites: 10.022, 5.072 (Computing Strand).


5.074 Computing Science for Mechanical Engineers  S1 L'T1
Prerequisite: Computing strand of 5.072.

Hardware and software: Peripheral devices and communications equipment. Program documentation, debugging and testing. Improved
5.112 Mechanical Engineering Design II
F L1T2
Prerequisite: 5.111. Co- or prerequisite: 5.412.
Mathematical modeling and analyses, decision theory, computer programming for design applications. More advanced design analyses and drawing with individual and group project engineering experience.

5.113 Mechanical Engineering Design III
F L1\frac{1}{2}T4\frac{1}{2}
Prerequisite: 5.112 or 5.123.
Special analytical and experimental techniques of engineering design. Optimization, reliability analysis. Major and minor design projects.

5.121 Mechanical Engineering Design I
S1 L4T4 S2L3
Prerequisites:
HSC Exam Percentile
Range Required
31-100
2 unit Science (Physics)
or
4 unit Science (multistrand)
or
2 unit Industrial Arts
or
3 unit Industrial Arts

Introduction to Engineering Design: Engineering method, problem identification, creative thinking, mathematical modelling, computer aided design, materials and processes, communication of ideas.
Design for Manufacture: The implementation of design and its interaction with manufacturing processes. Manufacturing capabilities and tolerancing. Selection of materials and processes. Approximately 60 hours of practical training, including casting, welding, fitting and machining. Project involving appraisal of an existing design and a report recommending design improvements, materials, equipment items and processes to be utilized.
Introduction to Materials Science: The structure and properties of the main types of engineering materials, with emphasis on the way in which properties may be controlled by controlling structure.

5.122 Mechanical Engineering Design II
F L1T2
Prerequisites: 5.010 or 5.0101, 5.121, 5.421 or 5.040 or 5.020. Co-requisite: 5.422.
Application of design strategy to creative design projects. Modelling, analysis and design of basic engineering elements and systems with further engineering drawing practice. Review of current available mechanical technology and use of standard equipment items, codes and trade literature.

5.123 Mechanical Engineering Design III
S1 L2T1 S2 L1T2
Prerequisite: 5.122. Co-requisite: 5.423 or 5.412.
Mathematical modeling and decision making in design with applications. More advanced design analyses, component design and drawing with individual and group projects of an interdisciplinary nature.

5.124 Mechanical Engineering Design IV
The combination of any four subjects in the sequence 5.1241 to 5.1245.

5.1241 Creative Design Project
SS LOT3
Prerequisite: 5.123.
This subject is concerned with the development of a feasible solution to a specified problem. The execution of the project requires attention to problem identification, creative thinking, feasibility analysis and decision making.

5.1242 Design Technology
SS L1\frac{1}{2}T1\frac{1}{2}
Prerequisite: 5.123.
Aspects of mechanical engineering technology which form the basis for machinery design. Includes hydraulic power systems; circuits, pumps, motors and other equipment; welding technology; vibration control and isolation; advanced tolerancing; composite materials; fracture mechanics.
Laboratory deals with the evaluation of components for compliance with specification.

5.1243 Machinery Design Project
SS LOT3
Prerequisite: 5.123.
Development of the final design for a solution to a specified problem. Requires attention to design analysis, component selection, decision making, specification and the preparation of engineering drawings.

5.1244 Design Management
SS L1\frac{1}{2}T1\frac{1}{2}
Prerequisite: 5.123.
Aspects of design management which are necessary for the successful achievement of design objectives. Includes project scheduling and control, contracts, specifications, use of standards and codes, statutory controls, quality assurance, product liability, patent law, marketing.
Laboratory deals with the evaluation of components for compliance with specification.
5.1245 Computer Based Engineering Design S2 L2T1

Prerequisites: S1 of 5.123, 5.074, 5.423.


5.303 Mechanical Vibrations S2 L1T½

Prerequisites: 5.330, 10.022.


Multi-degree-of freedom systems. Systems with negligible damping, Dunkerley's formula. Introduction to beam vibrations.

5.324 Automatic Control Engineering F L2T1

Prerequisite: 10.602.


5.330 Engineering Dynamics F L1T1

Prerequisites: 1.001 or 1.951, 5.0101 or equivalent, 10.001 or 10.011.

Kinematics and kinetics of particles and rigid bodies in planar motion: absolute motion and motion relative to translating and rotating frames of reference; constraint and degrees of freedom; moment of inertia; friction, Newton's second law and its extensions, D'Alembert's principle, differential equations of motion, gyroscopic couple; work and energy, variational principles; impulse and momentum, impact.

5.331 Dynamics of Machines I F L1½T½

Prerequisites: 5.330, 10.022.


Mechanical Vibrations: Simple harmonic motion. One degree of freedom systems, free and forced vibration, transmissibility and motion isolation. Whirling of shafts.

5.332 Dynamics of Machines II F L2T1

Prerequisite: 5.331 or 5.333.


5.333 Dynamics of Machines S2 L2T1

Prerequisites: 5.330, 10.022.


5.334 Engineering Dynamics II SS L2T1

Prerequisite: 5.333 or 5.331.

Inertia effects in machinery: analysis of torsional and translational disturbances set up in machines containing one or more reciprocating masses; means of reducing or eliminating undesirable effects. Mechanical vibrations: two degrees of freedom systems: free and forced vibrations; applications; the undamped vibration absorber. Multiple rotor systems; free and forced torsional vibrations. Geared branched systems. Introduction to beam vibrations. Matrix methods.

5.343 Linear Systems Analysis S1 L2T1

Prerequisites: 5.330, 10.022

Models of physical systems: differential equations for physical systems including mechanical, electrical, hydraulic, thermal and pneumatic systems; linearization. System analysis techniques: solution by Laplace transform method. Transfer functions and block diagrams. System response: response of first and second order systems to impulse step, ramp, sinusoidal and periodic inputs; higher order system response; system stability, applications.

5.344 Feedback Control S1 L2T1

Prerequisite: 5.343.


5.3541 Engineering Noise I SS L2T1

Prerequisite: 5.073.

5.3542  Engineering Noise II
Prerequisite: 5.073.

5.412  Mechanics of Solids III
Prerequisite: 5.411, 8.259, 10.022.

5.423  Mechanics of Solids III/Materials
Prerequisite: 5.010 or 5.0101.

5.424  General Mechanics of Solids
Prerequisite: 5.423.
Inelastic behaviour of bars, beams, shafts and columns. Thick cylinders and composite cylinders loaded by internal and external pressures; rotating discs, contact stresses. Elementary concepts of fracture mechanics; stress intensity factor; fracture toughness; crack propagation.

5.421  Mechanics of Solids I
Co- or prerequisites: 5.010 or 5.0101.

5.422  Mechanics of Solids II/Materials
Prerequisite: 5.010 or 5.0101, 5.421 or 5.040 or 5.020, 10.001.

5.423  Mechanics of Solids III
Prerequisite: 5.422 or 5.411, 10.022.
Fatigue of biaxial and triaxial systems. Deflections of beams and structures. Statically indeterminate beams and structures. Introduction to theory of elasticity; stress, strain, torsion. Membrane analogy. Finite element stress analysis. Basic concepts; structural stiffness method; bar, triangular, rectangular and brick finite elements; force and displacement methods; development and use of computer programs.

5.444  Theory of Elasticity
Prerequisite: 5.412 or 5.423, 5.330, 5.611 or 5.622.
Mathematical foundations; analysis of stress; deformation and strain; equilibrium, motion and flow; fundamental laws of continuum mechanics; linear elasticity; viscoelasticity; applications.

5.454  Theory of Plasticity
Prerequisite: 5.423 or 18.413.
Analysis of stress, strain, strain rate; plastic stress/strain relations with description of experimental verification. Application of plasticity theory to a selection of problems including metal working processes such as extrusion and rolling and metallic friction and wear.

5.464  Structural Instability
Prerequisite: 5.423.
Buckling of perfect and imperfect columns; bending and buckling of thin flat plates; local instability and crippling of thin-walled columns. Buckling of monocoque cylinders and curved panels. Stiffened panels. Tension field beams.

5.612  Fluid Mechanics/Thermodynamics II
Prerequisite: 5.330, 5.611, 10.022.

Subject Descriptions
5.622 Fluid Mechanics/Thermodynamics  F L2T2
Prerequisites: 10.001 or 10.011; 1.951 or 1.001 or 1.011; 5.010 or 5.0101. Co-requisite: 5.330.
Comprises 5.6221, 5.6222, 5.6223.

5.6221 Introductory Thermofluids  S1 L2T2

5.6222 Fluid Mechanics  S2 L1T1

5.6223 Thermodynamics  S2 L1T1

5.623 Heat Transfer  SS L2T1
Prerequisite: 5.611 or 5.622; 10.022.
Conduction: steady one and two dimensional; unsteady one dimensional. Radiation: radiation properties; shape factor; compound surfaces. Convection: laminar and turbulent boundary layers and heat transfer; flow in ducts and pipes; natural convection. Design of heat exchangers.

5.624 Refrigeration and Air Conditioning  SS L2T1
Prerequisite: 5.611 or 5.622. Co-requisite: 5.623, 10.022.
Psychrometry and air conditioning calculations, heat load, estimates, vapour compression, absorption and air cycle refrigeration, refrigeration and air conditioning systems and components, cryogenic cycles.

5.633 Turbomachines  SS L2T1
Prerequisites: 5.611 or 5.622; 10.022. Co-requisites: 5.073, 5.663.
Dimensional analysis and experience charts, cavitation, thermodynamics of a stage, blade element theory of axial machines, thin wing theory, cascade data and design procedures, aerodynamic design of an axial machine, theory of centrifugal machines, design of a centrifugal machine.

5.6341 Viscous Flow Theory  F LT1½
Prerequisite: 5.611 or 5.622; 10.022.

5.6342 Lubrication  F LT1½
Prerequisite: 5.611 or 5.622; 10.022.
History of lubrication, types of bearings and bearing operation, nature of surfaces and their contact, modes of lubrication, properties of lubricants, viscous flow in pipes and channels, measurement of viscosity, infinitely long and short bearing approximations, one-dimensional analysis of infinitely long bearing, the infinite journal bearing, one-dimensional analysis of short bearing, other slider bearing geometries, the effect of end leakage, hydrostatic or externally pressurized bearings, squeeze films.

5.635 Convection Heat Transfer  SS L2T1
Prerequisite: 5.623.
Conservation of energy, momentum and mass. Friction and heat transfer on surfaces with laminar boundary layers: similarity and integral methods, influence of fluid Prandtl number, relations for Nusselt and Stanton numbers. Natural convection boundary layers. Turbulent boundary layers: laminar and turbulent sub-layers, law of the wall, analogies between friction and heat transfer. Friction and heat transfer inside tubes: laminar and turbulent flow, relation between friction and heat transfer.

5.643 Thermodynamics and Combustion  SS L2T1
Prerequisite: 5.611 or 5.622; 10.022. Co-requisite: 5.653.
General thermodynamic relations, ideal and non-ideal gases, statistical thermodynamic derivations of internal energy and entropy, ideal gas mixtures. Combustible fuels, combustion equations, internal energy and entropy of reaction, First law analysis of combustion, adiabatic flame temperatures. Second law analysis of combustion, chemical equilibrium, chemical kinetics and rate controlled reactions. Application of chemical equilibrium and reaction rate methods to combustion and emission problems. Detonation, deflagration and diffusion flames, mixing controlled reactions.

5.644 Solar Energy  SS L2T1
Prerequisite: 5.611 or 5.622; 10.022. Co-requisite: 5.623.
Radiation heat transfer, spectral distribution of solar radiation and effect of atmospheric absorption. Solar radiation data, total and diffuse
Subject Descriptions

5.653 Compressible Flow

Prerequisite: 5.611 or 5.622; 10.022.

Part 1, compulsory for Aeronautical Engineers and forms a component of 5.811 — (7 weeks only)
1. One dimensional steady flow: isentropic channel flow, normal shock waves, supersonic wind tunnels and diffusers, flow visualisation. 2. Two dimensional steady flow: oblique shock waves, Prandtl-Meyer expansions, nozzles, airfoils. 3. One dimensional unsteady flow: moving waves, reflections, explosions in ducts, shock tubes, method of characteristics, internal flows, piston and valve effects.

5.654 Hydraulic Transients

Prerequisite: 5.611 or 5.622; 10.022.

Mass oscillations in surge systems with various types of surge tanks. Stability of surge systems, comparison with experiment. Alliev's theory of water hammer, fast and slow closures, water hammer in pumping systems, circle diagrams.

5.663 Potential Flow Theory

Prerequisite: 5.611 or 5.622; 10.022. Co-requisite: 5.073.


5.664 Multiphase Flow

Prerequisite: 5.611 or 5.622; 10.022.


5.800 Aircraft Design I

Prerequisites: 5.122 or 5.111; 5.330; 5.422 or 5.411. Co-requisites: 5.423 or 5.412 and 8.259.

Session I: As for 5.123.

Session 2: Aircraft types, materials, loads, load factors. The design process. Design of members in tension, compression, bending, torsion, riveted, welded and bolted joints. Wing lift distribution, stressing, design and drawing of components, fittings.

5.801 Aircraft Design II

Prerequisites: 5.303, 5.412 or 5.423; 5.600 (full-time only); 5.811; 5.822. Co- or prerequisite: 5.812, 5.823, 5.831.

A co-ordinated course of lectures in aerodynamics, structures and operations leading to detailed design, calculation and drawing of an original aircraft configuration.

5.811 Aerodynamics I

Prerequisites: 5.300, 5.611 or 5.622, 10.022.


5.812 Aerodynamics II

Prerequisites: 5.073; 5.612 or 5.811; 5.303 or 5.331 or 5.334; 5.343


5.822 Analysis of Aerospace Structures I

Prerequisites: 5.330, 5.411 or 5.422, 8.259; 10.022. Co- or prerequisite: 5.412 or 5.423.

Equilibrium of forces: aerospace applications of plane frames and space structures. Beams; shear and bending stress distribution in thin-walled beams, closed-section thin-wall beams, tapered beams, beams with variable flange areas. Semi-monocoque structures; ribs and bulkheads. Deflection of structures; stresses due to torsion and shear in multi-cell tubes. Statically indeterminate structures, beams, trusses and frames. Flexibility method; elastic centre method; moment distribution method. Aircraft materials; dimensionless stress-strain data.

5.823 Analysis of Aerospace Structures II

Prerequisites: 5.412, 5.423, 5.822.

Structural instability: buckling of perfect and imperfect columns; bending and buckling of thin flat plates; local instability and crippling of thin-walled columns; buckling of monocoque cylinders and curved panels; torsion field beams. Stress functions. Shear lag. Warping of thin-walled open and closed section tubes. Torsional buckling. Sandwich construction and analysis. Composite materials, elementary analysis.

5.831 Aircraft Propulsion

Prerequisites: 5.611 or 5.622; 5.653 or 5.811.

5.932 Principles of Ship Design II

Prerequisites: 5.922, 5.933, 5.941.

Design of a vessel to provide characteristics of hull form, preliminary general arrangement, lines plan, hydrostatic curves, investigation of stability and trim, structural profile and midship section, capacity, freeboard, tonnage, floodable length (if applicable), power requirements, propeller design, investigation of vibration, rudder design and final general arrangement.

5.931 Principles of Ship Design I

Prerequisites: All subjects in Years 1, 2 and 3. Co- or prerequisites: 5.922, 5.933, 5.941.


5.9321 Principles of Ship Design III

Prerequisites: 5.911, 5.931, 5.953


5.934 Ship Design Project

Prerequisites: All subjects in Years 1, 2 and 3. Co- or prerequisites: 5.922, 5.933, 5.941.

Each student is required to perform the following design tasks and submit the results: 1. Rationale, specifications, weights, inboard profile. 2. Power, capacities, freeboard, trim, stability, stern gear. 3. Sectional area curve, lines drawing, preliminary midship section. 4. Hydrostatics, floodable length and stability curves. 5. Powering, propeller, systems-schematic drawing, detailed capacity. 6. Section modulus calculation, bulkhead, midship section, module concept. 7. Final weights, capacity drawing, operational data, and evaluation.

5.941 Ship Propulsion and Systems

Prerequisites: 5.911, 5.953.


*Design laboratory
Subject Descriptions

5.953 Ship Hydrodynamics S1 L2T1 S2 L1½T½
Prerequisites: 5.330; 5.611 or 5.622; 10.022. Co-requisite: 5.073.
1. 5.663 (Potential Flow Theory) in Session 1. 2. 5.952 (Hydrodynamics) in Session 2. Introduction and elementary methods applied to ship hydrodynamics. Dimensional analysis and experimentation. Motion of a spar buoy and derivation of coefficients in equation of motion. Linearized uncoupled motions of a ship. Non-linear aspects. Coupled heave and pitch motion of a ship. Ocean waves and their properties.

Graduate Study

5.045G Advanced Topic in Mechanical Engineering C2
5.046G Advanced Topic in Mechanical Engineering C2
5.047G Advanced Topic in Mechanical Engineering C2
Subjects which may be offered by a Visiting Professor for graduate credit.

5.073G Ordinary Differential Equations in Mechanical Engineering C3
Excluded: 5.072G and equivalent.
Solutions and their meaning; integration constants; linearity; special methods of solution; integration factors; variation of parameters; Euler, higher order linear equations; physical origins of ordinary differential equations and linear systems; linearization of engineering problems; stability of engineering systems.

5.075G Computational Methods in Mechanical Engineering I C2
Prerequisites: 5.072 (Computing strand) and 5.073 (Numerical analysis strand) or equivalent.

5.076G Computational Methods in Mechanical Engineering II C2
Prerequisites: 5.072 (Computing strand) and 5.073 (Numerical analysis strand) or equivalent.
Partial differential equations: finite differences and finite elements. Mathematical formulation of physical problems in mechanical engineering and their solution.

5.086G Digital Logic Fundamentals for Mechanical Engineers C3
Discrete logic elements; assembly design; misoriented design; support devices; microprocessor units.

5.087G Microprocessor Fundamentals for Mechanical Engineers C3
Microprocessor chips; system design; memory; past design; programming; applications.

5.088G Industrial Applications of Microprocessors C3
Prerequisite: 5.087G or equivalent. Excluded: 6.432, 6.433G, 6.651G and equivalent.

5.089G Elements of Industrial Automation C3
An introductory overview of the elements of Industrial Automation systems and the factors governing their use in industry.

5.151G Refrigeration and Air Conditioning Design I C3
Prerequisite: 5.624 or equivalent.

5.152G Refrigeration and Air Conditioning Design II C3
Prerequisite: 5.151G or equivalent.
Design of refrigeration equipment: compressors; throttling devices; condensers; evaporators. Cooling towers: evaporative condensers; air...

5.307G Dynamics I  
Excluded: 5.304G and equivalent.

5.308G Dynamics II  
Prerequisite: 5.307G or equivalent. Excluded: 5.305G and equivalent.

5.317G Industrial Robotics  
Prerequisite: 5.086G or equivalent.


5.318G Advanced Mechanism Analysis and Synthesis I  
Excluded: 5.315G and equivalent.

5.319G Advanced Mechanism Analysis and Synthesis II  
Excluded: 5.316G and equivalent.

A selection of topics from Planar mechanisms: kinematic analysis of complex mechanisms; kinematic analysis; kinematic geometry, precision position synthesis. Cams: basic and common curves; equations of motion; development of profile; determination of system geometry and mechanical properties; noise, wear, backlash and manufacture. Spatial linkages; structural analysis; closure equations; screw system algebra; special configurations.

5.328G Control and Modelling of Mechanical Systems I  
Prerequisite: 5.328G or equivalent.

Development of modelling techniques using both digital and analogue computation, with special emphasis on the representation of non-linearities. Typical examples of mechanical systems.

5.335G Vibrations  

5.336G Random Vibrations  
Prerequisite: 5.331 or 5.333 or equivalent.

Probability, vibration theory review, linear mechanical system response to random vibrations. Statistical characteristics: autocorrelation, spectral density, convolution, narrow band processing, consistency, applications.

5.345G Analogue Control Systems  
Prerequisite: 5.324 or 5.344 or equivalent. Excluded: 5.321G and equivalent.


5.346G Non-Linear Control Systems  
Prerequisite: 5.324 or 5.344 or equivalent. Excluded: 5.322G and equivalent.


5.401G Experimental Stress Analysis  
Grid technique; More fringe method; Strain gauges; photoelasticity; crack detection techniques. Class project.

5.415G Stress Analysis for Mechanical Engineering Design I  
Prerequisite: 5.412 or 5.423 or equivalent. Excluded: 5.421-4G and equivalent.

5.416G Stress Analysis for Mechanical Engineering Design II  
Prerequisite: 5.412 or 5.423 or equivalent. Excluded: 5.421-4G and equivalent.

Three topics in each subject selected from: Pressure vessels and enclosures. Analysis for fatigue. Plastic collapse, limit state design.
5.417G Mechanics of Fracture and Fatigue C3

Excluded: 5.428G and 5.429G and equivalent.


5.601G Computational Fluid Dynamics C3

Prerequisite: 5.076G or equivalent.


5.616G Internal Combustion Engines I C3

Prerequisite: 5.653 or equivalent. Co-requisite (for undergraduates): 5.643. Excluded: 5.615G and equivalent.


5.617G Internal Combustion Engines II C3

Prerequisite: 5.615G or 5.616G or equivalent.


5.621G Gasdynamics I C2

Prerequisite: 5.653 or equivalent.

5.622G Gasdynamics II C2

Prerequisite: 5.653 or 5.621G or equivalent.


5.631G Lubrication Theory and Design I C2

Hydrostatic lubrication, squeeze films, hydrodynamic lubrication, slider bearings, tilting pad thrust bearings, journal bearings, practical journal and thrust bearing design; air bearings, friction; wear; dry boundary lubrication; lubricant, bearing material selection; anti-friction bearings.

5.632G Lubrication Theory and Design II C2

Prerequisite: 5.634 or 5.6342 or 5.631G or equivalent.


5.653G Acoustic Noise I C2

Prerequisite: 5.3542 or 5.653G or equivalent.


5.654G Acoustic Noise II C2

Prerequisite: 5.3542 or 5.653G or equivalent.


5.655G Energy Conservation and System Design C3

Examination of some existing systems, assessment of their energy losses and their improvement by tuning. Alternative energy sources and their availability, energy utilization and efficiency in various systems. Environmental aspects, assessment of emissions, means of improvement. Economically viable energy technology under present conditions. Expected trends in energy technology in the short and long term. A number of case studies.

5.716G Advanced Heat Transfer I C3

Prerequisite: 5.623 or equivalent. Excluded: 5.718G, 5.719G, 5.721G and equivalent.


5.717G Advanced Heat Transfer II C3

Prerequisite: 5.623 or equivalent. Excluded: 5.712G, 5.713G and equivalent.

5.722G Solar Thermal Energy Design C3
Prerequisite: 5.721G or equivalent. Excluded. 5.720G and equivalent.

5.751G Refrigeration, Air Conditioning and Cryogenics I C2
Prerequisite: 5.624 or equivalent.

5.752G Refrigeration, Air Conditioning and Cryogenics II C2
Prerequisite: 5.751G or equivalent.
Thermodynamic principles, diagrams; properties of real fluids, refrigerants. Thermodynamics of change of phase; liquids and dilute solutions; mixtures of liquids, static flow processes with binary mixtures; rectification of a binary mixture; absorption refrigeration; resorption refrigeration. The vapour compression cycle; multi-pressure systems; analysis of compressor performance; condensers, evaporators and expansion devices; properties of the ideal refrigerant, reversed cycles; analysis and performance characteristics of the complete cycle; Air-cycle, steam-jet refrigeration; application to air conditioning design; cooling towers, mixtures of gases and vapours; psychrometry; evaporative cooling of air; dehumidification of air. Thermoelectric cooling; Seebeck, Joule, conduction, Peltier, Thomson effects; thermodynamic analysis; thermoelectric materials. Production of low temperatures; liquefaction and rectification of gases; magnetic cooling; application to research.

5.758G Refrigeration and Air Conditioning Applications C4

5.909G Project C9

5.912G Naval Hydrodynamics I C2
Prerequisite: 5.663 or 10.411A or equivalent.

5.913G Naval Hydrodynamics II C2
Prerequisite: 5.912G or equivalent.
Advanced treatment of topics selected from: ship waves and ship resistance; ship manueuvrability; ship motion and seakeeping; hydrofoil and propeller theory; aero and hydrodynamics of surface effect machines.

5.918G Project Report C18

5.936G Thesis C36

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Electrical Engineering and Computer Science

Undergraduate Study

6.010 Electrical Engineering I S1 or S2 L2T4
Prerequisite: Electricity and magnetism section of 1.961.
An orientation subject to acquaint students with the various areas and problems of Electrical Engineering. Some aspects of energy conversion and transmission; electronics; logic, number systems, computers and microprocessors; systems and circuit theory; probability, information and communication. Laboratory exercises and project work in these areas include instrumentation and device characteristics.

6.021A Circuit Theory I S1 or S2 L2T2
Prerequisites: 1.961 or equivalent, 6.010, 10.001.

6.021B Power S1 or S2 L2T2
Prerequisite: 6.021A attempted at an acceptable level.
An introduction to the transmission, distribution and utilization of electrical energy, including devices which use the interaction of electric, thermal and magnetic fields. Topics include a revision of three-phase circuit analysis, magnetic circuits, transformers, and basic electromagnetic energy conversion.

6.021C Electronics I S1 or S2 L2T2
Prerequisite: 1.982, 6.021A.
Principles of operation and low-frequency characteristics of PN diodes, bipolar and field effect transistors, thyristors and various optoelectronic devices. Transistor low-frequency small-signal equivalent circuits. Design and analysis of low-frequency Class A transistor amplifiers. Temperature effects. Device ratings and use of data sheets.
6.021D Computing  
Assembler programming and simple machine architecture. The Unix operating system: file system, processes, pipes, programming in the Shell command language. Data structures: lists, trees, recursion. Sorting: some basic algorithms for sorting arrays. Engineering applications of computers.

6.021E Digital Logic and Systems  
Prerequisite: 10.001.  
A hardware oriented subject concerned with the design of digital circuits for control and general computational purposes. Includes representation of digital information, combinational logic design, clocked circuitry and digital systems.

6.0311 Circuit Theory II  
Prerequisites: 6.021A, 10.111A, 10.1113, 10.1114, 10.2111, 10.2112. (Two of 10.1113, 10.1114, 10.2111 or 10.2112 may be taken as co-requisites). 6.021B, 6.021C (one of 6.021B or 6.021C may be taken as a co-requisite).  
Basic circuit concepts followed by basic system ideas such as order, state, linearity and typical system waveforms. Typical linear time invariant systems modelled and described by differential equations leading to use of Laplace transforms. Partial fractions, poles, zero and stability. Transfer functions and circuit responses both in time and frequency domain. Basic signal analysis. Fourier series. Modern filter design. Butterworth and Chebyshev filters. Transformation of low pass filter to high pass, bandpass and band stop filters.

6.0312 Utilization of Electric Energy  
A continuation of study of the utilization of electric energy commenced in 6.021B. Topics treated included dc machines, synchronous machines, three-phase induction machines, single phase machines, motor speed control, the thermal behaviour and rating of machines.

6.0313 Electronics II  

6.0314 Systems and Control I  
Prerequisite: 6.0311.  

6.0315 Electrical Energy  
Prerequisite: 1.972, 6.0312 attempted at an acceptable level.  
Aspects of the supply, control and utilization of electrical energy. Choice of voltage and supply configuration. Transmission line characteristics and calculations. Dielectric and thermal considerations of power equipment. Symmetrical fault calculations and protection for medium voltage systems — circuit breakers, fuses, relays, surge divertors and their application. Electrical methods of industrial heating: direct, induction, dielectric, arc furnace, etc. Light sources, their operation and efficacy.

6.0316 Electronics III  
Prerequisite: 6.0313. Co-requisites: 6.0311, 6.021E.  
Extension of 6.0313 to include tuned amplifiers, oscillators, large-signal electronics of bipolar and field-effect transistors, charge-control switching analysis for bipolar and field-effect transistors, power amplifiers, waveform generators and shapers, monostables, astables, and an introduction to digital electronics, with an increasing emphasis on integrated circuit realizations.

6.0317 Communication Systems I  
Prerequisite: 6.0311 Co-requisites: 10.361.  
Overview of information acquisition, transmission and processing. Aims to enable students not specializing in this field to understand the communication problems they are likely to meet in their career, and to provide a background if they intend to specialize in communications. Topics: analogue to digital conversion (sampling, quantizing, aliasing, pulse code modulation, delta modulation, time and frequency division multi-plexing) Modulation and demodulation (amplitude, frequency and phase modulation signal to noise ratio, noise figure, error probability, bandwidth, spectrum, intersymbol interference). Communication systems (transmission lines, radio wave propagation, antennas and arrays, modems, repeaters, equalizers, line and error coding).

6.0318 Microprocessor Systems and Applications  
Review of logic elements and binary codes. LSI technologies and devices. Microprocessor integrated circuits. Outline of system configurations. Microprocessor busses, control signals and timing. The fetch execute cycle and microprocessor operation. Programming models and instruction sets. Programming languages including addressing modes, arithmetic and I/O. Memory devices including RAM, ROM, EPROM Input/output devices and support chips. Parallel and serial I/O devices. Direct memory access. Interrupt systems. A structured approach to programming. System development software including monitors, PROM programmers, editors, assemblers and higher level languages. Development tools, logic state analysers, emulators. Laboratory work involving both hardware and programming experience, where typical applications are considered.
A course of lectures and laboratory work of one session's duration treating basic electrical measurements using null or deflection techniques with analog or digital presentation in the range from DC to an upper frequency limit where lumped circuit techniques begin to be inadequate.

Analysis and processing of continuous-time and discrete-time (digital) signals. Generalized Fourier analysis; convolution, correlation, energy and power density spectra. Signal distortion (linear and nonlinear) Hilbert transforms; analytic signals, signals in systems. Sampling and digital processing of analogue signals; the discrete Fourier transform (DFT), the fast Fourier transform (FFT) algorithm. Design of finite and infinite impulse response (FIR and IIR) digital filters. Analysis of random signals and noise; transmission through linear systems and nonlinear devices; signal-to-noise ratios, matched filters; estimation and measurement of power density spectra.

The design and development of reliable, high-quality hardware, from components to systems: product and procurement specifications; factors in choice of system configuration, materials, components, processes; prediction of reliability, availability, system effectiveness; cost-of-ownership optimization; maintainability; thermal design; mechanical design; redundancy; design reviews; fault-free analysis; failure mechanisms; failure mode analysis; Monte Carlo simulation; worst case and statistical design; sensitivity analysis and marginal testing, component screening, product development; life testing, environmental testing, non-destructive testing; quality control, attribute sampling.

A survey of materials and their technology for electrical and electronic devices and systems: Influence of molecular and crystallographic structure on the relevant properties of metals, semiconductors, glasses, ceramics, polymers, liquids and gases, with particular regard to their electrical, magnetic, mechanical, optical and transducing characteristics and their behaviour in electrostatic, magnetic, electromagnetic and thermal fields. Thick and thin film microcircuits. Superconductivity. Control of material properties through heat-treatment, additives, etc. Composite materials, joining and bonding techniques. Failure mechanisms and long-term stability. Effects of environment, corrosion, Stabilizing and protective treatments. Example applications to illustrate selection criteria for specific purposes, including both traditional applications as well as some of contemporary interest.

A subject emphasizing interconnected system operation, performance and control, synchronous machines, power system analysis, operation and stability; energy resources.

Topics include: machines and electrical drives, applications and control in particular using power rectifiers and thyristors; unified machine theory; application of symmetrical component theory to the operation of induction motors; industrial heating; frequency changing, electrical equipment for hazardous atmospheres. A program of experimental projects and design applications accompanies the lectures.

An elective concerned with aspects of design and testing of electrical equipment used in the power industry. Topics include: fields and materials as applied to high power apparatus; effects of high currents and high voltages; design of testing equipment; methods of measurement of hv and hc under steady state and surge conditions; effects of transients, earthing techniques.

Fundamental aspects of high frequency and microwave circuits and electronics: TEM transmission lines, with emphasis on coaxial and microstrip lines and components. Introductory antenna theory, phased arrays and wide-band antennas. Two-port characterization, scattering parameters and noise theory, with application to high frequency bipolar and field effect transistors.

The material extends 6.303 High Frequency Circuits and Electronics I into further areas of high frequency and microwave circuits and electronics: Plane wave propagation and application to terrestrial communications. Waveguide theory and optical fibre. Parametric amplifiers. Microwave sources, with emphasis on Gunn and impact diodes.

Theory and applications of some electronic devices and systems with an associated laboratory-design program. Analogue or digital integrated circuits introduced as appropriate. Topics may include: active filters, switched transistor application, phase locked loops, optical links, charge coupled devices, power electronics, design factors of large electronic systems.
6.323 Communication Systems IIA  S1 L2T3
Prerequisites: 6.0317*, 10.033, 10.361.
Theory and practice of modern analogue and digital communication techniques. Topics include: Digital communication (representation of signals as vectors, matched filter, correlation receiver, spectrum bandwidth, line coding, adaptive equalization), Information Theory (mutual information and entropy, source encoding, rate distortion function, channel capacity), Linear and nonlinear analogue modulation (AM, SSB, FM, etc, signal to noise ratios, characterization and effect of nonlinearities on transmitters and receivers, comparison); Aspects of transmission media relevant to telecommunication systems.

6.333 Communication Systems IIIB  S1 L2T3
Prerequisites: 6.0316, 6.0317.
The material of 6.0317 is extended and applied to communications systems other than telecommunications systems. Topics covered are radio and sound systems (AM and FM, psychoacoustics, electroacoustics), television (colour vision, teletext, etc), radar and sonar, navigation systems.

6.402 Biology and Physiology for Engineers  S1 L2T2
Bridging the language barrier between biology and engineering. Some problems and techniques of biology and medicine encountered by the biomedical engineer. Cells, tissues and organs, with emphasis on their system, function and characteristics.

6.412 Systems and Control II  S1 L2T3
Prerequisites: 6.0311, 6.0314.
The design and analysis and identification of single and multivariable feedback control systems as encountered in industrial processes. Emphasis on the synthesis of a prescribed dynamic performance via both transient and frequency domain methods. Consideration of the effects of nonlinearities on the system performance. Simulation and computer-aided design.

6.413 Digital Control  S2 L2T3
Prerequisites: 6.0314*, 10.033, 10.361.
The design and analysis of digital control systems. Consideration of problems in analog-digital and digital-analog conversion such as quantization, aliasing and finite word length and their relation to the design of numerical control algorithms. On-line digital identification and adaptive control techniques as illustrated by the self-tuning regulator, minimum variance and dead beat control structures.

6.432 Computer Control and Instrumentation  S1 L2T3
Prerequisites: 6.0314, 6.0316, 6.0318*.
Current practice in hardware and introduction to software techniques as applied to the implementation of control and instrumentation systems. Analog computers and associated circuit techniques. Transducers, actuators, controllers and special electro-mechanical devices as used in industrial instrumentation. Digital instrumentation. Hybrid devices and analog conversion. Sampling. Computer control organization and interfacing concepts. Microprocessor peripherals, including display systems, and magnetic data storage devices. Bus communication system for instrumentation. Programmable logic controllers. Standard process control configurations. Introduction to software systems for digital control applications. Computer control of processes via on-line languages. Includes a significant laboratory program aimed both at illustrating the lecture material and introducing new concepts.

6.483 Biomedical Engineering  S2 L2T3
Prerequisites: 6.0314, 6.0316, 6.402.
A course designed to introduce electrical engineering students to the practice of engineering techniques applied to the biological and medical fields. The lectures are supplemented by demonstrations and experimental work, and deal with medical instrumentation and measurement techniques and modelling of various types of biological systems.

6.512 Semiconductor Devices  S1 L2T3
Prerequisite: 6.0313.
Principles of operation and circuit characteristics of a range of semiconductor devices including bipolar diodes and transistors, MOS devices and circuits, charge-coupled devices, solar cells, light-emitting diodes, and semiconductor lasers. The lectures are supplemented by experimental work with these devices.

6.522 Transistor and Integrated Circuit Design  S2 L2T3
Prerequisites: 6.0313, 6.0316.
Analysis of bipolar and field-effect transistor structure and operation as far as necessary for the development of accurate models for use in computer aided circuit design. Ebers Moll (EM) and Gummel-Poon transistor models. Aspects of the solution techniques used in modern CAD programs such as SPICE. Integrated circuit design including special circuit and layout considerations to take advantage of the inherent component matching. Consideration of selected circuits, for example, high-performance operational and instrumentation amplifiers, multipliers and other non-linear circuits, voltage controlled oscillators, A/D and D/A converters, etc, as class interests suggest. Practical work will involve computation on the VAX11 system and may involve CAD graphics.

6.606 Computing Science Honours

6.607A Computing Hardware Architecture  S1 L3T2
Prerequisites: 6.613, 6.632, 6.642, 6.643 at an acceptable level.
A review of principles covering hardware technology, PMS (Processor-Memory-Switch) and ISP (Instruction Set Processor) notation, data representation, basic structures, instruction sets, control units, memory and input/output organization, performance evaluation. Case studies of high performance and vector machines, stack machines, associative and array processors, high level language machines, multiprocessor and multiprocessor and

*Pass Conceded not acceptable as prerequisite.
distribution systems, fault tolerant systems, data base machines, data flow and functional processors. A second strand is to be selected for a list which typically includes advanced switching theory, VLSI system design, computer graphics and high speed arithmetic systems.

6.670B Advanced Software Technology S2 L3T2
Prerequisites: 6.613, 6.632, 6.642, 6.643 at an acceptable level.
A selection of two topics from a list which normally includes programming language theory, program verification and programming methodology, artificial intelligence, computer system performance.

6.611 Computing I S1 or S2 L3 T3
Prerequisite: As for 10.001. Co-requisite: 10.001 or 10.011. Excluded: 6.600, 6.620, 6.021D.
Introduction to programming: design and correctness of algorithms and data structures; programming in a high level algorithmic language which provides simple, high level program control and data structuring facilities. Problem solving: basic ideas of problem solving; introduction to abstract structures used for computing solutions to problems.
Introduction to propositional logic, computing machinery, computer arithmetic, propositional logic, artificial intelligence, and the axiomatic semantics of a programming language.

6.612 Computer Systems Engineering S2 L2T3
Prerequisites: 6.021E or 6.631.

6.613 Computer Organization and Design S2 L2T3
Prerequisites: 6.631* or 6.021E*, 6.021D* or 6.620* or 6.621*. Excluded: 6.031B.
Bussing structures (asynchronous and synchronous); input/output organization; polling, interrupt and DMA control; parallel and serial device and processor communication and interfacing. Memory organization, CPU and control unit design. Processes: synchronization and communication. Microprocessor case studies.

6.621 Computing IIA S1 or S2 L3T2
Prerequisites: 6.611*, 10.001 or 10.011. Excluded: 6.620, 6.021D.
For those students who intend to take further subjects in computer science.
Expansion and development of material introduced in 6.611. Systematic program development: introduction to programming language semantics, reasoning about programs, program derivation, abstract programs, realization of abstract programs (conversion from abstract to concrete). Practice in programming in a high-level programming language. Data-structures: arrays, lists, sets, trees, recursive programming; introduction to computer organization: a simple machine architecture. Introduction to operating systems.

6.622 Computing Application and Software S1 L2T3
Prerequisites: 6.620 or 6.021D. Excluded: 6.646.
The use of computers for solving problems with a substantial mathematical and operational research content: includes use of some standard software packages. Topics selected from: discrete event simulation; pseudo random number generation; simple queuing theory; applications of mathematical programming; statistical calculations; critical path methods; computer graphics; artificial intelligence; symbolic computing using the PROLOG language.

6.631 Computing IIIB S1 or S2 L3T2
Prerequisites: 6.620* or 6.621* or 6.600 (CR) or 6.021D*. Excluded: 6.621E.
Assembler programming: programming in a low level machine oriented language in order to illustrate the mapping of higher level language constructs onto a typical machine and the interaction between operating systems and devices. Digital logic design: register transfer description of a tutorial computer, switching algebra, minimization, combinational logic design, integrated circuits, registers, counters, and other medium scale integration (m.s.i.) devices, clocked sequential circuits, computer arithmetic.

6.632 Operating Systems S1 L2T3
Prerequisites: 6.631* or 6.021E*, 6.641*.
Introduction to operating systems via an intensive case study of a particular system, namely the UNIX Time-sharing system which runs on the PDP-11 computer. Includes system initialization, memory management, process management, handling of interrupts, basic input/output and file systems. A comparison of UNIX with other operating systems. General principles for operating system design.

6.633 Data Bases and Networks S2 L2T2
Data base management systems: data models; relational and network structures; data description languages; data manipulation languages; multi-schema structures. Data integrity and security; recovery; privacy. Computer networks: economic and technological considerations; digital data transmission; error detection and recovery; network configurations; circuit switching, packet switching; communication protocols; current international standards; data compression; encryption and decryption.

6.641 Computing IIC S1 or S2 L3T2
Prerequisite: 6.620* or 6.600 (CR) or 6.021D* or 6.621*.

6.642 Design and Analysis of Algorithms S1 L3T2
Prerequisite: 6.641*.
Techniques for the design and performance analysis of algorithms for a number of classes of problems. Analysis of algorithms: order notation, recurrence equations, worst case and expected order statistics. Design
of efficient algorithms; recursion, divide and conquer, balancing; backtracking algorithms, branch and bound, dynamic programming; set manipulation problems; fast search algorithms; balanced optimal and multiphase trees; graph representations and algorithms; pattern matching algorithms. NP — complete problems. Design and specification of programs: modularization, interface design, introduction to formal specification techniques.

6.643 Compiling Techniques and Programming Languages
Prerequisite: 6.641.*
1. Language description: phrase structure grammars, Chomsky classifications, context-free grammars, finite state grammars, Backus Naur Form, syntax graphs, LL(k), LR(k), LAL(k). 2. Lexical analysis: translation of an input (source) string into a (machine independent) quasiterminal symbol string. Finite state recognizers. 3. Syntax analysis: top-down compilation for LL(1) grammars using syntax graph driven analysers or recursive descent. Bottom-up compilation for simple- and weak-precedence and LR(k) grammars. 4. Semantic analysis: program translation and code generation; attributed grammars. 5. Compiler generators: automatic generation of compilers for LALR(1) grammars.

6.646 Computer Applications

The use of computers for solving problems with a substantial mathematical and operational research content: includes use of some standard software packages. Topics selected from: discrete event simulation; a simulation language; pseudo random number generation; simple queueing theory; applications of mathematical programming: statistical calculations; critical path methods; computer graphics; artificial intelligence

6.647 Business Information Systems
Introduction to accounting systems — general ledger, debtors and creditors, auditing and internal system controls; models of business information systems; integrated business systems. System specification, system analysis, system design and implementation; testing and debugging. Managing a project team, project control. The COBOL programming language, file organization and design, sequential, indexed sequential, random, inverted, B-tree file organizations, file updating. Includes an invited lecture strand presented by guests from commerce and industry. A major project, written in COBOL, is undertaken as a team exercise.

6.649 Computing Practice†
Not offered in 1983.
For students majors in Computer Science who seek a programming career in government or commercial industry. Topics, related to current computing practice, include: Comparative study of computer hardware in current popular use; Comparative study of the ‘popular’ programming languages, e.g. COBOL, RPG, BASIC, FORTRAN, PL/1, APL. Job control languages. Data Preparation procedures. Key-board entry.

6.632 Industrial Electrical Machinery
Prerequisite: 1.001 or equivalent.
An applications-oriented introduction to the usage of electrical machinery in industry. Provides a basis of circuit-theory then considers the characteristics and selection of electrical machinery, their interface with the prime power supply, protection and electrical safety. Included in the course is a project illustrating the application of electrical engineering to other disciplines.

6.651 Electronics and Instrumentation
Prerequisite: 6.651R.
An applications-oriented introduction to electronics. Provides a basis of circuit theory and elementary electronics and then treats filters, frequency response, general amplifier characteristics, operational amplifiers and their use in instrumentation, power supplies, analog computers and their use in modelling non-electrical systems. Included is a project illustrating the application of electrical engineering to other disciplines.

6.652R Electrical Machinery and Supply
Prerequisites: 6.851R.
A user-oriented introduction to the usage of electrical power in industry, covering the characteristics and selection of electrical machinery, their interface with the prime power supply, protection, electrical safety and compliance with Australian standards. Included in the subject is a project illustrating the application of electrical engineering to various aspects of industry.

6.653 Analog and Digital Instrumentation
Prerequisites: 6.651 & 6.652.
Study of electrical and electronic equipment, emphasising analog and digital techniques applicable to the electrical measurement of non-electrical quantities. Open-loop and closed-loop control systems and some of their applications to instrumentation.

6.654 Electrical Engineering
Prerequisite: 1.001 or equivalent.
Extensive introduction to the theory and application of heavy current electrical engineering. Commences with the requisite circuit theory and then proceeds to consideration of the distribution of electrical power and the characteristics and selection of electrical machinery.

DC power supplies, three-phase AC supply, voltage regulation, transformers, AC and DC machines and their rating, a project illustrating the application of electrical engineering to various aspects of industry. Consists of two 2-hour tutorial or laboratory sessions per week each commencing with a structured mini-lecture. Detailed lecture notes are provided. Can only be counted with at least 3 other Level III Computer Science units. Pass conceded not acceptable as prerequisite.
6.855  Electrical Power Utilization  S2 T4

Prerequisite: 6.851 or 1.922.

Introduction to the distribution and utilization of electrical power in industry. The characteristics and selection of electrical machinery, its interface with the supply, protection and electrical safety; a project illustrating the application of electrical engineering to various aspects of industry. Consists of two 2-hour tutorial or laboratory sessions per week each commencing with a structured mini-lecture. Commences in week 4 of session 2.

6.902  Industrial Experience

A minimum of three years of appropriate industrial experience must be obtained concurrently with attendance in Course 3650. Students are required to submit to the School evidence from their employers confirming completion of the prescribed period of industrial training.

6.903  Industrial Training

Students enrolled in courses 3640, 3725 and 3720 must complete a minimum of 60 days industrial training. Students are required to submit to the School evidence from their employers confirming completion of the prescribed training.

6.911  Thesis

This is done in the last two sessions of the BE degree course. For full-time students, two hours per week in the first session, and three days per week in the second session are devoted to directed laboratory and research work on an approved subject under guidance of members of the lecturing staff. Part-time students may need to attend the University full-time in their final session or attend for one further part-time session. If facilities are not available for the thesis to be done at work, generally the thesis involves the design and construction of experimental apparatus together with laboratory tests. Each student is required to present a seminar, and a written thesis must be submitted on each project by the penultimate Monday in November or June.

6.921  Project

The project is done in the final stages of the BSc(Eng) course. It involves the design and construction of experimental apparatus together with laboratory tests. Each student is required to present a seminar and submit a written report. The project should represent the equivalent of a minimum 100 hours of directed laboratory work. If facilities are not available for this to be done largely at work, students may need to attend the University full-time in final session, or attend for one further part-time session.

6.931  Industrial Elective

6.932  Industrial Elective

6.933  Industrial Elective

Prerequisites: Students must be in at least the third stage of part-time BE course and be in full-time approved employment.

These electives normally represent one year of appropriate quality concurrent industrial experience for students in approved full-time employment. Students must submit evidence to the satisfaction of the Head of School: this could include a critical analysis and reporting of aspects of the student's experience and may require some attendance at the University for reporting sessions and the submission of a written report.

A maximum of three such electives can be taken and they may be substituted for certain subjects in course 3640 requirements. Students who have nearly completed course 3650 and wish to transfer to course 3640 would typically replace 10.033, one Technical Elective and one Professional Elective. An Industrial Elective cannot be claimed for work submitted for credit as 6.911 Thesis. Details of the procedure for registering and the requirements to be met can be obtained from the School of Electrical Engineering and Computer Science.

Graduate Study*

6.050G  Occasional Elective — Digital Signal Processing  S2 C3

Prerequisite: 6.042 or 6.341G or similar. Excluded: 6.150G (1980 version)

Advanced subject on the techniques and applications of digital signal processing which assumes students have had basic courses on discrete-time systems and signals (such as digital filters, z-transforms and discrete Fourier transforms) and elementary random processes. Application areas stressed are telecommunications, speech processing and seismic signal processing and possibly radar and sonar. Topics to be included are: interpolation and decimation of digital signals with applications in telecommunications (e.g., TDM/FDM transmitter/receivers); linear prediction with autoregressive (AR) and moving average (MA) parameter estimation applied to spectrum estimation and speech analysis; least mean-square adaptive and predictive deconvolution, (including Wiener and Kalman filtering), with applications in impulse response restoration and the removal of noise and echoes in communication systems and seismic signals; short-time Fourier analysis and synthesis and homomorphic signal processing for speech and seismic signals; two-dimensional digital signal processing with applications in image de-blurring and data compression. Practical work includes computer assignments and the use of special purpose, programmable hardwaresignal processors.

6.053G  Advanced Mathematics II  C3

Mathematical techniques applicable to electrical engineering problems. Topics may include: an introduction to state variable theory, Green’s functions, operator theory.

6.054G  Numerical Computation  C3

Topics include numerical solution of partial differential equations and approximation theory.

* Subjects which do not have a session notation are not offered in 1983
6.160G Field Theory in Electrical Engineering C3
Revision of metric transformations and co-ordinate systems. Solution of the Laplace and Poisson equations in the eleven Eisenhart co-ordinate systems in three dimensions. Extension to selected cases of the diffusion and wave equations.

6.161G Field Mapping C3
The Laplace and Poisson equations: complex variable techniques for 2-dimensional solutions. Graphical, experimental and numerical methods for 2- and 3-dimensional problems. The Helmholtz equation. Cases where solutions may be based on the Laplace equation. Review of selected examples in electrical engineering.

6.164G Microwave Antenna Theory and Applications C3
Co-requisite: 6.167G or similar

6.167G Propagation and Transmission of Electromagnetic Waves S1 C3

6.169G Microwave Circuits: Theory and Techniques S2 C3
Co-requisite: 6.167G or similar.
Properties of microstrip transmission lines and the theory and design of microwave integrated circuit components and systems. Includes: microwave measurement techniques, waveguide components and applications.

6.170G Microwave Electronics S2 C3
The principles and applications of solid state and electron tube microwave devices. Includes: Gunn, IMPATT, TRAPATT and PIN diodes; mixers and detectors; space charge waves; travelling wave tubes, klystrons and crossed-field devices.

6.224G Electrical Insulation Engineering C3
Co-ordinated approach to the design of insulation systems for application at high and low voltages. Basic principles, experimental and theoretical factors involved in the establishment of particular design criteria. Practical situations and demonstrations.
6.225G Electrical Discharges and their Technical Applications C3
Prerequisite: 6.202 or 6.222 or equivalent.
Low and high pressure gaseous discharges, both naturally occurring and laboratory produced. Methods of production of discharges. Diagnostic techniques. Arcing in circuit breakers and methods of control and extinction. Other technological applications of electrical discharges.

6.226G Electrical Apparatus Design C3
Prerequisite: 6.222 or equivalent.
Based on fundamental concepts and in which thermal, electric and magnetic properties on a macroscopic scale and their inter-relationships are displayed in relation to the design of electrical and electronic apparatus.

6.227G Assessment of Insulation Performance in Electrical Plant C3
Prerequisite: 6.202 or 6.222 or equivalent.
Demonstrations and projects to support the lecture material.

6.228G Power System Equipment C3
Prerequisite: 6.202 or equivalent.
Includes study of the operating characteristics and major design features of the items comprising a power system, including alternators, power transformers, voltage and current instrumentation equipment, oil and gas insulated circuit breakers, isolators, overhead lines and components. Lightning arresters and protection for lines and substations. Power and line coupling capacitors, bus bars, connectors, cables and bushings. Line carrier systems.

6.234G Power System Protection C3
Prerequisite: 6.202 or equivalent: credit level or higher.
The theory and application of protective devices and systems, related to the protection of transmission lines, transformers, busbars and generators.

6.246G Power System Operation and Control C3
Prerequisite: 6.247G.

6.247G Power System Analysis C3
Prerequisite: 6.203 or equivalent.

6.248G Power System Planning C3
Prerequisite: 6.247G.
World energy resources and alternative methods of generation and transport of energy. Sources of electrical energy on a large scale. Economic evaluation of projects. Planning the location and rating of power stations. Transmission system planning: voltage levels, fault levels, basic network interconnections. High voltage DC transmission: comparison with high voltage AC. Problems in planning distribution systems (brief treatment only). Industrial system planning. Power system reliability.

6.249G Dynamic Performance of Power Systems C3
Prerequisite: 6.247G.
The dynamic behaviour of power systems. Modelling of power system components, simulation of their dynamic behaviour by computer program, and design of control systems for alternators in power systems.

6.250G Power Elective I C3
As for 6.350G.

6.251G Power Elective II C3
As for 6.350G.

6.256G Underground Systems C3
Prerequisite: 6.202 or equivalent.
A specialized course relating to developments and contemporary practises in underground systems for the transmission of electrical energy. The thermal and electrical properties, rating and economics of cable systems and their accessories for a range of voltages from the reticulation level through to transmission voltage levels.

6.257G Electric Power Distribution Systems C3
Prerequisite: 6.203 or equivalent.
The engineering problems of distribution systems including industrial power systems, stressing the electrical distribution system as an entity. Distribution system planning. Overall design criteria. Coordination of thermal ratings. Protection of distribution network: cables and overhead lines. Design and performance of individual plant items. Particular problems of urban and rural distribution systems. Demonstrations and project work.

6.336G Digital Communication Networks S2 C3
Prerequisites: 6.343G or similar. Some familiarity with probability, random processes, queuing theory and Markov processes is an advantage.
Provides an up-to-date coverage of key techniques and their underlying principles in two important areas of digital communications, namely: Computer Communication Networks including capacity assignment.
time delay versus cost trade-offs, information flow control, queueing theory, concentration and buffering in store-and-forward networks, message and packet switching algorithms, protocols, routing and network topology. Random Access Techniques including time-division multiple access, ALOHA systems, spread spectrum systems, direct sequence systems, interference rejection, jamming margin, error correction techniques using block and convolutional codes.

6.337G Sound Broadcast Systems
Prerequisites: 6.167G, 6.341G or similar.
Theory and practice of sound broadcasting systems. Topics: Specifications, coverage, bandwidth, power, AM radio: studio equipment, sound equipment, medium and shortwave systems, transmitters, antennas. FM radio: stereotransmission, studio equipment, transmitters. Recording equipment: links, etc. Distortion: distortion in recorders, distortion and noise in various parts of the transmission path.

6.338G Television Systems
Prerequisites: 6.167G, 6.341G or similar.

6.339G Electroacoustics
Aspects of acoustics which are relevant to sound engineering. Includes: scalar wave equation, plane and spherical waves, plane piston as a sound source; analysis of mechanical and acoustical lumped systems; loudspeaker and microphone types, practical aspects; room acoustics; sound recording; the ear, loudness and annoyance, underwater sound; introduction to sound in solids.

6.340G Communication Electronics
Modern electronics as used in communication systems. Includes: analogue and digital integrated circuits (including ADCs, DACs PLLs, VCOs, multipliers, etc, and a survey of the main digital IC families); high-frequency and noise performance of active and passive circuits, particularly those using transistors; transistor ratings; microwave ICs; microstrip, thick film, and thin film circuits; CCDs and SEW devices, and their use in signal processing; introduction to active and other filters; factors involved in the design of large electronic systems. Prerequisite or co-requisite for 6.170G and 6.345G.

6.341G Signal Analysis
Excluded: 6.042, 6.484G, 32.621G or similar.
The fundamental aspects of the analysis and processing of digital and analogue signals, with emphasis on random signals and noise. Includes: Generalized Fourier analysis; convolution, correlation, energy and power density spectra. Hilbert transforms; analytic signals and signals in systems. Sampling and digital processing of analogue signals, including digital filtering. The discrete Fourier transform (DFT) and the use of fast Fourier transform (FFT) algorithms. Random processes, the transmission of signals and noise through linear systems and non-linear devices. Poisson and Gaussian random processes. Estimation and measurement of power density spectra. Prerequisite or co-requisite for 6.337G, 6.338G, 6.343G, 6.344G, 6.345G and 6.349G.

6.343G Digital and Analogue Communications
Prerequisite: 6.341G or similar.
Fundamentals of modern telecommunications systems, including theoretical and practical aspects of: linear and non-linear analogue modulation (AM, SSB, FM, etc), digital signal transmission, pulse code modulation, computer communication, effects of noise in analogue and digital systems, error control, multi-channel systems (FDM, TDM, etc), synchronization, relay systems, optimum transmitters and receivers. Prerequisite or co-requisite for 6.347G and 6.349G.

6.344G Communication Theory
Prerequisite: 6.341G or similar.
An advanced subject, mainly for potential research workers, concerned with the theoretical aspects of information transmission and the design of optimum analogue and digital communication systems. Topics: Information theory of discrete and continuous systems, channel capacity, rate distortion theory and fidelity criteria. Information theory for two-way communication. Optimum detection and estimation of analogue and digital signals using maximum likelihood (ML), maximum a posteriori (MAP), minimum mean-square error (MMSE), etc criteria. Includes Wiener and Kalman filtering, and optimum detection and estimation of linear and non-linearly modulated, analogue or digital signals.

6.345G Analogue and Digital Filters
Prerequisites: 6.340G and 6.341G or similar.
Theory and practice of modern filter design, particularly the design of active and digital filters. Includes: overview of modern filter methods, the approximation problem for analogue and digital filters, active filters and digital filters. In addition: classical LC filters, sensitivity and parasitics, equalizer design, adaptive and/or non-linear equalization, mechanical filters, other digital signal processing techniques.

6.347G Digital Communications
Prerequisite: 6.343G or similar.
Advanced and unified treatment of digital transmission systems. Principal topics are: Baseband ASK digital communication Systems including inter-symbol interference, eye patterns, power spectral density, probability of error estimates and bounds, Nyquist criterion, partial response signals (eg simple and modified duobinary). Digital Modulation including various types of shift keying modulation such as amplitude ambiguity, amplitude and phase, offset amplitude and phase, and frequency and minimum shift keying (ASK, APSK, QPSK, PSK, FSK and MSK). Power spectral density, probability of error, signal constellations and system comparison. Line Coding including linear codes, alphabetic codes, non-alphabetic codes and their comparison. Equalization including linear, non-linear, adaptive and automatic equalization and Viterbi decoders.

6.348G Optical Communications
Co-requisites: 6.167G, 6.343G or similar.
Optical communications, with emphasis on optical fibre communication. Includes: theory of optical fibre propagation, cable technology, LED and laser sources, optical detectors and receiver design, measurements on optical fibres, system performance, wide-band systems and future systems, applications to power and military systems.
6.349G Radar and Navigation Aids S2 C3
Co-requisites: 6.167G and 6.341G or similar.
Theory, performance and applications of various electronic location and navigation systems. Includes: review of basic radar theory, CW radar, pulse radar, pulse-Doppler radar, tracking radar, detection of radar signals in noise, error analysis, clutter suppression, multiple-target detection, theory of high-resolution radar, synthetic aperture radar, terrain-avoidance and terrain-following radar; aircraft landing systems; DME; radio ranges; hyperbolic navigation systems, Doppler navigation, satellite navigation.

6.350G Solid State Electronics Elective C3
This syllabus changes from one occasion to the next, allowing presentation of a modern topic at graduate level, particularly by visiting academics of eminence.

6.373G Advanced Semiconductor Devices C3
Theory and characteristics of semi-conductor devices, notably bipolar transistors, field effect transistors, and thyristors. The course discards many of the simplifications and generalizations made in the undergraduate treatment of transistors.

6.375G Integrated Circuit Technology S2 C3
An account of the modern planar technology of semiconductor device and integrated circuit fabrication.

6.376G Reliability Engineering S1 C3
Prerequisite: 10.361 or equivalent. Excluded: 6.044.
Principles and applications of the reliability engineering concept, with equal emphasis on design analysis, developmental engineering, calculation and prediction of reliability and associated parameters, quality control, failure mechanisms, reliability testing, economic basis of reliability and on reliability improvement techniques. Applicable to both electronic and non-electronic systems.

6.377G Integrated Circuit Design S1 C3
Prerequisite: 6.0316 or equivalent.
An advanced treatment of the design of integrated circuits with emphasis on the relationships between technology, device characteristics and circuit design. Includes properties and modelling of bipolar and MOS circuit components, circuit analysis and simulation, layout rules, analog functions such as operational and power amplifiers, multipliers, D/A and A/D converters. Digital circuits include gates, compound functions, RAM, ROM, speed and power analysis. Economics and yield analysis for MSI, LS1 and VLSI devices.

6.378G Solar Energy Conversion C3

Harnessing of sunlight by using solar cells to convert it directly to electricity. The properties of sunlight and of the semiconductors used in solar cells are reviewed and their interaction described. Factors important in the design of solar cells and the current technology used to produce cells. Likely future developments in this technology. System applications ranging from systems which are currently viable economically to residential and central power systems which may be a possibility for the future.

6.380G Data Acquisition and Analysis in Remote Sensing S1 C3
Prerequisites: 10.361 or similar.
Techniques for extracting information from remotely sensed data with particular emphasis on satellite imagery. Topics taken from: nature and characteristics of earth resources and related satellites, satellite sensors and data formats; image enhancement techniques; image classification methods; including clustering, classification and feature selection; image classification methodologies; new horizons in remote sensing image analysis.

Prerequisite: 6.3806 or similar.
A detailed treatment of computer methods for implementing analytical techniques used with remotely sensed data. Topics include: software requirements for image enhancement and analysis; structure and capabilities of the software package LARSYS, ORSER, BICEP, LASP; implementation of classification methodologies; introduction to image processing hardware and associated operating systems; interactive image processing.

6.433G Applied Microprocessor Design S2 C3
Prerequisite: 6.060G.
Aims to familiarize the systems designer with the architecture and applications of the rapidly expanding family of microprocessor hardware support devices for dedicated control functions. Topics include: review and comparison of bus protocols of common systems; architecture, programming and applications of specialized support devices and peripheral control chips; single chip microprocessors, architecture and applications to dedicated control tasks.
Laboratory work includes individual design projects involving typical systems application of these devices.

6.452G Feedback Control I S1 C3
Excluded: 6.412.
An intensive series of lectures and tutorials for upgrading at graduate level those students who are deficient in the basics of control. Material covered includes both time and frequency domain approaches to the design of control systems for linear, continuous single input/single output plants. Topics include: Nyquist stability theory; root locus diagrams; Nichols charts; state feedback and observer design. Computer-aided design techniques are applied where appropriate.
6.453G Computer Methods of Optimization C3
Use of digital, analog and hybrid computers for the solution of optimization problems in engineering. Includes: constrained and unconstrained minimization, review of search techniques, optimal control and the two point boundary value problem, linear quadratic problems and minimum time schemes. All methods are implemented on the computer.

6.455G Systems Identification and Modelling S1 C3
Develops the basic techniques used in System Identification and Modelling. Topics include: representation of static and dynamic systems; parameter estimation, Maximum Likelihood Estimation methods; nonparametric methods; time series; spectral methods; pseudo random noise methods; recursive methods; least squares; analysis of residuals; accuracy, goodness of fit; adaptive systems (online estimation).

6.456G General Concepts in Formal System Theories C3
Provides fundamental concepts common to many formal abstract system theories reflecting different aspects of the physical systems, which are their bases.
Input-output, state transition, fuzzy, axiomatic-hierarchical and evolutionary representatives will be reviewed with discussion based on differential and discrete models, and some form of pulsed automatica.

6.457G Cybernetic Engineering S1 C3
The fundamentals of cybernetic engineering, the genesis of cybernetics, machines modelled on life and the evolution to present day robots. Includes: biological information transmission (biochemical coding and control, genetic and neural), pattern recognition learning systems and perception, sub-systems of the human brain, and functional descriptions for a Cybernetic Brain, an introduction to industrial manipulators and third generation robots; self-organizing control for manipulators and robots and the social consequences of flexible automation with industrial robots.

6.458G Decision and Syntactic Systems for Digital Pattern Recognition S2 C3
Concepts and techniques in decision-theoretic pattern recognition systems with an in-depth study of both non-parametric and parametric methods. Includes: pattern, feature and classification spaces, feature selection, linear discriminant functions and training algorithms; precession linear, discriminant functions; decision rules; the Bayes framework, approximation of probability densities; clustering and dimensionality reduction. Structural pattern recognition, including such topics as formal linguistics, primitives, grammar and syntax analysis as a recognition procedure.

6.459G Control Computing C3
Prerequisites: 6.412 and 6.021D.
Review of fundamental principles of digital and analog computation with special reference to the solution of engineering and control problems. Topics include: small computer systems architecture; process control interfacing techniques; machine language programming; operation of hybrid computers and their applications.

6.460G Real Time Computing and Simulation S2 C3
Simulation of industrial processes by the use of real-time modelling techniques is now an acceptable method for the study of complex industrial plant, eg, fossil-fired boiler-turbines, 747 aircraft, nuclear reactors. The fundamentals of real time computing, with examples carried out on an EAI 2000 — PDP-11 computing system. Analog, digital and hybrid simulation techniques as applied to the solution of lumped and distributed parameter systems.

6.464G Digital Estimation, Prediction and Control S1 C3
Prerequisites: 6.452G, 6.472G.
Topics selected from: optimal linear filtering, recursive filters, Kalman filters; optimal smoothing algorithms; and least squares estimation. The real time digital implementation of the algorithms is emphasised in the laboratory using both a PDP11/34 minicomputer and Motorola 6800 microcomputer. Specific applications relate to on-line digital control and signal processing.

6.466G Computer-Aided Design of Multivariable Control Systems C3
Many control problems result from interaction between key variables and can only be solved by a multivariable analysis. This can be approached in the time domain, eg the linear quadratic regulator, or the frequency domain, eg the inverse Nyquist array. Methods available, their limitations and strengths, and integration and comparison of the time and frequency approach. Laboratory work using interactive programs on the Department's Varian computer. Topics include: time domain methods, pole shifting, state decoupling, optimal control, frequency domain methods, inverse and direct Nyquist methods, characteristic locus.

The fundamentals of image processing including such topics as visual perception and the image model; uniform and non-uniform sampling and quantization; image transforms; image enhancement, sharpening and smoothing; image restoration and least squares filtering; image encoding, mapping, quantizing and encoding, image segmentation and description, grammars, languages and similarity. Material oriented towards scene analysis and world models for industrial robots including scenes; labeling; shadows; shape information; structural descriptions and representing knowledge; computer vision for robots.

6.468G Computer Display Systems and Interactive Instrumentation S2 C3
Prerequisite: 6.060G.
Man-machine-process communication and control, and associated microprocessor based instrumentation. Review of appropriate analog and digital technology. Microcomputer hardware and programming for interactive communication using both machine and high-level languages. Display devices, operating principles and performance limitations. Hardware and software techniques for computer generation and processing of pictures. Colour and movement. Interactive design and graphics creation. The geometry of transformations and projections. Light pens and other input devices. Non-visual communications including speech input-output.
Engineering

6.470G Advanced Topics in Control — Robotics, Automation and Productivity Technology

Principles of Robotics relevant to future trends in automating the manufacturing process. Such aspects as arm configurations, dynamics and control with relevant sensing methods; image understanding for inspection, assembly and control together with trends in artificial intelligence for Robotics are discussed.

6.471G Systems and Control Elective — Compartmental System Analysis

Compartmental system analysis, an important branch of system theory and design, serves to unify modelling and analysis in many diverse fields. It has wide application in pharmacokinetic, metabolic, ecosystem and chemical kinetic modelling, and in the future will be applied increasingly to engineering systems. Topics include: classes of compartmental structure, fundamental properties; rate processes; interred parameters, input-dependent kinetics; optimal input design; algorithms for identification and control.

6.472G Feedback Control II

Prerequisite: 6.452G. Excluded: 6.412, 6.413.

Models of Linear and Nonlinear Systems including lumped and distributed systems, continuous and sampled data systems. Fitting parameters to linear models by batch and recursive methods; State estimation. Systems with time delays and types of nonlinearities. Introduction to digital process control including algorithms for 3-term controllers, dead beat response systems and optimal control.

6.481G Biology and Physiology for Engineers

Excluded: 6.402

Bridging the language barrier between biology and engineering. Some problems and techniques of biology and medicine encountered by the biomedical engineer. Cells, tissues and organs, with emphasis on their system, function and characteristics.

6.484G Biological Signal Analysis

Excluded: 6.341G.

Digital computer methods of extracting information from biological signals using filtering and averaging, expectation density functions, correlation functions, spectral analysis and other techniques. Methods of constructing models of biological systems.

6.485G Medical Instrumentation

A critical survey of the theory and practical applications of medical transducers and electromedical equipment in common use in hospitals and research laboratories.

6.500G Computer Science Elective — VLSI System Design

Prerequisites: 6.021E, 6.631, 6.0313 or similar. Excluded: 6.607A.

Introduction to the design and implementation of very large scale integrated systems, using NMOS technology. Basic information about integrated devices, circuits, digital subsystems and system architecture. Design procedures, including structured design methodology, symbolic layout, use of scalable design rules, delay time estimates. Fabrication procedures and computer aided design. Scaling effects. A design project in LSI is an integral part of this course. Selected projects are fabricated and returned to students for testing and bonding.

6.651G Digital Electronics

Prerequisite: 6.021E and 6.0313, or 6.631.

Digital circuits and principles, sub-system organization, microprocessors, memory technology, interface design, integrated circuit technologies and characteristics.

6.654G Digital Systems

Prerequisite: 6.021E. Excluded: 6.612.

Computer architecture, implementation and realization. Use of hardware description languages for the analysis, design and specification of arithmetic units, storage and control Microprogramming techniques.

6.655G Computer Organization and Architecture

Basic principles of computer architecture. A comparative study of the architectural features of a number of significant computer systems.

6.656G Software Systems A

Prerequisite: 6.641*. Excluded: 6.643, 6.602D.

A theoretical and practical basis for subject matter within the following areas: compiler organization: data structures, table organization, list structures, trees, stacks, etc, lexical analysis, syntax analysis, code generation, code optimization. Portability: solutions to the problems of moving software systems between different machines. Compiler compilers: translator writing systems designed to provide facilities to aid the compiler writer.

6.657G Software Systems B

Prerequisite: 6.631* and 6.641*. Excluded: 6.632, 6.602B.

Overview of operating systems, sequential processes, concurrent processes, processor management, store management, scheduling algorithms, resource protection, data communication case studies.

6.659G Data Bases and Networks

Prerequisites: 6.641*

Data management, compression techniques, redundancy coding; indexing; hashing encryption and decryption. Data base management systems; data description languages; data manipulation languages; integrity and recovery. The relational view of data. Computer networks; digital data transmission; communication protocols; circuit switching; packet switching; packet routing; network performance. Current international standards and practice. Distributed data bases.

6.660G Design and Analysis of Algorithms


Techniques for the design and performance analysis of algorithms for a number of classes of problems. Analysis of algorithms: order notation, recurrence equations, worst case and expected order statistics. Design of efficient algorithms: recursion, divide and conquer, balancing; backtracking algorithms, branch and bound, dynamic programming; set manipulation problems; fast search algorithms, balanced optimal and multiway trees; graph representations and algorithms; pattern matching algorithms. NP complete problems. Design and specification of programs: modularization, interface design, introduction to formal specification techniques.

*Pass Conceded not acceptable as prerequisite
6.661G  Business Information Systems  S1 C3

6.662G  Computing Practice  C3
For students majoring in Computer Science who seek a programming career in government or commercial industry. Topics, related to current computing practice include: Comparative study of computer hardware in current popular use: comparative study of the "popular" programming languages, eg COBOL, RPG, BASIC, FORTRAN, PL/1, APL. Job control languages. Data Preparation procedures. Key-board entry. Verification. Word processing; report preparation; documentation. Social implications of computing. Professional responsibilities and ethics. Project management, software engineering; psychology of computer programming.

6.909G  Project  C9
6.918G  Project Report  C18
6.936G  Thesis  C36

7.224R  Operational Management  F L1T½

Civil Engineering

Undergraduate Study

8.001  Industrial Training
Prerequisite: 8.670. Requirement for the Bachelor of Engineering Degree.
Students are required to complete a minimum of sixty working days of approved industrial training and submit a report on this training before the fourth week of Session 1.

8.002  Industrial Experience
Requirement for the Bachelor of Science (Engineering) degree.
A minimum of three years of satisfactory industrial experience must be obtained concurrently with attendance in the course. Students are required to submit to the School an enrolment in the final year evidence from their employers confirming completion of the prescribed period of industrial training.

8.011  Special Projects  SS LOT3
Equal to one technical elective.
A minor thesis or research project on any approved topic.
*Pass Conceded not acceptable as prerequisite.

Mining Engineering

Undergraduate Study

7.214R  Mine Economics and Planning  F L2T1
8.012 Elements of Architecture SS L2T1
Introduction concerning the influence of structural technique in the past on architectural styles. Effect of modern structural engineering systems on architecture. Responsibilities of the structural engineer as a consultant.

8.013 Bridge Engineering SS L1½T1½
Prerequisite: 8.1622.
An introductory subject in the design of road and railway bridges. Types of bridges, economic spans and proportions. Design loads and codes. Aspects of the design of steel, reinforced concrete, prestressed concrete, and composite bridges by empirical, elastic and limit state methods.

8.014 Computer Applications in Civil Engineering SS L2T1
Prerequisites: 8.2733, 8.351 or 8.362, 8.360.
Advanced programming techniques such as the use of tapes, discs and plotter. Applications of advanced computational methods to structural analysis, geotechnology and flow problems.

8.015 Road Engineering SS L2T1
Prerequisite: 8.671. Co-requisite: 8.2732.

8.017 Transportation Engineering SS L2T1
History, development and characteristics of modes of transport. Fundamentals and evaluation of transport systems, performance and output. Interaction between land use and traffic demand.

8.018 Construction Engineering SS L2T1
Prerequisites: 8.671, 8.312 or 8.301.
Advanced construction methods and techniques with special reference to major civil engineering projects under construction in Australia.

8.019 Railway Engineering SS L2T1

8.020 Hydrology SS L2T1
Prerequisite: 8.582.
Flood estimation with particular reference to design and flood forecasting. Outline of current practices and recent developments. Discussion of possible/likely implications of recent developments for the practising engineer.

8.021 Environmental Aspects of Civil Engineering SS L2T1
Prerequisite: 8.301 or 8.312.
Examination of the professional issues arising from the environmental impact of civil engineering planning, design and construction. Methodologies for environmental impact evaluation and general project evaluation. Environmental legislation, institutional procedures and decision-making processes. Case studies and project work in the above context.

8.023 Hydrodynamics SS L2T1
Prerequisite: 8.572.
Equations of continuity, motion and vorticity; stream function and velocity potential function; Laplace equation; standard flow patterns; practical applications.

8.024 Foundation and Dam Engineering SS L2T1
Prerequisite: 8.2732.

8.025 Structural Failures SS L2T1
Prerequisites: 8.174, 8.1822.
Case studies of significant structural failures and distress during concept, construction, design and use. Modes, causes, consequences, responsibilities, corrective procedures.

8.026 Systems Methods in Civil Engineering SS L2T1
Prerequisite: 8.672.
The development of models for the definition, design, and control of engineering problems in construction project management. Influence of decision level on systems model formulation. Case study approach coupled with field investigations and group projects. All students are required to visit a nominated field site as an integral part of the subject.

8.027 New Materials I SS L2T1
Prerequisite: 8.2722.

8.028 New Materials II SS L2T1
Prerequisite: 8.1822, 8.2722.
Theory and application of fibre reinforcements — glass and steel fibre reinforced cements, mortars and concrete composites. Shrinkage
compensated and expansive cement — applications, utilization of blast-furnace slag. Special aggregates and high strength concretes. New techniques of testing and removing concrete and reinforced concrete structures.

8.029 Continuum Mechanics SS L2T1
Prerequisite: 8.172.
Concept of continua, mathematical foundations, analysis of deformation, strain and stress, fundamental laws of continuum mechanics, constitutive equations, mechanical properties of solids and fluids, simple problems in elasticity.

8.030 Construction Management SS L2T1
Co-requisite: 8.672.
Civil Engineering Construction organization, management and control.

8.031 Construction Project Finance SS L2T1
Co-requisite: 8.672.
Civil Engineering construction project feasibility, financial management, cash flow, cost control, insurance and company finance.

8.032 Construction Law SS L2T1
Prerequisite: 8.672.
The legal system, court procedures, sources of legal information, areas of liability for the professional engineer. The basic rules and concepts of the laws of tort and contract, with particular reference to their application to construction work. Case studies of significant litigation involving construction engineers and their actions. Arbitration as an alternative means of settling disputes.

8.033 Industrial Law and Arbitration SS L2T1
Prerequisites: 8.672, 8.032.

8.034 Engineering Economy SS L2T1
Prerequisite: 8.672.
Economic evaluation of civil engineering projects, including benefit-cost analysis and rate of return analysis.

8.038 Special Topics in Reinforced Concrete Design SS L2T1
Prerequisite: 8.1822.
General design process; limit states concepts. Design for bending and compression; ductility. Biaxial bending. Shear and torsion. Serviceability design.

8.039 Computer Programming SS L2T1
Excluded: 8.360.
Introduction to the use of higher level programming languages such as PASCAL and FORTRAN and the principles of program design. Computing techniques. Development of software and its applications.

8.040 Advanced Engineering Geology SS L2T1

8.041 Geological Engineering SS L2T1
Prerequisite: 8.2721.

8.042 Water Resources SS L2T1
Resource systems approach to the problem of matching, by means of engineering works, the supply of water and the demand for water. The design and operation of water resource systems.

8.043 Public Health Engineering SS L2T1
Prerequisite: 8.581.

8.047 History of Civil Engineering SS L2T1
A study of the theoretical, practical and sociological aspects of the development of civil engineering, including its relationship to other disciplines.

8.051 Design Project — Materials
Final year design project in the field of civil engineering materials.

8.052 Design Project — Structures
Prerequisite: 8.191.*
Final year design project in the field of structural engineering.

8.053 Design Project — Water
Prerequisite: 8.573 or 8.592 or 8.581.
Final year design project in the field of hydraulics and water resources.

8.054 Design Project — Engineering Construction
Prerequisite: 8.672.
Final year design project in the field of engineering construction and management.

*Students who have failed this subject may apply for permission to enrol simultaneously in this subject and the subsequent subject.
8.056 Practical Structural Design
Prerequisite: 8.191.*
Choice of structural system, approximate methods of analysis, preliminary proportioning of members. Checks on design calculations and computer output. Domestic structures, home-unit building design; steel industrial buildings; design of stairs and lift shafts; design of floor systems.

8.057 Special Topics in Prestressed Concrete
Prerequisite: 8.1621.
Historical development, methods of prestressing, general flexural theory, calculation of losses, anchorage zone design, partial prestressing.

8.058 Special Topics in Steel Design
Prerequisites: 8.174, 8.1621.
Plastic analysis and design of steel members and frames. Elasto-plastic material behaviour, moment-rotation relations. Lower bound and upper bound theorems. Plastic design of steel structures.

8.059 Structural Vibrations
Prerequisite: 8.174.
Importance of structural dynamics in civil engineering; earthquake effects and design requirements in buildings and other structures; wind loads on structures. Review of basic methods in dynamic analysis, with structural applications.

8.060 Numerical Methods in Geotechnology
Prerequisite: 8.2732, 8.2733.
Introduction to finite element methods; application of finite element and finite difference techniques to various soil mechanics and rock mechanics problems such as stability analysis of foundations, retaining walls, tunnel linings; prediction of settlement of footings, piles and raft foundations; seepage and consolidation analysis.

8.062 Construction Camp
Prerequisite: 8.672.
A one week field camp involving several of the following: Falsework systems and field productivity measurements; Optimization of earthmoving equipment performance; Concrete pumping systems; Pile driving practice and the measurement of performance parameters; Bridge erection techniques; Rock drilling and blasting design and management; Formwork design and erection and concrete pressure measurements; Operation of earthmoving plant and demonstration of plant capabilities; Noise measurements on construction sites; Prestressing calculations and measurements on a full scale beam; Crane capacity and productivity measurements; Dewatering systems and measurement of well point performance; Site investigation; Compaction.

8.063 River and Coastal Engineering
Prerequisite: 8.573.
Sediment transport in channels and rivers. Coastal processes, wave characteristics and longshore transport. Design and use of hydraulic models.

8.061 Probability and Statistics for Civil Engineers
Prerequisite: 8.351 or 10.381.
Tests of hypotheses; Analysis of variance and co-variance. Stochastic processes; queues (single and multiple channels), Markov chains, simulation. Bayesian decision. Applications to structural, geotechnical, and water problems.

8.082 Numerical Methods for Civil Engineers
Prerequisite: 8.362.
Introduction to finite element method, application of FEM to structural, geotechnical and water engineering. Numerical techniques for the solution of eigenvalue problems; Optimization.

8.113 Civil Engineering for Electrical Engineers
Prerequisite: 8.191.
Includes an introduction to the various branches of civil engineering, the nature and organization of the profession. Relationship between clients and design consultants. The historical development of Civil Engineering. Theory of beams and trusses, resultant forces, structural action, stress and strain. Relation between load, shear force and bending moments, geometric properties of sections, deflection of beams. Properties of materials used in structures: various steels, concrete (plain, reinforced and prestressed), aluminium and timber. B entle fracture. Introduction to buckling. Engineering failures. Introduction to design of transmission lines and towers.

8.170 Statics
Prerequisites:
HSC Exam Percentile
Range Required

8.171 Mechanics of Solids I
Prerequisite: 8.170.*

*Students who have failed this subject may apply for permission to enrol simultaneously in this subject and the subsequent subject
**Students who have failed 8.170 may apply for permission to enrol in 8.170 and 8.171 concurrently
8.172 Mechanics of Solids II
Prerequisite: 8.171.
Structural statics. Bending moments, shear force, and torque. Stresses due to shear force in solid and thin-walled sections; shear centre. Torsion of circular, non-circular, and thin-walled sections. Principal stresses and strains; yield criteria. Combined stresses. Concepts of instability.

8.173 Structural Analysis I
Prerequisite: 8.172.
The analysis of pin-jointed trusses. The principle of work applied to trusses; forces in, and deformation of, statically determinate trusses; statically indeterminate trusses (force method); displacement method of analysis; variational theorems; non-linear analysis.

8.174 Structural Analysis II
Prerequisite: 8.173.
Force and displacement transformations. Rigid jointed frames and their components; the principle of work applied to frames; forces in, and deformation of, statically determinate frames; force and displacement methods of analysis; moment distribution; moving loads.

8.181 Structural Design IA
Prerequisite: 8.170, 8.171. Co-requisite: 8.172.

8.182 Structural Design IB
Prerequisites: 8.172, 8.1811.
Behaviour, analysis, and design of reinforced concrete beams from first cracking up to the ultimate moment capacity. Ultimate Strength Design of singly and doubly reinforced beams; T-beams, and one-way slabs. Theory and the service load behaviour of beams. Design for shear; the truss analogy. Modular Bending theory and deformation of reinforced concrete continuous beams and frames and stairways. Behaviour and design of statically determinate prestressed concrete beams; pretensioning, post-tensioning, pros and cons, elastic stress calculations; moment and shear capacity; losses of prestress, and end block design.

8.1822 Structural Design IIB
Prerequisite: 8.1812.

8.191 Structural Engineering
Prerequisites: 8.174, 8.1811, 8.1822.

8.271 Introduction to Materials
Prerequisite: 8.271.
Types of civil engineering materials; historical development, characteristics, response to environment; material selection; traditional and new materials. Nature of materials; structure, imperfections, relationship of properties to structure; phase equilibria, iron-carbon system.

8.2722 Geotechnical Engineering I
Prerequisite: 8.2721.
Basic soil properties and classification for engineering purposes; soil water, soil suction and the effective stress law; steady flow of water through soils; consolidation of soil masses; failure and shear strength of soils; stress strain characteristics of soils.* Students who have failed this subject may apply for permission to enrol simultaneously in this subject and the subsequent subject.
8.2732 Geotechnical Engineering II
Prerequisite: 8.2731.
Site investigation principles and practice; compaction and mechanical stabilization for soil masses; lateral earth pressures and retaining wall analysis; bearing capacity of isolated foundations; settlement analysis of isolated foundations; slope stability analysis for natural and man made slopes.

8.2733 Rock Engineering
Prerequisite: 8.2721.

8.2741 Concrete Technology
Prerequisite: 8.2721.

8.2742 Metals Engineering
Prerequisite: 8.2722.
Application of metals in civil engineering structures; steels, aluminium alloys and other common metals. Design for avoidance of service failures. Corrosion, basic principles, causes and control. Fatigue and brittle fracture, relationships between material toughness, design stress, flaw size, stress concentrations and service conditions; effects of temperature, loading rate, restraint. Tradition and applied fracture mechanics approaches to fracture safe design. Welding, significance for the designer, quality requirements and control.

8.311 Systems Engineering I
Prerequisites: 5.0102, 8.670, 10.001.
The systems approach to problem formulation and analysis by introduction to elements of systems theory and case studies relevant to engineering and project design.

8.312 Systems Engineering II
Prerequisite: 8.311, 8.360. Co-prerequisite: 10.381.
Formulation of engineering resource problems for numerical analysis and decision-making, and study of a selected set of numerical evaluation techniques.

8.351 Engineering Mathematics
Prerequisite: 10.022.

8.360 Computing
Prerequisite: 10.022.
An introduction to the use of higher level programming languages such as PASCAL and FORTRAN and the principles of program design. Computing techniques. Development of software and its applications.

8.362 Engineering Computations†
Prerequisite: 8.2721.
Solution of equations encountered in stress analysis. Eigenvalue algorithms for buckling and vibration problems. Finite difference solution to deflection of beams and plates, heat conduction, flow of fluids and wave propagation.

8.400 Transport Engineering I
Prerequisite: 8.371.

8.401 Transport Engineering II
The land use/transport system — urban, regional and local systems. Definitive concepts and ideas — land use potential, transport impedance accessibility, traffic generation. Equations of state of a land use/transport system; feedback equilibrium. Land use transport planning process; land use, traffic generation, distribution, assignment and evaluation models. Strategic planning issues, optimization, sensitivity analysis, constraints and resources. Operational planning.

8.571 Hydraulics I
Prerequisites: 5.0201, 10.001.

8.572 Hydraulics II
Prerequisite: 8.571.

8.573 Hydraulics III
Prerequisite: 8.572.

<<Available from 1983 onwards>>
8.581 Water Resources I  SS L1½T1½
A prior knowledge of elementary hydraulics is assumed.

8.582 Water Resources II  SS L1½T1½
A prior knowledge of elementary hydraulics is assumed.
The hydrologic cycle, water and energy balances, climatology, atmospheric moisture, precipitation, runoff cycle, infiltration, stream gauging, hydrograph analysis, storm runoff and loss rates, design storms, flood estimation, yield and storage determination.

8.583 Water Resources III  SS L1T2
Prerequisites: 8.572, 8.582.
Hydraulics of groundwater systems, application to regional problems. Water resources planning, systems approach, applied aspects of water engineering.

8.670 Introduction to Engineering Construction  SS L1T0
Introduction to construction engineering, projects and decision agents, construction equipment and methods. A report required involving site visits on a construction operation.

8.671 Engineering Construction  SS L2T1
Prerequisite: 8.670.
Role of professional construction engineer. Project breakdown into construction activities and operations. Engineering construction characteristics of equipment, materials and methods with emphasis on earthmoving, rockworks, compressed air and concrete placement and formwork.

8.672 Planning and Management I  SS L2T2
Prerequisite: 8.671.
Project definition, documents, estimating, planning and scheduling models. Project finance and cost control methods. Field project management and reporting systems.

8.673 Planning and Management II  SS L1T2
Prerequisite: 8.672.
Fundamentals of Engineering Economy developed within a microeconomic systems framework for application by the following decision-makers: plant engineer, contractor, developer, local government engineer, and State/National engineering project managers.

8.674 Planning and Management III  SS L1T2
Prerequisite: 8.672.
Project implementation, organization and control, field management techniques, industrial relations, field documentation and information flow, field change orders, risks, and delays, legal aspects, the relationship and duties between professional agents involved in projects.

8.711 Engineering for Surveyors I  SS L1½T1½
Prerequisites: 8.670.
Municipal Engineering. Soil Mechanics: Soil forming processes, pedological classification; engineering classification of soils; pavement design based on engineering classification; effective stress concept for saturated and unsaturated soils; shear strength, flow of water through soils, consolidation; slope stability and earth pressures. Public Utilities: Relationship between urban development and each of water supply, wastewater and stormwater drainage, transport.

8.712 Engineering for Surveyors II  SS L3T0
Municipal Engineering. Soil Mechanics: Soil forming processes, pedological classification; engineering classification of soils; pavement design based on engineering classification; effective stress concept for saturated and unsaturated soils; shear strength, flow of water through soils, consolidation; slope stability and earth pressures. Public Utilities: Relationship between urban development and each of water supply, wastewater and stormwater drainage, transport.

Servicing Subjects

8.112 Structures  S1 L1T2
8.250 Properties of Materials  SS L2T2

Graduate Study

8.401G Human Factors in Transport  SS C3
Human capabilities, ergonomic principles, attitudes to new concepts, planning, the law; application to transport planning, design and implementation. The human as a processor of information, influence on design of transport facilities particularly information displays; signals, signs and lighting.
8.402G  Transport, Environment, Community  

8.403G  Theory of Land Use/Transport Interaction  
Theoretical aspects of land use transport planning. Basic concepts, data collection methods, systems models and equation of state (functional, behavioural, optimizing). Introduction to land use-transport modelling (land use, generation, distribution, modal assignment, network assignment, evaluation). Planning methodologies (short-, medium-, long-term; action planning, strategic planning; local, urban, regional, national).

8.404G  Local Area Transport Planning  
Application of theoretical methods to local area planning. Local government planning and engineering: pedestrian planning, frontage land use problems, analysis of residential areas, industrial estates, shopping centres and recreational facilities, accessibility studies, environmental studies, parking studies.

8.405G  Urban Transport Planning Practice  

8.406G  Regional Transport Planning  
The role of transport in economic and social development in regions including Third World countries, historical and contemporary analysis. Analytical techniques for regional planning. Planning practice, feasibilities studies, evaluation methods. Case studies.

8.407G  Transport System Design (Non-Urban)  
Process of location of road, railway and airport facilities. Data collection, alternative routes, public discussion, methods, techniques, aids, plans and diagrams produced. Geometric form: differences between road, railway and airport carriageway layout. Optical guidance, design models, landscape, provision for surface-water signposting, fencing and posts.

8.408G  Transport System Design (Urban)  
Types of urban transport facilities. Distributors, streets, bicycle routes, walk-oriented areas, bus lanes and rapid transit lanes, stops and change terminals, noise control. Minimum geometric form: speed range controls, provision for surface water on urban roads, landscape. Design of intersections and parking areas.

8.409G  Interchange Design  
Central projection theory and application to alignment design, perspective drawing methods, introduction to aerial and terrestrial photogrammetry, photomaps and photomontage as applied to transport facilities. Speed change lanes, exit and entrance terminals, ramp types, ramp speeds and design. Interchange location and layout, provision for surface water, signposting. Computer use. Safety measures during maintenance.

8.410G  Highway Engineering Practice Part I  

8.411G  Highway Engineering Practice Part II  

8.412G  Economics for Transport Studies  

8.413G  Transport Economics  
Cost and price analysis of each of the transport modes (road, rail, air and sea). Welfare analysis and taxation theory with respect to transport. Economics of location; economics of land use models; regional trade model.

8.414G  Transport Systems Part I  

8.415G  Transport Systems Part II  
Historical introduction to transport systems and development of various transport modes: road, vehicles, pedestrians, cycles, conveyor, rail, sea continued overleaf

8.416G Traffic Engineering F C6

8.417G Transport and Traffic Flow Theory F C6
Analysis of deterministic and stochastic models of the traffic stream. Topics include the following: Definition and measurement of traffic stream parameters. Space and time distribution of speed. Overtaking models and the moving-observer method. Fundamental diagram of traffic. Car-following theory. Headway and counting distributions. Introduction to queuing theory. Simulation techniques. Signalized and unsignalized intersections.

8.418G Statistics for Transport Studies C3
Part I

Part II

8.420G Transport Engineering Elective SS C3
An occasional offering in a specialized Transport and Highways topic selected according to current demand and/or availability of a local or visiting specialist.

8.701G Economic Decision Making in Civil Engineering C3
Review of practical engineering decision-making problems and relevant techniques. Engineering economics, benefit/cost analysis, consideration of inflation and taxation in investment decisions, bidding, decision theory, microeconomic theory, objectives and criteria, multiple objective planning.

8.702G Network Methods in Civil Engineering C3
Graphs, flow-in networks, optimal paths, critical path schedule, resources levelling, simulation networks, stochastic networks, project management, further applications.

8.703G Optimization Techniques in Civil Engineering C3
Search, linear programming, non-linear programming, geometric programming, calculus of variations, maximum principle, applications.

8.704G Stochastic Methods in Civil Engineering C3
Queueing, Markov processes, theory of storage, reliability, renewal, application, transportation and allocation.

8.705G System Modelling C3
The development of system models for specific problem areas and decision positions. Problem environment, goals, objectives, and definition established by field contact and team discussion. Information flow requirements and the design of user-oriented decision processes. Class size is limited to selected students.

8.706G Experimental Methods in Engineering Research C3
Purposes of experimentation in engineering research. Design of experiments: factorial and other designs; replication. Analysis of experimental data: analysis of variance and covariance; spectral analysis; other statistical methods. Decision theory.

8.707G Numerical Methods in Civil Engineering C3

8.710G Advanced Topics in Optimization in Civil Engineering C3
Special studies in optimization in Civil Engineering design and construction to be offered from time to time by appropriate specialists.

8.714G Advanced Topics in System Modelling C3
Special studies in system modelling to be offered from time to time by appropriate specialists.

8.723G Construction Design C3
Design of field services and structures; compressed air services, cofferdams, ground anchors, floating plant, formwork and falsework, bridge cemnting, well-points and dewatering systems.

8.724G Construction Technology C3
A selection of topics from: drilling, blasting techniques, tunnelling, rockbolting and other ground support, earth/rock transport, harbours, railways, dams, bridges, structural steelwork techniques, pipeline construction, foundation grouting, compressed air work.
8.725G  Construction Accounting and Control  C3

8.726G  Construction Law and Professional Practice  C3

8.727G  Construction Planning and Estimating  C6
Project initiation and development, feasibility studies, planning and estimating procedures, contract administration; estimating costs of labour, plant and materials, indirect costs and overheads; profit; construction administration. Preparation of cost estimate for a major civil engineering project.

8.728G  Design of Construction Operations  C6
Heavy equipment, labour intensive, and composite operations; spatial layout and material flow concepts; the modelling of operations at the micro, macro, and systems level; engineered estimates and productivity prediction models; analysis of construction operations by time-lapse methods; field methods at foreman, superintendent, engineer, and project manager levels; field studies of specific construction operations.

8.731G  Project Management  C3
A problem-oriented approach to Project and Mission management; the nature of engineering and construction projects; the project team; behavioural aspects of project management; the organization and management of project resources; short term field planning and management strategies.

8.732G  Advanced Project Management Theory  C3
A theoretical and formative approach to Project and Mission Management; management strategies and project success evaluation techniques; organizational and behavioural aspects of the project team; behaviour norms and their impact on project team motivation; project management decision processes; case studies in project management.

8.748G  Pavement Materials I  C3
Properties and usage of soil and rock as pavement materials in road, rail or other construction work. Modification and evaluation of these properties; criteria for use and acceptance testing; variability and quality control; requirements of crushed rock for surfacing; use of non-standard materials in pavements; materials resources; service conditions and their effect on materials performance.

8.749G  Pavement Materials II  C3

8.750G  Pavement Design and Evaluation I  C3
Pavement types for road, rail, airfield and other works. Stress distribution in pavements, theoretical and actual: sub-grade conditions and traffic loadings; design principles methods, and criteria for flexible pavements: design principles, methods and criteria for rigid and semi-rigid pavements, including stabilized soil and multilayer pavements; design principles, methods and criteria for design of railtracks. Design of special-duty and temporary pavements.

8.751G  Pavement Design and Evaluation II  C3

8.752G  Terrain Engineering  C6
Basic geology, geological processes and geomorphology as they affect the planning of engineering works and construction. Specific civil engineering applications for highways, water storages, buildings, civil and military transport operations, etc. Photo interpretation, ground surveying, terrain mapping, information storage and retrieval.

8.753G  Soil Engineering  C3

8.754G  Applied Soil Mechanics  C3
A detailed study of rigid and flexible retaining structures, and of slope stability using both traditional and recent analytical methods. Applications of plasticity theory, refined failure surface analysis and the finite element method.

8.755G  Materials of Construction (Concrete Technology) I  C3
Concrete as a structural material. Basic Structure. strength microcracking and failure mechanisms; significance of tests and relation to design requirements. Variability, target strength, code and special criteria for acceptance and rejection of concrete. Non-destructive testing. Accelerated curing and special high-strength concretes for column and prestressed construction. Recent developments in constitutive materials, special cements and admixtures. Workability, mix design theories and practical applications.

8.758G  Soil Mechanics  C3
A critical review of the theories of real soil behaviour and their implications for the selection of soil parameters for use in engineering design. Examination of the actual stress-strain and shear strength behaviour of saturated and unsaturated soils under static and dynamic conditions, survey of modern soil mechanics testing techniques; influence of real soil behaviour on the performance of scale models.
8.760G Materials of Construction (Concrete Technology) II

Concrete as a structural material, with special application to marine structures. Volume changes, shrinkage and thermal stresses, creep; predicated and design values. Cracking of plain and reinforced concrete, fracture toughness and extensibility; cracking problems caused by volume changes and creep affects in mass and offshore-type structures. Bond and impact strengths. Durability and fatigue of reinforced and prestressed concrete. Types of durability breakdown; sea water attack, FIP and other design recommendations and current research for marine structures. Special concretes.

8.764G Composites in Civil Engineering

History; relationship between structure and mechanical and physical properties. Elastomers, adhesives, reinforced plastics natural composites. Applications and case studies.

8.766G Welding in Structural Engineering

Terminology, welding processes, metallurgy, weldability of ferrous and non-ferrous metals; pre-heat and post-heat treatments residual stresses and distortion, weld quality levels, destructive and non-destructive testing, economic welded design, quality assurance.

8.771G Foundation Engineering

A specialized study of theoretical and practical aspects of geotechnical engineering directly relevant to the analysis and design of foundation systems. The primary object of the course is to establish the state-of-art with particular emphasis on the application of recent theoretical developments to foundation engineering, including piles, rafts, raft-piles, laterally loaded piles, retaining structures and techniques of strengthening soils.

8.773G Materials of Construction (Metals) III

Previously 8.756G.

Use of metals as structural materials; specification; structural aluminium alloys; modern steels; philosophy of materials selection; properties, applications, limitations; behaviour under mechanical loading; effects of environment; corrosion and corrosion protection.

8.774G Soil Dynamics

Fundamental of vibrations; wave propagation in elastic homogeneous medium; wave propagation in layered medium, vertical, sliding, torsional and rocking motion or footings on elastic half-space; behaviour of dynamically loaded soils, design procedures for dynamically loaded foundations.

8.775G Geotechnical Aspects of Natural Hazards

Basic principles involved in earthquake engineering: treating on seismic waves; earthquake effects on foundations of buildings, dams slopes and embankments, intake towers, etc. Criteria for earthquake resistant design; landslides and their effects on soil slopes; probabilistic evaluation of slope failures; treatment of slopes, liquefaction.

8.776G Rock Mechanics

Strength and deformation characteristics of rock mass and joints: flow through joints and porous rock, failure criteria; stresses and deformations around underground openings; tunnel lining and rock anchors; stability of rock slopes; stabilization of rock slopes; stability of underground excavations related to mining; foundations of dams in fissured and layered rocks.

8.777G Numerical Methods in Geomechanics

Fundamentals of finite element and boundary element methods: deformation and flow problems; linear and non-linear analysis; applications to underground opening, stability of slopes, foundations, mining excavation, seepage and consolidation; soil-structure interaction problems; earth pressures, retaining walls and buried pipes; thermal stress analysis.

8.778G Geotechnical Processes for Energy Resources

Principles of rock fragmentation: blasting patterns; prediction and estimation of ground vibrations; damage criteria; numerical techniques for the prediction of rock fracture; grouting materials and techniques.

8.779G Building Materials Technology in Third World Countries

Appropriate technology and building, traditional materials; cement and concrete, bricks, soil and stabilized soil, timber and timber products, composite materials, ferrocement; material selection.

8.780G Geological Engineering


8.802G Elastic Stability I

Euler strut; uniform and non-uniform cross sections. Eccentric loading; stressing beyond the elastic limit. Struts continuous over several supports. Stability of frames.

8.803G Elastic Stability II

Energy methods of formation of stability problems. Approximate methods. Thin-walled open section struts; lateral buckling of beams; bending and buckling of thin plates.

8.804G Vibration of Structures I

Review of basic aspects. Analysis of lumped mass systems with various degrees of freedom. Vibration in beams and other continuous structures.
8.805G  Vibration of Structures II  C3

8.806G  Prestressed Concrete I  C3
Historical development. Methods of prestressing. Elastic analysis and design. Flexural capacity and shear capacity of prestressed elements.

8.807G  Prestressed Concrete II  C3

8.808G  Prestressed Concrete III  C3
Partially prestressed concrete; cracked section analysis; crack control and deflection calculations; determination of appropriate level of prestress; strength calculations. Rational design procedures for prestressed members. Continuous beams; secondary moments; practical design procedures. Prestressed slabs; two-way slabs; flat slabs; load balancing approach to design; effect of tendon distribution; design procedures; flexural and shear strength; deflections.

8.809G  Reinforced Concrete I  C3
Historical development. Methods of analysis and design, including limit state concepts. Analysis and design for bending, compression and combined bending and compression. Shear and torsion. Serviceability requirements.

8.810G  Reinforced Concrete II  C3

8.811G  Reinforced Concrete III  C3

8.812G  Plastic Analysis and Design of Steel Structures I  C3
The perfectly plastic material; the plastic hinge; plastic collapse of beams and frames; basic theorems; general design methods.

8.813G  Plastic Analysis and Design of Steel Structures II  C3
Estimation of deflections; factors affecting plastic moment; shake-down; three-dimensional plastic behaviour; minimum weight design.

8.814G  Analysis of Plates and Shells  C3

8.817G  Experimental Structural Analysis I  C3
Dimensional analysis and principles of similitude, model analysis and design of models. Instrumentation and special methods of measurement. Evaluation of data.

8.818G  Bridge Design I  C3

8.819G  Bridge Design II  C3

8.820G  Structural Analysis and Finite Elements I  C3

8.821G  Structural Analysis and Finite Elements II  C3

8.822G  Structural Analysis and Finite Elements III  C3
Application of the finite element method to analysis of structures. Verification of the results of standard computer programs. Structural stability and vibration of structures.

8.830G  Hydromechanics  C3
General equation of fluid motion, potential flow, conformal mapping, laminar flow, Navier-Stokes equations; turbulence, shear flows, jets and wakes, boundary layers, turbulent mixing, diffusion, air entrainment, cavitation, stratification.
8.831G Closed Conduit Flow
Theories for energy loss in conduit flows, roughness at pipe walls and tunnels, design applications. Cavitation in conduits, transport of water-borne mixtures in pipes, accuracy of flow measurement in pipe lines.

8.832G Pipe Network and Transients

8.833G Free Surface Flow
Theory of water flow in open channels. Application of theory to design of hydraulic structures, spillways, control gates, energy dissipators, channel transitions. Use of hydraulic models.

8.835G Coastal Engineering I
Theory of periodic waves as applied to tides and wind generated waves in water of varying depths. Wave and tide prediction.

8.836G Coastal Engineering II
Wave forces on structures, shore processes and beach erosion. Estuarine hydraulics, wave and tide models.

8.837G Hydrological Processes
Hydrologic cycle, water and energy balances, atmospheric moisture, precipitation process, evaporation and transpiration, storm runoff process, land use and management, stream gauging, instruments.

8.838G Flood Design
Excluded: 8.846G.
Introduction to flood estimation, design rainfall data, hydrograph analysis, storm runoff, loss rates, rational method, unit hydrographs, introduction to urban drainage design, flood frequency.

8.839G Advanced Flood Estimation
Flood routing, catchment characteristics, runoff routing, synthetic unit hydrographs, urban runoff, regional empirical flood estimation methods, advanced unit hydrograph theory.

8.840G Reservoir Design and Yield Determination
Storage-yield analysis, extension of runoff records, deterministic catchment models, stochastic hydrology, storage probability studies, spillway capacity and reservoir flood routing.

8.841G Hydrometeorology
Water and energy balances, atmospheric moisture, precipitation, evaporation and transpiration, snow and snowmelt, extreme precipitation.

8.842G Groundwater Hydrology
Confined and unconfined aquifers, analogue and digital models of aquifer systems, water movement in the unsaturated zone, recharge, groundwater quality, sea water intrusion.

8.843G Groundwater Hydraulics
Mechanics of flow in saturated porous materials, steady and unsteady flow to wells, leaky aquifers, partial penetration, multiple aquifer boundaries, delayed yield from storage, regional studies.

8.844G Soil-Water Hydrology
Hydrologic characteristics of unsaturated media, hysteresis, theory of infiltration, drainage and redistribution studies, laboratory and field instrumentation, applications to field problems.

8.846G Urban Drainage Design
Excluded: 8.838G.
Introduction to flood estimation design, rainfall data hydrograph analysis, storm runoff, loss rates, rational method. Urban drainage design.

8.847G Water Resources Policy
Resource economics, water supply, water demand, multiple objective planning, multiple purpose projects, water law, water administration, case studies.

8.848G Water Resource System Design
Principles of the optimal design and operation of multiple purpose, multiple component, water resource systems; evaluation of cost and benefits in complex and simple systems.

8.849G Irrigation
Soils, soil-water relationships, plants, climate, crop requirements; water budgets, sources, quality, measurement; irrigation efficiency. Design of irrigation systems, appurtenant works, distribution.

8.850G Drainage of Agricultural Land
Characteristics of drainage systems, steady and unsteady state drainage formulae, conformal transformation solutions, soil characteristics, field measurement of hydraulic conductivity and soil water pressure, significance of unsaturated zone, practical aspects.
8.851G Unit Operations in Public Health Engineering C3

Theory of physical, chemical, biological, and hydraulic processes used in both water and wastewater treatment. Applications where these are common to both water and wastewater treatment.

8.852G Water Distribution and Sewage Collection C3

Water collection, transmission and distribution systems — layout design and analysis, reservoirs, pumping. Sewage collection system design and analysis — capacities, corrosion, pumping.

8.854G Solid and Liquid Waste Management C2

Sources and nature of refuse-collection and transportation-disposal: sanitary landfill, incineration, pyrolysis, resource recovery, composting. Collection, treatment and disposal of strong liquid wastes.

8.855G Water and Wastewater Analysis and Quality Requirements C3

The effects of impurities in water and wastewater on its suitability for various beneficial uses, and methods used for detecting impurities. Analytical methods used in water and wastewater treatment for monitoring and process control.

8.856G Water Treatment C3

Application of processes and process variations used to upgrade the quality of water for specified uses, with particular reference to the treatment of water for municipal use.

8.857G Sewage Treatment and Disposal C3

Application of processes and process variations used to improve the quality of sewage effluent, and the disposal of the effluent. Re-use of effluents where applicable. Sludge treatment and disposal.

8.858G Water Quality Management C3

Fundamental concepts; systems approach to quality aspects of water resource systems; quality interchange systems; quality changes in estuarine, surface, and ground water. Quality management by engineered systems. Economic criteria relating to water use and re-use systems.

8.860G Investigation of Groundwater Resources I C3

Occurrence and extraction of groundwater, investigation and drilling methods, systems approach, optimization techniques, conjunctive use studies, quality of groundwater.

8.861G Investigation of Groundwater Resources II C3

Geophysical methods, remote sensing, photo-interpretation, and environment studies, analog models, case studies.

8.862G Fluvial Hydraulics C3

Unsteady and varied flow in non-uniform channels, secondary currents, sediment transport, channel morphology, scour and shoaling, river control works, modelling of fluvial processes.

8.863G Estuarine Hydraulics C3


8.864G Arid Zone Hydrology S1 L1½T1½ C3

Co-requisite: 8.837G, 8.838G.

Arid zone rainfall characteristics, data collection and instrumentation, runoff processes, infiltration, transmission loss, recharge processes, flood characteristics and design; water yield, storage of water; evaporation and evaporation suppression; sediment transport and measurements.

8.865G Arid Zone Water Resources Management S1 or S2 L1½T1½ C3

Water as a resource demand for and supply of water; works and management to match demand with supply. Special features of the arid zone climate, water uses, quantification of demand quantities and qualities; and zone grazing system modelling, water supplies, quantities and qualities; measurement of flow rate, volume, quality. Engineering works: design, construction, operation and maintenance of works, including excavation tanks, dams, pipelines, pumps, windmills, engines and motors, troughs; costs; reliability; energy sources for pumping. Special practices: water spreading, irrigation including trickle irrigation; evaporation reduction, desalination.

8.901G Civil Engineering Elective I C3

A Session 1 occasional elective on a civil engineering topic, selected according to current demand and availability of local and visiting specialists.

8.902G Civil Engineering Elective II C3

A Session 2 occasional elective on a civil engineering topic, selected according to current demand and availability of local and visiting specialists.

8.909G Project C9

8.918G Project Report C18
Mathematics

Undergraduate Study

10.001 Mathematics I  
**F L4T2**
Prerequisites:

HSC Exam Percentile  
Range Required  
2 unit Mathematics  
71-100  
3 unit Mathematics  
21-100  
4 unit Mathematics  
1-100  
10.021B

Excluded: 10.011, 10.021A, 10.021B, 10.021C.

Calculus, analysis, analytic geometry, linear algebra an introduction to abstract algebra, elementary computing.

10.011 Higher Mathematics I  
**F L4T2**
Prerequisites:

HSC Exam Percentile  
Range Required  
3 unit Mathematics  
71-100  
4 unit Mathematics  
1-100  
10.001, 10.021A, 10.021B, 10.021C.

Calculus, analysis, analytic geometry, linear algebra, an introduction to abstract algebra, elementary computing.

10.022 Engineering Mathematics II  
**F L2T2**
Prerequisite: 10.001 or 10.011.

Differential equations, use of Laplace transforms, solutions by series; partial differential equations and their solution for selected physical problems, use of Fourier series; introduction to numerical methods; matrices and their application to theory of linear equations, eigenvalues and their numerical evaluation, vector algebra and solid geometry; multiple integrals; introduction to vector field theory.

10.031 Mathematics  
**F L1T1**
Prerequisite: 10.001 or 10.011 or 10.021C(CR).

Differential equations, use of Laplace transformations, solution by series; partial differential equations and their solution for selected physical problems, use of Fourier series; multiple integrals, matrices and their application to theory of linear equations, eigenvalues; introduction to numerical methods.

10.033 Electrical Engineering Mathematics III  
**F L1½T½**
Prerequisites: 10.111A, 10.1113, 10.1114, 10.2111, 10.2112.


Optimization.

10.111A Pure Mathematics II — Linear Algebra  
**F L1½T1**
Prerequisite: 10.001 or 10.011.


10.1113 Pure Mathematics II — Multivariable Calculus  
**S1 or S2 L1½T1**
Prerequisite: 10.001 or 10.011.

Multiple integrals, partial differentiation. Analysis of real valued functions of one and several variables.

10.1114 Pure Mathematics II — Complex Analysis  
**S1 or S2 L1½T1**
Prerequisite: 10.001 or 10.011.

Analytic functions, Taylor and Laurent series, integrals Cauchy's Theorem, residues, evaluation of certain real integrals.

10.2111 Applied Mathematics II — Vector Calculus  
**S1 or S2 L1½T1**
Prerequisite: 10.001 or 10.011.

Vector fields; divergence, gradient curl of a vector; line, surface, and volume integrals. Gauss' and Stokes' theorems. Curvilinear coordinates.

10.2112 Applied Mathematics II — Mathematical Methods for Differential Equations  
**S1 or S2 L1½T1**
Prerequisites: 10.001 or 10.011.


10.341 Statistics SU  
**F L1½T½**
Prerequisite: 10.001 or 10.011.

Introduction to probability theory, random variables and distribution functions, Sampling distributions, including those of \( t \), \( \chi^2 \) and \( F \). Estimation procedures, including confidence interval estimation with an emphasis on Least Squares and surveying problems, and computer based exercises.
10.351 Statistics SM  
**Prerequisite:** 10.001 or 10.011.

For students in Aeronautical, Industrial and Mechanical Engineering and Naval Architecture as part of 5.071 Engineering Analysis or 5.072 Statistics/Computing.

An introduction to probability theory, with finite, discrete and continuous sample spaces. Random variables: the standard elementary distributions including the binomial, Poisson and normal distributions. Sampling distributions: with emphasis on those derived from the normal distribution: t, X² and F. Estimation of parameters: the methods of moments and maximum likelihood and confidence interval estimation. The standard tests of statistical hypotheses, and, where appropriate, the powers of such tests. An introduction to regression and the bivariate normal distribution.

10.361 Statistics SE  
**Prerequisite:** 10.001 or 10.011.

For students in the School of Electrical Engineering.

An introduction to probability theory. Random variables and distribution functions: the binomial, Poisson and normal distributions in particular. Standard sampling distributions, including those of X² and t. Estimation by moments and maximum likelihood; confidence interval estimation. The standard tests of significance based on the above distribution with a discussion of power where appropriate.


10.381 Statistics SC  
**Prerequisite:** 10.001 or 10.011.


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Accountancy

Undergraduate Study

14.001 Introduction to Accounting A  
**Prerequisite:** 14.001.

An introduction for non-commerce students to the nature, purpose and conceptual foundation of accounting, information systems including accounting applications. Analysis and use of accounting reports.

14.002 Introduction to Accounting B  
**Prerequisite:** 14.001.

An introduction for non-commerce students to managerial accounting. Long-range planning, budgeting and responsibility accounting; cost determination, cost control and relevant cost analyses.

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Graduate Study

10.061G Advanced Mathematics for Electrical Engineers  
**Prerequisite:** 10.061G.

Boundary value problems in partial differential equations. Selected topics from complex variable analysis, integral transforms, and orthogonal functions and polynomials.

10.361G Statistics  
**Prerequisite:** 10.001 or 10.011.

Probability theory; a survey of random processes with engineering applications — processes in discrete and continuous time. Markov processes, ergodicity, stationarity, auto-correlation, power spectra, estimation of auto-correlation and power spectra.

10.371G Statistics  
**Prerequisite:** 10.001 or 10.011.

Revision of probability and distribution theory, including estimation of hypothesis testing. Extension of this to include topics such as more complex probabilistic modelling, analyses of modified data (censored, truncated and missing observations), general statistical inference (decision theory), acceptance testing, and reliability analysis (hazard functions).

14.042G Industrial Law  
**Prerequisite:** 14.001.

The elements of the law of contract and tort as applied to industrial law; the New South Wales and Commonwealth industrial arbitration systems, including award making and interpretation, and industrial disputes; workers’ compensation.

14.062G Accounting for Engineers  
**Prerequisite:** 14.001.

Problems related to industrial situations, and their relevance in decision-making. Manufacturing and cost accounts, budgeting and budgetary control, cost analysis and control and profit planning.
Industrial Engineering*

Undergraduate Study

18.003 Numerical Methods/Industrial Experimentation
Prerequisites: 5.072, 10.001, 10.022.


18.004 Manufacturing Management
Prerequisites: 18.503, 18.603, 14.001, 14.002.


18.011 Industrial Engineering IA
Prerequisite: 10.022. Co-or prerequisites: 5.071, 5.111 or 5.122.


18.020 Industrial Orientation
A series of lectures and discussions designed to prepare students for Industrial Training. Topics include: Forms and structure of private and public organizations; line and staff; authority and responsibility; company objectives; functions of staff departments, eg personnel, purchasing, quality control, industrial engineering, accounting; new forms of organization. Industrial legislation, industrial relations, safe practices. Employer expectations of the trainee engineer, requirements for the Industrial Training Report. Introduction to the specialist streams of the Years 3 and 4.

18.021 Industrial Engineering IB
Prerequisite: 10.022. Co- or prerequisite: 5.071.


18.022 Industrial Engineering IIB
Prerequisites: 5.071, 18.021.

Design of Manufacturing Facilities: Product and objectives, equipment selection. Charting and systematic improvement of methods, factory and workplace layout, the factory environment. The Use of Human and Physical Resources: Motion and time study, financial incentives, applications to machine controlled processes. Work sampling and data collection, predetermined motion-time systems.

Industrial Psychology: Individual differences, operator selection and training, motivation to work, conflict and frustration, social aspects of industry, worker participation.

*Industrial Engineering is a Department within the School of Mechanical and Industrial Engineering.

18.091 Industrial Management

Prerequisites: 10.211, 10.361.

Engineering Economy: economic objectives of the firm. Economic measures of performance: net present value, annual equivalent value and the DCF rate of return (including the incremental rate of return) and their application in the selection and replacement of processes and equipment. Introduction to Operational Research: The formation and optimization of mathematical models of industrial processes. The development of decision rules. Some techniques of operational research and applications, e.g., mathematical programming, queuing theory, inventory models, simulation, critical path networks. The Use of Human and Physical Resources: Methods engineering, ergonomics, motion and time study, financial incentives, applications to machine controlled processes, work sampling and data collection. Plant location, factory layout. Production and Quality Control: Control of jobbing, repetitive batch and continuous production. Manufacturing organization, functions, inter-relationships and information flow. Sampling techniques in quality control, control charts. Introduction to Inventory Control: Analyses of some engineering planning decisions.

18.224 Numerical Control of Machine Tools

Overview of numerical control systems; machine specification and selection, manual part programming; production and operator aspects including selection of operating conditions, work holding devices and tooling; introduction to computer assisted programming.

18.303 Methods Engineering

Prerequisites: 5.072, 18.020.


18.403 Production Design and Technology

Prerequisites: 5.072, 5.422 or 5.411 and 8.259.

Basic metrology and tolerancing; introduction to plasticity theory and its application to theories for machining and forming; economics of production processes; interaction of machines and tools; principles of process selection; review of major processes; interaction of design, production quantity, materials and processes; value analysis.

18.404 Design for Production

Prerequisite: 18.413 or 5.123.

Overview of design for production and its relation to overall design process; selection, specification and interpretation of tolerances, process selection; analysis of various production processes, jig, fixture and gauge design.

18.413 Design for Industrial Engineers

Prerequisites: 5.122, 5.422.

Session 1: Industrial design, tooling design. Production aids. Fluid power systems. Introduction to fatigue in design.

Session 2: (Common with Session 2 in 5.123 Mechanical Engineering Design III.) More advanced design analyses, component design and drawing with individual and group projects of an interdisciplinary nature.

18.432 Design of Production Systems

Prerequisites: 5.071, 18.011, 18.021.

This subject may be taken only by part-time students in their final year.

Interchangeable Manufacture: Design for production, tooling, gauges, metrology.

Process Selection: Evaluation of alternative processes, make or buy decisions, planning the process sequence, case studies.

Production Planning: Forecasts, capacity decisions, plant location, factory design and layout.

Production Systems: Computer systems for production control and information flow, computer control of machines and groups of machines, socio-technical systems.

Project: The project will consist of the design analyses for production and the planning of the production system for the manufacture of a simple engineering assembly. A comprehensive written report will be required.

18.503 Operations Research A

Prerequisites: 5.072, 10.022. Co-requisite: 18.803.

History and overview of operations research. Decision theory. Methodology, identification and formulation of the problem, construction of a model, obtaining solutions, testing the model and implementing the solution. Case study.

18.551 Operations Research

Prerequisites: Either 5.071 and 18.021 or 10.031, 10.331 and 16.121.

The formulating and optimization of mathematical models. The development of decision rules. Some techniques of operations research such as mathematical programming, queueing theory, inventory models, replacement and reliability models; simulation. These techniques applied to situations drawn from industrial fields, e.g., production planning and inventory control. Practical problems of data collection, problem formulation and analysis.
18.603 Management/Economics  
Prerequisites: 5.072, 16.020.

Introduction: objectives of a company, measures of performance, need for economic decisions.

Cost information: sources of costs, fixed and variable, overheads, break-even analysis.

Engineering economics: time value of money, Derivation and use of interest formulae, Evaluation of alternatives, annual and present equivalents, D.C.F. rate of return, The minimum acceptable rate of return, Capital budgeting, Replacement studies, Risk and uncertainty.

Management objectives of an organization; definition and functions of management. Development of management thought; interactions between organizations and their environment. The management functions of planning, organizing, leading and controlling; management and computers; the marketing concept. Industrial relations, trade union and arbitration structures in Australia.

18.803 Optimization  
Prerequisite: 10.022.


Servicing Subjects

18.121 Production Management  
F L3T0

18.131 Operations Research

Graduate Study

18.061G Industrial Experimentation I  
C3

Design of experiments with reference to industrial problems; planning experiments; significance testing; simple comparative experiments, accelerated experiments; fatigue testing, tool life testing; economic aspects of experimental design; analysis of variance of randomized block, latin square and factorial experiment designs.

18.062G Industrial Experimentation II  
C3

Regression analysis; use of orthogonal polynomials in regression analysis and analysis of variance, confounding in factorial design; response surfaces and determination of optimum conditions.

18.074G Industrial Management  
C3

Definitions of management; evolution of management thought, classical, quantitative and behavioural schools, interactions between organizations and their environment. The planning process; strategic and tactical planning, developing planning premises, nature of managerial decision making, quantitative aids, management by objectives. Organizational structures; co-ordination and spans of control, the informal organization, authority delegation and decentralization, groups and committees, managing organizational change and conflict. Motivation, performance and satisfaction; leadership, interpersonal and organizational communication, staffing and the personnel function. The control process; budgetary and non-budgetary methods of control, use of management information systems.

18.075G Decision Support Systems  
C2

Descriptive analysis of the decision-making process; alternative perspectives on organizational decision-making: rational, satisficing, organizational output, political process and individual differences perspectives; structured, semi-structured and unstructured decisions. Levels of decision support; conversion of data into information by simple algorithms; models, integrative structures; use of decision analysis (single and multi-attribute) cognitive mapping, cross impact analysis, fuzzy sets. Overall system design implementation and maintenance with particular reference to the man-machine interface; practical examples of decision support systems.

18.171G Inspection and Quality Control  
C3

Economics of measurement; advanced measuring and inspection methods; non-destructive testing; quality control systems; sampling by attributes and variables; standardization, case studies; process capability and variability, machine tools acceptance testing; estimation procedures.

18.260G Computer Aided Programming for Numerical Control  
C3

Brief review of N.C. systems and manual programming. Requirements of a high level language designed specifically for programming N.C. machine tools. Languages available and their use on minicomputer, mainframe or micro computers, eg APT, ADAPT, FANAPT, UNIAPT, MICRO APT, etc. Detailed study of the structure and use of "Automatic Programmed Tools" (APT) language including overview of language, basic APT grammar, part program structure, geometry statements, motion statements, macro commands, postprocessors, diagnostics.
18.261G Computer Automation

Computer architecture including central processor, random-access memory, read only memory, input/output ports, peripherals, and the relationships between each. A systematic study of the requirements for interfacing computers to the real world. Machine code, assembly language, and high level languages such as BASIC or FORTRAN with a comparison of each for particular applications. Development of small computer system for machine tool control, automated inspection, supervision, stock control, etc.

18.360G Ergonomics

Applied anatomy and kinesiology, anthropometry; application to work place arrangement, seating and bench design, tool and equipment design, lifting techniques, consumer product and architectural design. Physiological and psychological aspects of work and fatigue; measurement of energy consumption, limits to energy expenditure at work, static muscular fatigue, boredom. Environment effects; natural and artificial lighting arrangements, problems of perception, colour; noise and vibration, physiological and psychological effects; preventive measures; heat and ventilation, thermal regulation in man, criteria for comfort, effects of pollutants. Man-Machine interface. Displays, machine controls, reaction times, vigilance. Applications of ergonomics to occupational safety and health. Ergonomic research methodology.

18.371G Factory Design and Layout

Production Requirements: Processes, machines and storage; optimum factory size, multiple factories. Plant Location: Single and multiple factories and warehouses; location models and economic analysis.


18.380G Methods Engineering


18.461G Design for Production

Influence of manufacturing processes on design; design simplification and standardization; value engineering; economics of process selection; case studies.

18.464G Value Analysis/Engineering

Cost reduction through value analysis/engineering illustrated by case studies: Selection of projects to be studied, collection of information, creative problem solving, development of alternatives, functional analysis system technique, functional evaluation, cost-function relationship, decision making, communication and implementation of the proposal. Applications to engineering design and services.

18.471G Design Communication

Communication systems in design; aids to design communication; engineering drawing practice; standardization; interpretation of design information.

18.571G Operations Research I

Excluded: 18.503, 18.551, 18.580G.

The formulation and optimization of mathematical models. The development of decision rules. Some techniques of operations research such as mathematical programming, queuing theory, inventory models, replacement and reliability models and simulation. These techniques are applied to situations drawn from industrial fields, for example, production planning and control. Practical problems of data collection, problem formulation and analysis.

18.574G Management Simulation


18.579G Case Studies in Operations Research

Problems confronting management are seldom in the form of clear cut textbook type exercises; rather they are often ill-structured and ambiguous. A variety of such problems in operations research/management science is considered with emphasis on the common pitfalls that arise in solving real world problems and the comparison of different strategies for solution. Students are expected to prepare written reports on certain cases considered suitable for submission to management.

18.580G Operations Research

Excluded: 18.503, 18.551, 18.571G.

The formulating and optimization of mathematical models. The development of decision rules. Some techniques of operations research such as mathematical programming, queuing theory, inventory models, replacement and reliability models; simulation. These techniques applied to situations drawn from industrial fields, eg production planning and, inventory control. Practical problems of data collection, problem formulation and analysis.

18.671G Decision Theory

Excluded: 18.672G.

Theories of choice, value, risk and uncertainty for the individual and for multi-person situations. Statisical decision theory. Bayes and minimax rules.

18.672G Decision Theory for Industrial Management

Excluded: 18.671G.

18.673G Energy Modelling, Optimization and Energy Accounting

The analysis of energy systems using computer models. Applications of such models range from policy analysis at government level to investment analysis within individual industries. Covers both the formulation of energy models and the techniques used to obtain optimized solutions, with examples from actual studies. Effects of uncertainty and the use of energy accounting as an analytical tool.

18.675G Economic Decisions in Industrial Management

General aspects: the economic objective, the single-period investor's model, economic criteria, the mathematics of finance. Deterministic models: project evaluation using discounted cash flow analysis; capital structure; debt and equity financing; cost of capital and the minimum acceptable rate of return; taxation; inflation and its effects. Probabilistic models: multiple objectives and multi-attribute value systems based on means and variances of cash flows. Particular applications of economic decision-making: venture and risk analysis, risk management, static and dynamic replacement models, rent-or-buy decisions, break-even analysis, expansion and economic package concepts, analyses of projects with public financing.

18.681G Engineering Economic Analysis

Price-output decisions under various competitive conditions. The time-value of money, net present worth and DCF rate of return, and their application in the selection and replacement of processes and equipment. Construction and optimization of particular models, eg replacement, capital rationing. Measures of profitability.

18.761G Simulation in Operations Research


18.763G Variational Methods in Operations Research

The variational problem and its history. The modern formulations. Mathematical Theory. Application to a wide range of problem areas such as production and inventory control, advertising, machine maintenance and natural resource utilization.

18.764G Management of Distribution Systems

Prerequisite: 18.503.
The distribution system: single depot location, multi-depot location, vehicle scheduling, vehicle loading, fleet size, case studies.

18.765G Optimization of Networks

Prerequisite: 18.551.

18.770G Stochastic Control


18.772G Information Processing Systems in Organizations

The place of operations research in information processing systems. Computer hardware and software. Data structures and data manipulation techniques. Typical structures of suites of programs. The life cycle of information processing systems. System design. Applications packages with emphasis on systems for production and inventory control. Major problems in information processing systems.

18.773G Optimal Control in Operations Research

Brief survey of dynamic optimization techniques. Introduction to the calculus of variations and the maximum principle for both continuous and discrete systems. Applications to operations research problems drawn from the areas of production and inventory control, machine maintenance, investment and natural resource utilization.

18.774G Applied Stochastic Processes

Examples of stochastic processes, basic concepts and Markov chains. Renewal theory. Applications to queues, inventory replacement, risk, business and marketing. Markov decision processes.

18.775G Networks and Graphs

Basic concepts. Application of Hamiltonian paths, Euler cycles, trees, planar graphs, dominating and independent sets to operations research problems. Shortest route algorithms. Concept of maximum flow in a network applied to transportation assignment and scheduling problems.

18.776G Production and Inventory Control

Basic inventory replenishment models, continuous stock review, periodic re-ordering and base stock models, with deterministic, probabilistic, and dynamic demands. Variations of the basic models to include additional features (eg demand dependent on delivery time). Costs of the complete system in practice. Production smoothing models. Forecasting techniques. Optimum stock locations in multistage systems. Practical inventory surveys and control systems.

18.777G Time Series Forecasting

18.871G Mathematics for Operations Research C2

18.875G Geometric Programming C2
The geometric programming theory is developed for convex and non-convex mathematical programs. The theory is applied to polynomial and posynomial mathematical programs. Examples include polynomial and posynomial programs will be solved.

18.876G Advanced Mathematics for Operations Research C2
A survey of mathematical ideas which are of value in operations research. Topics will be selected from the following areas: set theory, real analysis, matrix theory, topology, function spaces, linear operator theory, inequalities, stability, complex analysis, convex analysis, distribution theory, group theory and measure-theoretic probability theory.

18.878G Industrial Applications of Mathematical Programming C2
Problem formulation: profitability criteria, operating constraints. Convexity for large-scale matrix construction; list and table-processing, error-checking. Use of commercial systems: data organization, interpretation of output, ranging procedures. Examples from actual industrial studies.

18.909G Project C9
18.918G Project Report C18
18.936G Thesis C36
18.965G Seminar (Industrial Management) C0
18.967G Advanced Topic in Production Engineering* C2
18.968G Advanced Topic in Production Engineering* C2
*Subjects which allow the presentation of special topics, particularly by visiting academics.
16.969G  Advanced Topic in Production Engineering*  C2
18.970G  Seminar (Operations Research)  C0
18.977G  Advanced Topic in Operations Research*  C2
18.978G  Advanced Topic in Operations Research*  C2
18.979G  Advanced Topic in Operations Research*  C2

Nuclear Engineering

Undergraduate Study

23.051  Nuclear Power Technology  F L2¼T½
Atomic nuclei, radioactivity, neutron reactions, fissile and fertile materials, nuclear conversion and breeding cycles, plutonium. Criticality requirements, heat removal, control and safety of nuclear reactors. The thermal, hydraulic and structural aspects of gas and liquid cooled thermal reactors and liquid metal cooled fast breeder reactors. The status of fusion research and development. The technology, safety, economics and environmental impact of nuclear fuel cycles, from mining, through enrichment, fabrication and burnup to waste disposal. Comparative assessment of nuclear, fossil and alternative energy systems in local and global contexts.

23.023G  Reactor Thermal Performance  S1 L2¼T½ C3
The processes of heat generation, conduction, heat transfer and heat and momentum transport in fluids, in relation to the thermal performance of reactor channels and cores.

Graduate Study

Not all subjects are available in any one year.

23.013G  Neutron Transport and Diffusion  S2 L2¼T½ C3
Neutron and nuclear reactions, the formation of neutron spectra in infinite multiplying media, transport and diffusion theories, and their application to the analysis of heterogeneous reactor lattices.

23.014G  Fewgroup Reactor Theories  S2 L2¼T½ C3
The derivation and use of fewgroup reactor models for the macroscopic analysis of finite reactor criticality, burnup and control.

23.015G  Multigroup Reactor Theories  S2 L2¼T½ C3
A selection of topics from general reactor theory, variational principles, perturbation theory, and multigroup transport theory, for the general problem of three-dimensional fine scale neutron flux distribution analysis.

23.016G  Neutron Kinetics and Reactor Dynamics  S1 L2¼T½ C3
The derivation and application of point reactor kinetic models to the study of macroscopic power reactor dynamics, stability and control, and the development of general space-time kinetic models.

23.024G  Boiling and Two Phase Flow  S1 L2¼T½ C3
Subcooled and bulk boiling, boiling crises, and the special problems associated with the analysis of reactor channel and core performance under boiling and two-phase flow conditions.

23.025G  Reactor Structural Mechanics  S1 L2¼T½ C3
A study of theoretical models and numerical techniques required for the analysis of mechanical and thermal stress, deformation, and failure modes of reactor core components and containment structures under high temperature, neutron and gamma irradiation.

23.026G  Reactor Systems Analysis  S2 L2¼T½ C3
Nonlinear and linear system dynamics and stability theory applied to reactor processes and components, for the development and use of overall reactor and power system dynamics models.

Subjects which allow the presentation of special topics, particularly by visiting academics.
23.027G Boiling Reactor Dynamics
The special problems associated with the dynamics and stability of fluid cooled reactors under boiling conditions.

23.028G Reactor Accident and Safety Analysis
The mathematical modelling and computation of ideal and actual reactor accident histories, particularly for fluid cooled systems, and the application of probability theory to reactor hazard evaluation.

23.032G Mathematical Analysis and Computation
Mathematical methods, partial differential equations, special functions, and numerical methods for digital computation, relevant to Nuclear Engineering.

23.033G Matrix Theory and Computation
Matrix theory and matrix computations required for the numerical solution of problems in neutronics, fluid dynamics, structural mechanics, etc., arising in the analysis and prediction of nuclear power system performance.

23.034G Random Processes and Reactor Noise
The mathematics of random processes applied to fluctuation phenomena in nuclear reactors, and the practical application of noise analysis techniques to reactor monitoring, control, and parameter estimation.

23.042G Nuclear Fuel and Energy Cycles
The utilization of nuclear energy, the thermodynamics of nuclear power systems and applications, and the study of nuclear fuel cycles.

23.043G Nuclear Power Costing and Economics
The principles of nuclear power cost estimation for various reactor types and applications, the comparative evaluation of nuclear power systems, and the problem of reactor strategy.

23.044G Nuclear Engineering Optimization
The theory and application of function and functional minimization techniques to problems of design, control and operation of nuclear reactors and associated nuclear fuel supply complexes.

23.045G Uranium Enrichment Technology
The theory and technology of uranium enrichment by the diffusion, ultra-centrifuge and nozzle processes; the economics of enrichment within the nuclear reactor fuel cycle, in relation to optimal reactor strategy and resources utilization.

23.049G Project

23.909G Project Report

23.936G Thesis

Geography

Undergraduate Study

27.1711 Introduction to Remote Sensing
Principles and technical aspects of remote sensing. Forms of available imagery, their utility and facilities for their interpretation.
Basic airphoto interpretation techniques relevant to environmental assessment. Introduction to principles of the electromagnetic spectrum, photometry and radiometry. Sensor types, image formation and end products associated with selected satellite programs, including LANDSAT.
Land-cover and land-use interpretation procedures in visual image analysis. Basic procedures in machine-assisted image enhancement.

27.1712 Remote Sensing Applications
Spectral characteristics of natural phenomena and image formation. Ground truthing, collection and calibration. Introduction to computer classification procedures. Multitemporal sampling procedures, image to image registration and map to image registration.
Major applications of remote sensing in the investigation of renewable and non-renewable resources to include: soils, geology, hydrology, vegetation, agriculture, rangelands, urban analysis, regional planning, transportation and route location and hazard monitoring.
†Offered subject to availability of staff
Subject Descriptions

27.295 Physical Geography for Surveyors S1 L2T2
Fundamentals of physical geography. Landscapes of Australasia. Techniques of landscape appraisal. Laboratory classes to support the above, including map analysis, air photo interpretation and examination of soil properties. There is a compulsory one-day excursion.

29.002 Surveying II S2 L2T3
Traversing: fieldwork, computation and adjustment. Principles of levelling, levels and associated equipment, field and reduction procedures, testing and adjustment of levels. Vertical staff tacheometry: principles, field and reduction procedures for stadia, self-reducing tacheometers. Survey methods for detail and contour surveys.

Graduate Study

27.901G Geomorphology for Hydrologists S2 L1T1½

Surveying

Undergraduate Study

Note: Electronic Calculators.

Students enrolled in the surveying courses are required to equip themselves with an electronic calculator. Advice on the purchase of this equipment is given to students at the commencement of their course.

29.001 Surveying I S1 L3T1½

29.005 Surveying V S1 L3T2
Prerequisite: 29.003.
Electronic distance measurement principles, applications and instruments, propagation of electromagnetic waves, meteorological and geometric corrections, field procedures, instrumental errors and their calibration. Calibration of linear scales. Precise angle measurement, observations and reduction procedures, sources of error and their testing.

29.006 Surveying VI S2 L2T1
Prerequisite: 29.003.
Error theory, expression of uncertainty, testing of observations, applications to design and analysis of surveys. Precise levelling, equipment, field procedures. Project surveys, integrated surveys, surveys for large structures, precise surveys for deformation, measurement and setting out machinery, mining and tunnel surveys, hydrographic surveys.

29.031 Electronic Distance Measurement S1 L2T1
Prerequisite: 29.005.
Short range instruments: sources of error, field and computational methods of calibration, baseline design. Long range instruments: laser and microwave distance meters, sources of error, calibration, precise measurement techniques, geometric and atmospheric corrections. Properties of reflectors. Power sources.
29.032 Precise Surveys in Industry and Engineering
Prerequisite: 29.006.
Review of survey problems in industry and engineering. Setting-out of large structures: network design, measurements, methods of height transfer, optical plumbing, examples and accuracy requirements. Surveys for measurement of deformation and settlement; design of control network and stations, observation and adjustment techniques, detection of movement, electric measurement of small changes in length, height and inclination. Close-range indoor surveys: optical taping, special equipment and techniques, auto-collimation, laser interferometry.

29.033 Characteristics of Modern Theodolites and Levels*
Prerequisites: 29.006.
Construction features, sources of error and methods of testing modern optical surveying instruments. Topics selected from: circle and micrometer graduation errors, coded circles, calibration and behaviour of bubbles, automatic compensator systems, axis wobble, temperature effects.

29.034 Mine Surveying
Prerequisite: 29.006.

29.035 History of Surveying*
Prerequisite: 29.006.
Historical development of geodesy, astronomy, cartography, photogrammetry, and geophysics. History of general surveying: mathematical aids, optics, instruments, electronic aids for surveyors. Selected topics from history of surveying and land law in Australia.

29.121 Electronics for Surveyors
Prerequisite: 1.971.

29.150 Introduction to Computer Programming
Prerequisite: 29.150.
Computer components and functions. Program design and flow charting. Algorithm development and coding using a high level language. Computer output diagnostics, program documentation.

29.151 Survey Computations I
Prerequisite: 29.150.

29.152 Survey Computations II
Prerequisite: 29.151.

29.153 Adjustment of Control Surveys
Prerequisite: 29.212.

29.161 Hydrographic Surveying I
Prerequisite: 29.006.
Introduction, theory of echo sounder, sounding techniques. Visual fixing, electronic position fixing, tides, tidal streams, tidal datums, ocean currents, acoustic and wire sweeps.

29.162 Hydrographic Surveying II
Prerequisite: 29.161.
Practical training: undertake a hydrographic survey requiring establishment of horizontal and vertical control, preparation of plotting sheets, control marking, bathymetry, equipment calibration, tidal observations and reductions, inking in. Static display of other equipment. Lectures on nature of seabed, wind waves, the survey report. Discussions on practical surveying tasks or topics of current interest. A harmonic analysis of 12 days of tidal data.

29.173 Project
Prerequisite: High standard in the chosen topic area normally required; permission of project supervisor.
Theoretical or practical investigation of a selected topic under the guidance of a supervisor, with a report of a high academic standard required. Topic may be one suggested by the School or by the individual student based on his experiences.

29.174 Major Project
Prerequisite: High standard in the chosen topic area normally required; permission of project supervisor.
An elective subject involving a detailed investigation of a selectd or assigned topic under the guidance of a supervisor, with a report of a high academic standard required. Topic may be one suggested by the School or by the individual student based on his experiences.

29.191 Survey Camp I
Co-requisites: 29.001, 29.002.
A one-week field camp equivalent to 42 contact hours. A series of field surveying tasks designed to consolidate the current year's work and

*Not offered in 1983.
serve as an introduction to the following year’s work. Tasks include traversing, levelling, stadia and detail survey measurements for the production of a large-scale plan. Calculations, preparation of plans and reports.

29.192 Survey Camp II
Prerequisite: 29.191. Co-requisite: 29.003, 29.004.
A one-week field camp equivalent to 42 contact hours. A series of field surveying tasks designed to consolidate the current year’s work and serve as an introduction to the following year’s work. Surveys for the design of a road alignment, determination of dam capacity and methods of point fixation. Calculations, preparation of plans and reports.

29.195 Survey Camp III
A two-week field camp equivalent to 84 contact hours. Survey projects designed to consolidate course work. Field astronomy, triangulation, trigonometric levelling, photogrammetric control and cadastral survey.

29.196 Survey Camp IV
Co-requisite: 29.195.
Two weeks of office computations equivalent to 84 contact hours. Preparation of comprehensive individual reports based on field survey tasks completed in Survey Camp III.

29.211 Geodesy I
Prerequisite: 29.191. Co-requisite: 29.003, 29.004.
A one-week field camp equivalent to 42 contact hours. Survey projects designed to consolidate course work. Field astronomy, triangulation, trigonometric levelling, photogrammetric control and cadastral survey.

29.212 Geodesy II
Prerequisite: 29.191. Co-requisites: 29.151, 29.211.

29.213 Geodesy III
Prerequisite: 29.212.
Topics from: advanced geodetic techniques and instrumentation-principles and applications; variations in geodetic position with time; earth satellite orbits; geoid solutions from gravimetry; earth's gravity field from satellite orbits; extension of gravity into unsurveyed regions.

29.231 Geophysics for Surveyors
Prerequisite: 29.212.

29.232 Atmospheric Effects on Geodetic Measurements

29.311 Astronomy I
Prerequisite: 29.311.
Uses of field astronomy. The solar system, the celestial sphere and the astronomical triangle. Time systems and time keeping. Latitude by circum-meridian and longitude by extra meridian methods. Prediction of observation programs. Evaluation of precision of results. Introduction to the determination of azimuth.

29.312 Astronomy II
Prerequisite: 29.311.
Determination of azimuth from circum polar, circum-elongation and sun observations. Simultaneous determination of latitude and longitude by the position line method. Prediction of observation programs. Evaluation of precision of results.

29.313 Astronomy III
Prerequisite: 29.312.
Topics selected from: geodetic astronomical methods, daylight star observations, meridian and equal altitude methods, variation in star coordinates, sun dials, celestial methods in navigation.

29.441 Surveying for Engineers
Co-requisite: 29.441. Surveying for Engineers.

29.491 Survey Camp
Prerequisite: 29.441. Surveying for Engineers.
A one-week field camp for students studying 29.441, Surveying for Engineers.

*Not offered in 1983.
29.511 Photogrammetry I
Prerequisite: 29.511.

29.512 Photogrammetry II
Prerequisite: 29.511.

29.513 Photogrammetry III
Prerequisite: 29.512.

29.514 Principles of Remote Sensing
Prerequisite: 29.512.

29.631 Land Inventory I
Prerequisite: 29.512.

29.632 Land Inventory II
Prerequisite: 29.512.

29.651 Land Development I
Prerequisite: 29.651.

29.652 Land Development II
Prerequisite: 29.512.

29.653 Land Development III
Prerequisite: 29.652.
Design and studio project for a neighbourhood development. Constraint and site analysis: preparation of maps for land use and vegetation, surface and soils, drainage and terrain, slopes, climate and aspect, composite maps. Structure plan: residential precincts, schools, commercial areas, industrial areas, active and passive recreation, pedestrian ways and road hierarchy. Plan of detailed lot layout: consideration of access, grades, drainage, drainage reserves, parks, and pedestrian ways. Engineering design and plans: catchment details, longitudinal and cross-sections, drainage layout and longitudinal sections, flow schedule with calculations, longitudinal sections of kerb profiles.

29.654 Land Development IV
Prerequisite: 29.653.

29.661 Cadastral Surveying and Land Law I
Prerequisite: 29.661.
The legal system in NSW as it affects the land surveyor. Forms of titles: Old System titles, Torrens titles and Crown lands titles. Land law: legislation, real and personal property, interests and estates in land, riparian rights and conveyancing. The status of roads in NSW. Maritime law. The operation of the cadastre in NSW: an historical introduction, the role of the boundary surveyor and boundary control.

29.662 Cadastral Surveying and Land Law II
Prerequisite: 29.661.
Practical and legal aspects of cadastral surveying in NSW including: survey and title searching; survey investigation; re-determination of artificial and natural boundaries; related statutes, regulations and case law; the preparation of plans for title surveys; and subdivisions under the Strata Titles Act, 1973 as amended.
29.663 Cadastral Surveying and Land Law III  
**S1 L2T1**

Prerequisite: 29.662.

The relationship between land information systems, title and deed registration, cadastral surveying and the cadastre. Forms and components of land tenure and cadastral systems. Aspects related to the definition of the cadastre: cadastral mapping, integrated surveys and methods of defining land parcels.

29.664 Modern Title Concepts  
**S2 L2T1**

Prerequisite: 29.662.


29.700 Professional Orientation  
**S1 L1T½**

Introduction to the total field of surveying activities and their relationship to associated disciplines. Introduction to geodesy and position fixing from celestial bodies. Map projections and co-ordinates. Introduction to the use of aerial photographs. Maps and aerial photographs and their application to resource surveys. Role of consulting surveyor. Brief introduction to cadastral, engineering and land development surveys. Mining and hydrographic surveys. Includes a visit to several surveying establishments.

29.701 Seminar I  
**S2 T1**

Basic writing and speaking, introduction to the literature of the profession. Oral presentation by individual students on assigned topics in selected areas of surveying.

29.702 Seminar II  
**T1**

Effective writing and speaking, increased emphasis on research of literature. Oral presentation by individual students on assigned topics in selected areas of surveying.

29.703 Seminar III  
**S2 L½T½**

Effective communication. Technical writing for comprehension. Additional speaking experiences. Invited speakers on current areas of interest in surveying. Student critique of course.

29.704 Management I  
**S1 L2**


29.705 Management II  
**S2 L2T0**


Quantitative management methods. Project planning. Introduction to cost benefit analysis. Project and office management.

29.800 Survey Draughting  
**S1 L½T2½**

Fundamentals of survey draughting. Abbreviations, symbols, sizes of drawing sheets, layout of drawing sheets, lines, letters, numerals, scales, projection and sectioning, dimensioning, architectural drawing, engineering survey and design drawings.


29.801 Cartography I  
**S2 L1½T1½**

Co-requisite: 29.151.


29.802 Cartography II*  
**S1 L1½T1½**

Cartographic technology: characteristics of base materials, drawing techniques, scribing techniques, symbol and type preparation, photomechanical methods, screens and masks, colour registration, proofing methods, principles of lithography. Planning, costing and organizing cartographic work.

29.803 Mapping Technology*  
**S2 L1½T1½**

Prerequisite: 29.512.

Production of base maps from aerial photographs, rectification theory, photographic mosaics, differential rectification and orthophotomaps. Cartographic completion of photomaps. Automation of cartographic processes, data collection and processing, plotting software and hardware, digital terrain models.

Servicing Subjects

29.411 Surveying for Architects and Builders  
**S1 L1T½**

29.901 Introduction to Mapping  
**S1 L1T½**

*Not offered in 1983.
Graduate Study

29.101G  Aspects of Electromagnetic Distance Measurement  SS L2T1 C3


29.102G  Characteristics of Optical Surveying Instrumentation  SS L2T1 C3

Sources of error in modern optical surveying instruments. Methods of testing and calibration. Observational techniques for reducing effects of errors. Developments in circle reading and level sensing systems. Design of instrument testing facilities.

29.103G  Precise Engineering Surveys  SS L2T1 C3

Techniques and instrumentation for precise surveys. Applications in industry and engineering: deformation and settlement surveys, surveys for large constructions, optical tooling, special measurement problems.

29.106G  Special Topic in Surveying A  C3

A special subject to be lectured on by visiting professors or other visiting staff. Details of syllabus and lecturer to be communicated to the Higher Degree Committee on each occasion when the subject runs.

29.107G  Special Topic in Surveying B  C3

A special subject taken by an individual student or a small group of students by private study in conjunction with tutorial sessions with the member(s) of staff in charge of the subject.

29.151G  Adjustment of Observations  SS L2T1 C3


29.171G  Mathematical Methods I — Numerical Analysis  SS L2T1 C3

Topics from real analysis, computational error theory, curve fitting by orthogonal polynomials, trigonometrical and exponential series, time series and quadrature.

29.172G  Mathematical Methods II — Statistical Theory of Survey Observations  SS L2T1 C3

Advanced application to survey observations of frequency distributions, moments, minimum variance, unbiased estimation, central limit theorem, analysis of variance and statistical testing. Outlying observations.

29.173G  Mathematical Methods III — Spherical Harmonics  SS L2T1 C3

Two dimensional Fourier Series. Theorems of vector field theory. The solution of Laplace's equation in spherical coordinates. Spherical harmonics.

29.174G  Mathematical Methods IV — Theory of Survey Adjustment  SS L2T1 C3

Matrices, multivariate normal distribution of quadratic forms, five standard problems of Tienstra, geometrical interpretation of least squares adjustment, free-net adjustment and generalised matrix algebra. Solution of large sets of equations. Confidence ellipses.

29.175G  Mathematical Methods V — Collocation  SS L2T1 C3

Fundamental assumptions. The covariance function and its modelling. The solution and theoretical accuracy. Interpolation, filtering, prediction and transformation by collocation. Applications in physical geodesy.

29.201G  Geodetic Methods  SS L2T1 C3


29.202G  Earth and Ocean Dynamics  SS L2T1 C3


29.203G  Gravimetric Geodesy  SS L2T1 C3

29.204G Geodetic Refraction SS L2T1 C3

29.205G Satellite Geodesy SS L2T1 C3

29.206G Advanced Geodetic Instrumentation SS L2T1 C3
Developments in: distance measuring instruments; Strainmeters; Tiltmeters. Optical-angle measurement instruments; Gravity measurements; Gravity gradiometers; Inertial navigation systems; Gravity measurements at sea; Tide gauges; Ocean pressure measurements; Bathymetry; Positioning on deep-ocean floor; Radio Doppler; Satellite laser ranging; Global positioning system; Drag-free satellite technology; Long base-line microwave interferometry and Satellite altimetry.

29.207G Doppler Positioning SS L2T1 C3
Introduction to Doppler positioning using the NNSS satellite system. The use of point positioning, transocation and short arc techniques. Review of available hardware. Majority voting; general and specialized reduction techniques. Computing techniques associated with the integration of a Doppler position into terrestrial network. Introduction to the Global Positioning System (GPS).

29.314G Geodetic Astronomy SS L3T3 C6

29.516G Mathematical Model of the Imaging Process SS L3T0 C3

29.517G Stereophotogrammetry SS L2T1 C3

29.518G Analytical Photogrammetric Orientation SS L3 C3
Prerequisite: Prior knowledge of FORTRAN computer programming is assumed.

29.519G Photogrammetric Instrumentation SS L2T1 C3

29.520G Photogrammetric Production Processes SS L1½T1½ C3

29.521G Control Extension A SS L3 C3
Prerequisite: 29.517G or consent of the instructor.

29.522G Control Extension B SS L3 C3
Prerequisite: 29.518G.

29.601G Remote Sensing Principles and Procedures S1 L2T1 and S2 L1½T1½ C6
29.602G Mass Appraisal Methods SS L2T1 C3


29.603G Statutory Controls of Land Development SS L2T1 C3

Detailed examination of the subdivision and development process in N.S.W., with particular emphasis on the statutory procedures and controls at the local government level. The Local Government Appeals Tribunal and its major relevant decisions. Local Government and land development law. Case studies in land development.

29.604G Land Information Systems SS L2T1 C3

Land information as maps and records. Methods of data collection. Integrated surveys and coordinate systems. Legal boundaries. Land tenure. Identifiers. Computerisation of land information. Data input methods. Data storage methods. Data processing and manipulation, including management, searching, existing data base languages, and interactive data editing. Data output, including computer graphics, line printer maps, and digital plotters.

29.605G Ground Investigations for Remote Sensing S1 L2T1 C3

The spectral, temporal and spatial characteristics of various surfaces, and the available sensors to effect maximum differentiation. Ground and image comparisons. Instruments available for field measurements. Field investigation procedures including positioning and sampling considerations.

29.706G Survey Management SS L2T1 C3

Introduction to management accounting. Information systems and accounting, balance sheets, income statements, accounting reports, costing, budgets and capital investment decisions.

29.707G Quantitative Management Methods SS L2T1 C3

Detailed analysis of operations research methods and discounted cash flow techniques as they apply to mapping, surveying and development projects. Various case studies and their solutions will be examined.

29.909G Project C9

See Section on Graduate Study earlier in this book for details of research areas in the School.

29.918G Project Report C18

See section on Graduate Study earlier in this book for details on research areas in the School.

29.936G Thesis C36

See section on Graduate Study earlier in this book for details of research areas in the School.

Biomedical Engineering

Graduate Study

32.010G Biomedical Engineering Practice S1 L2 C2

Introduction to clinical situations in hospitals. Presentation of guest lectures by eminent people working in this field. Lecture topics include cardiology, neurology, orthopaedics, rehabilitation, etc. Visits to various biomedical engineering units.

32.012G Biomedical Statistics S1 L2½ T1½ C4

Statistical assessment of normal and diseased states. Statistical relationships between multiple variables used to assess disease; analysis of variance, regression, factor analysis, discriminant analysis. Progression of diseases over time. Diagnosis and assessment of treatments. Experimental design and sampling. Computation methods.

32.018G Project Report C18

32.020G Radiation Physics S2 L2T2 C4

Sources, effects and uses of radiation on human tissues. Ultrasonic, X-ray and nuclear radiations are included together with ultraviolet, infrared, laser, microwave and longer wavelength electromagnetic effects. Precautions in using these radiations are stressed.

32.030G Project Report C30

32.101G Mathematical Modelling for Biomedical Engineers S1 L3T1 C4

Model formulation and validation, solution of ordinary and partial differential equations by analytical and numerical techniques.
32.311G Mass Transfer In Medicine S2 L2T2 C4

Material and energy balances, modelling of intrabody mass transfer, elementary treatment of diffusion, convection, hydraulic permeability and osmosis in biological and synthetic membranes. Applications to hemodialysis, blood oxygenators and artificial livers.

32.321G Physiological Fluid Mechanics S2 L2T2 C4

Fundamentals of biological fluid flow by way of the governing equations. Kinematics and dynamics, viscous and inertial flow, boundary layers, separation, physiological flows (cardiac, vascular, pulmonary, urinary etc.) and flow in artificial organs.

32.331G Biocompatibility S2 L2 C2

Interaction of biological fluids and cells with foreign surfaces, in vitro tests to assess biocompatibility and thrombogenicity, current status of biocompatible materials as applied to hemodialysis, hemofiltration, membrane oxygenation and prosthetic devices.

32.500G Computing for Biomedical Engineers S1 L2T1 C3

Program design and documentation, printer plotting, computer graphics, editing (XEDIT/MODIFY), KCL and procedure files. Overview of computers in biomedical engineering. Microprocessors and their capabilities. Assessment of hospital computing requirements and evaluation of computer packages.

32.510G Introductory Biomechanics S1 L2T1 C3

The principles of the mechanics of solid bodies: force systems; kinematics and kinetics of rigid bodies; stress-strain relationships; stress analysis of simple elements.

32.511G Mechanics of the Human Body S2 L2T1 C3

Prerequisite: 32.510G or equivalent.

Statics and dynamics of the musculoskeletal system; mathematical modelling and computer simulation, analysis of pathological situations.

32.521G Biomechanics of Physical Rehabilitation S2 L2T1 C3

Prerequisite: 32.510G or equivalent.

The application of biomechanics principles to the areas of: performance testing and assessment, physical therapy, design of rehabilitation equipment, design of internal and external prostheses and orthoses.

32.531G Mechanical Properties of Biomaterials S2 L2T1 C3

Prerequisite: 32.510G or equivalent.

The physical properties of materials having significance to biomedical engineering: human tissues; skin; soft tissues; bone; metals; polymers and ceramics: the effects of degradation and corrosion.

32.611G Medical Instrumentation S2 L2T1 C3

Prerequisite: 1.9222 or equivalent.

A critical survey of the theory and practical applications of medical transducers and electromedical equipment in common use in hospitals and research laboratories.

32.621G Biological Signal Analysis S1 L3 C3

Digital computer methods of extracting information from biological signals using filtering and averaging, expectation density functions, correlation functions, spectral analysis and other techniques. Methods of constructing models of biological systems.

32.701G Dynamics of the Cardiovascular System S1 L2T1 C3

Structure of the heart; organization of the mammalian vasculature; mechanical, electrical and metabolic aspects of cardiac pumping; the fluid mechanics of blood vessels.

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Town Planning

Undergraduate Study

36.411 Town Planning S1 L2T1

Introduction to the purpose, scope and application of planning. The urban planning process. Objectives and means of planning cities. Levels of planning and types of plans: state environmental policies,
regional environmental plans, local environmental plans. Problems in
planning — equitable distribution of resources. Environment and
environmental impact statements. Planning law and administration.
Future of cities.

**Safety Science**

**Graduate Study**

**47.051G**  **Principles of Solid Mechanics**  **C3**

The principles of the mechanics of solid bodies: force systems;
kinematics and kinetics of rigid bodies; stress-strain relationships; stress
analysis of simple elements.

**47.052G**  **Introduction to Safety Engineering**  **C3**

Management of dangerous materials; fire and explosion; ventilation;
occupational toxicology; noise control; radiation protection; electrical
safety; microbiological safety; failure of structures and machines.

**47.054G**  **Machines and Structures Safety**  **C3**

Machinery contact dangers; machine guarding. Deformation failures;
fracture, failure of pressure vessels, lifting equipment, excavations,
scaffolding. Deterioration due to wear, corrosion, fire. Inspection and
control (including non-destructive testing). Maintenance and reliability.

**47.060G**  **Electrical Safety**  **C3**

Electric current; effects of current flow and electric fields; elementary
circuit representation, typical supply situations; likely dangerous
conditions; static electricity; hazardous locations; some special problem
areas; codes of safe working; treatment of electric shock.

**47.070G**  **Ventilation**  **C3**

Prevention of ventilation problems by process change, substitution,
isolation, segregation, housekeeping.

Ventilation: basic principles, air cleaning, recirculation, dilution, mainten-
ance, safety considerations.

Airborne emissions: dusts, gases, fumes, aerosols. General industrial
control; dispersion, air cleaning, specific industry problems.
47.120G Human Behaviour and Safety Science  
Industrial relations and implementation of a safety program. Learning and safety programs. Attitudes and attitude change. Safety compliance — individual and group factors affecting compliance. Work motivation and safety practice. Accident proneness and personal selection. Individual differences in attitudes to work.

47.180G Management for Safety  
Accounting; risk management; safety management and loss control; organization and management for safety; cost effectiveness of safety programs. Selection and training of personnel. Communications; modes of communication; preparation of safety and accident reports; presentation of evidence.

47.230G Radiation Protection  
Radiation physics; radiation dosimetry; radiation biology; shielding and control of radiation; administration; waste management; emergency procedures; environmental impact, non-ionizing radiation. Special topics; practical work and site visit.

47.330G The Accident Phenomenon  
Approaches to injury control; causes of injury and defensive strategies: reduction of loss from accidental injury; epidemiology and demography of accidental injury; human factors; the environment and accidents; systems analysis in the study and control of accidents; accident investigation and analysis; case studies in transport, industry, recreation and the home.

47.390G Noise and Vibration Control  
Community Noise Control (39.908G): Introduction; sound and sound propagation; sound power, sound pressure, decibels; sound perception, psychoacoustics: loudness, annoyance, phons and dB(A); hearing conservation, acoustic measuring and analysing instrument-sound level meters, filters, analysers, recorders, sound sources; community noise assessment; the NSW Noise Control Act; practical exercises in sound recording, analysis and assessment; noise control-source noise reduction, use of barriers, enclosures, distance, sound absorbing materials; sound transmission through building elements, noise components of environmental impact statements.

Vibration Control: Instrumentation and techniques for vibration measurement; techniques for vibration control.

47.480G Fire and Explosion  
Chemistry and physics of combustion reactions; types of flames; deflagration and detonation; ignition; fire point; flammable limits.

47.481G Management of Dangerous Materials  

47.900G Introductory Law  
The concept of law; the creation and interpretation of statutes; the judicial and court systems; locus standi; common law and equity; basic principles of legal liability (civil and criminal); basic principles of administrative law and the liability of the Crown; the common law of employment; statutory regulation of employment; compulsory arbitration of industrial disputes.

Chemical Engineering and Industrial Chemistry

Undergraduate Study

48.302 Fuels and Energy  
A servicing subject for students in Electrical Engineering which deals with sources and properties of fuels (with particular emphasis on coal, crude oil and natural gas), principles of combustion including combustion calculations and the technology of boilers and other fuel plant. A variety of alternative energy sources are discussed and the national and global energy situation reviewed.
Anatomy

Undergraduate Study

70.011C  Introductory Anatomy  S1 L2T4 C6
Introduction to gross anatomy, based on a study of prospected specimens. Musculoskeletal, cardiovascular, respiratory, gastrointestinal, genito-urinary and nervous systems. General topographical and surface anatomy. Normal variations including those related to sex and age (childhood, adolescence, maturity and senescence).

70.306  Functional Anatomy I  S1 L2T4
Prerequisites: 70.011A, 70.011C.
Introduces fundamental issues in the morphology and dynamics of human movement systems, including physical properties of bone, muscle and connective tissue; biomechanics, movement analysis and neuromuscular control. These basic principles are applied to a detailed study of musculoskeletal components of head and neck and upper limb. Emphasis on modern analytical techniques and findings. Tutorials include detailed limb and joint dissections plus intensive study of surface and radiological anatomy.

Physiology and Pharmacology

Undergraduate Study

73.111  Physiology 1A  F L2T4 C12
Introduction to fundamental physiological principles — basic cellular function in terms of chemical and physical principles, and operation of the various specialized systems in the body: for example, the cardiovascular system, the respiratory system, the gastrointestinal system, the kidney, the endocrine system and the nervous system.

Graduate Study

97.001G  Linguistics and Written and Spoken Communication  S1 L2T1 C2
The lectures in linguistics aim to display the present state of linguistic theory in its aspects that relate most directly to human communication in the English-speaking world, includes the structure of English sentences in terms of pragmatics, semantics, syntax, and phonology. The orientation is eclectic, and encompasses at least the traditional, the structural and the transformational-generative approaches. Stress on applications of linguistics, especially in language teaching, in technological developments for speech transmission, and in speech and language disorders. Students are expected to develop their own special interests and to write one substantial paper on an approved topic.

97.002G  Basic Information Theory  F L1T2 C6

97.003G  Human Transinformation  F L1T2 C6
Review of transfer functions, feedback and statistical tests. Measurement of information and coding, entropy, codes and relevant coding.
theorems. Human information source and sink characteristics, language, Markov and Zipf, transformation models of ear and eye. The channel, Bayes’ theorem, entropy and equivocation in human context. Multivariate systems in the human group context, stochastic model in the time domain.

97.004G  The Psychology of Communication  S1 L2T1 C3
The basic communication process analysed in terms of Source, Medium/Message, Respondent and Effects. A social context theory of communication relating the influence of groups, roles, social class, power, status etc on communication. Attitude change through communication. Statistics and statistical analyses in the experimental study of communication.

97.005G  Audio and Video Equipment — Capabilities and Applications  S2 L2T2 C4
Aims to give an understanding of the characteristics of equipment used in sound recording and broadcasting, television and printing with some reference to mechanical detail. Topics: audio systems; testing of audio equipment; microphones and loudspeakers; amplifiers; sound transmission; level control, recording and reproduction; studio acoustics; sound mixing; editing and effects. Television scanning; television signals; camera tubes and cameras; television receivers and picture monitors; basic concepts of colour television; the PAL colour television system; switching, mixing and processing of television signals; lighting equipment; studio floor equipment; digital signal processing equipment. Printing processes; letterpress, gravure and lithography. Photography.

97.007G  Audio and Visual Signals in Communication  S1 L1T2 C3


97.008G  The Body in Communication  S2 L1T2 C2

97.010G  Basic Fortran  F L1 C2
Introduction to computer programming using FORTRAN for people with no computer experience and no mathematical training beyond High School mathematics. Practice at programming and debugging, with problems taken from both data processing and scientifc applications. Input and Output FORMAT statements; Nestad DO loops; Arithmetic statement functions; Matrix arrays; Impiled DO loops; Function subprograms and subroutine programs; Sorting and merging techniques; Common Storage; Communicating with peripherals of microcomputer; program planning and debugging.

97.012G  Project  S2 T5 C5
97.013G  Presentation of Information  S1 L1T2 C3
Styles, terms and models in communication. Channels of communication, audio and video. Characteristics of the various media of communication. Production and presentation of information by audio and video displays. Radio, films and TV for education. The actor in communication.

97.014G  Project Report  F C18
97.015G  Programming in Basic  S1 L1T2 C2
A brief introduction to programming, programming in BASIC on common microcomputers and Cyber 171. Definition of programming problems using flowcharts, error diagnosis and debugging techniques, tab function, nested subroutines and FOR NEXT loops, sorting and comparison of strings and arrays, operations on 2-dimensional arrays, plotting, memory limitations.

97.016G  Project Report  C9
97.031G  Linguistics and Written and Spoken Communication  C1
As for 97.001G (lectures only).

97.032G  Basic Information Theory  C1
As for 97.002G (lectures only).

97.034G  Psychology of Communication  C2
As for 97.004G (lectures only).

97.035G  Audio Video Equipment  C2
As for 97.0075 (lectures only).

97.037G  Audio Visual Signals in Communication  C1
As for 9.007G (lectures only).

97.038G  The Body in Communication  C1
As for 97.008G (lectures only).

97.043G  Presentation of Information  C1
As for 97.013G (lectures only).

97.046G  Introduction to Microprocessor Systems  C3
Review of semiconductor technologies and their development. Digital logic and integrated circuit devices. Codes. Microprocessors and their
Engineering

bus structures. Fundamental computer cycles and internal operations. Programmer's model of a microcomputer system. Instruction sets and simple machine language programs. Semiconductor memory devices and their interfacing. Interfacing and programming of serial and parallel input/output. Description of software development tools including monitors, assemblers, EPROM programmers and higher level languages.

97.345G  Active and Adaptive Circuits  C3

Financial Assistance to Students

The scholarships and prizes listed below are available to students whose courses are listed in this handbook. Each faculty handbook contains in its Financial Assistance to Student section the prizes and scholarships available within that faculty. The General Information section of the Calendar contains a comprehensive list of scholarships and prizes offered throughout the University.

Scholarships

Undergraduate Scholarships

As well as the assistance mentioned earlier in this Handbook (see General Information: Financial Assistance to Students), there are a number of scholarships available to students. What follows is an outline only. Full information may be obtained from Room G20, located on the Ground Floor of the Chancellery.

Unless otherwise indicated in footnotes, applications for the following scholarships should be made to the Registrar by 14 January each year. Please note that not all of these awards are available every year.

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bursary Endowment Board*</td>
<td>$150 pa</td>
<td>Minimum period of approved degree/combined degree course</td>
<td>Merit in HSC and total family income not exceeding $4000</td>
</tr>
</tbody>
</table>

*Apply to The Secretary, Bursary Endowment Board, PO Box 460, North Sydney 2060 immediately after sitting for HSC
### Undergraduate Scholarships (continued)

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
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<tbody>
<tr>
<td><strong>General (continued)</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Sam Cracknell Memorial</td>
<td>Up to $3000 pa payable in fortnightly instalments</td>
<td>1 year</td>
<td>Prior completion of at least 2 years of a degree or diploma course and enrolment in a full-time course during the year of application; academic merit; participation in sport both directly and administratively; and financial need</td>
</tr>
<tr>
<td>Girls Realm Guild</td>
<td>Up to $1500 pa</td>
<td>1 year renewable for the duration of the course subject to satisfactory progress and continued demonstration of need</td>
<td>Available only to female students under 35 years of age enrolling in any year of a full-time undergraduate course on the basis of academic merit and financial need</td>
</tr>
<tr>
<td><strong>Electrical Engineering</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>The Tyree Electrical Company Pty Ltd</td>
<td>Up to $6720 over 4 years</td>
<td>1 year renewable for the duration of the course, subject to satisfactory progress</td>
<td>Eligibility for admission to the full-time degree course in Electrical Engineering</td>
</tr>
<tr>
<td>** Mechanical Engineering**</td>
<td></td>
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</tr>
<tr>
<td>The Fox Manufacturing Company</td>
<td>Up to $1500 pa</td>
<td>1 year renewable for the duration of the course, subject to satisfactory progress</td>
<td>Eligibility for admission to the full-time degree course in Mechanical Engineering</td>
</tr>
<tr>
<td>James Howden &amp; Co Australia Pty Ltd</td>
<td>Up to $400 pa</td>
<td>1 year</td>
<td>Permanent residence in Australia and eligibility for admission to the full-time degree course in Mechanical Engineering</td>
</tr>
<tr>
<td><strong>Surveying</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Institution of Surveyors, NSW Division</td>
<td>Under review. Further details from Student Records and Scholarships Office.</td>
<td></td>
<td>Permanent residence in Australia and eligibility for admission to the full-time degree course in Surveying</td>
</tr>
</tbody>
</table>
### Graduate Scholarships

Application forms and further information are available from the Student Records, located on the Ground Floor of the Chancellery. Information is also available on additional scholarships which may become available from time to time, mainly from funds provided by organizations sponsoring research projects.

The following publications may also be of assistance:

1. *Awards for Postgraduate Study in Australia and Awards for Postgraduate Study Overseas*, published by the Graduate Careers Council of Australia, PO Box 28, Parkville, Victoria 3052;
2. *Study Abroad*, published by UNESCO†;

<table>
<thead>
<tr>
<th>Donor</th>
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<th>Year/s of Tenure</th>
<th>Conditions</th>
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</thead>
<tbody>
<tr>
<td>University of New South Wales Postgraduate Scholarships</td>
<td></td>
<td>1-2 years for a Masters and 3-4 years for a PhD degree</td>
<td>Applicants must be honours graduates (or equivalent). Applications to Registrar by 31 October (30 November in special circumstances).</td>
</tr>
<tr>
<td>Commonwealth Postgraduate Research Awards</td>
<td>Living allowance of $4620 pa. Other allowances may also be paid.</td>
<td>1-2 years; minimum duration of course</td>
<td>Applicants must be honours graduates (or equivalent) or scholars who will graduate with honours in the current academic year, and who are domiciled in Australia.</td>
</tr>
<tr>
<td>Commonwealth Postgraduate Course Awards</td>
<td></td>
<td></td>
<td>Preference is given to applicants with employment experience. Applicants must be graduates or scholars who will graduate in the current academic year, and who have not previously held a Commonwealth Postgraduate Award. Applications to Registrar by 30 September (in special circumstances, applications will be accepted until 30 November).</td>
</tr>
<tr>
<td>Australian-American Educational Foundation Travel Grant (Fulbright)*</td>
<td></td>
<td></td>
<td>Applicants must be graduates, senior scholars or post-doctoral Fellows. Applications close 30 September.</td>
</tr>
<tr>
<td>Australian Federation of University Women</td>
<td>Amount varies, depending on award</td>
<td>Up to 1 year</td>
<td>Applicants must be female graduates who are members of the Australian Federation of University Women</td>
</tr>
</tbody>
</table>

*Application forms are available from The Secretary, Department of Education, AAEF Travel Grants, PO Box 826, Woden, ACT 2606.
†Available for reference in the University Library.
### General (continued)

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Caltex Woman Graduate of the Year</strong></td>
<td>$16000 over 2 years for further studies in USA, UK, Northern Europe or in special cases Australia. There are no special allowances for travel or accommodation for married graduates.</td>
<td>2 years</td>
<td>Applicants must be female graduates who will have completed a University degree or diploma this year and who are Australian citizens or have resided in Australia for at least seven years. Selection is based on scholastic and literary achievements, demonstrable qualities of character, and accomplishments in cultural and/or sporting/recreational activities. Applications close 30 September.</td>
</tr>
<tr>
<td><strong>Commonwealth Scholarship and Fellowship Plan</strong></td>
<td>Varies for each country. Generally covers travel, living, tuition fees, books and equipment, approved medical expenses. Marriage allowance may be payable.</td>
<td>Usually 2 years, sometimes 3</td>
<td>Applicants must be graduates who are Commonwealth citizens or British Protected Persons, and who are not older than 35 years of age. Applications close with Registrar by 30 September.</td>
</tr>
<tr>
<td><strong>Sam Cracknell Memorial</strong></td>
<td>Up to $3000 pa payable in fortnightly instalments</td>
<td>1 year</td>
<td>Prior completion of at least 2 years of a degree or diploma course and enrolment in a full-time course during the year of application; academic merit; participation in sport both directly and administratively; and financial need.</td>
</tr>
<tr>
<td><strong>The English-Speaking Union (NSW Branch)</strong></td>
<td>$5000</td>
<td></td>
<td>Applicants must be residents of NSW or ACT. Awarded to young graduates to further their studies outside Australia.</td>
</tr>
<tr>
<td><strong>Gowrie Scholarship Trust Fund</strong></td>
<td>$3500 pa. Under special circumstances this may be increased.</td>
<td>2 years</td>
<td>Applicants must be members of the Forces or children of members of the Forces who were on active service during the 1939-45 War. Applications close with Registrar by 31 October.</td>
</tr>
<tr>
<td>*<em>Harkness Fellowships of the Commonwealth Fund of New York</em> **</td>
<td>Living and travel allowances, tuition and research expenses, health insurance, book and equipment and other allowances for travel and study in the USA</td>
<td>12-21 months</td>
<td>Candidates must be either: 1. Members of the Australian or a State Public Service or semi-government Authority. 2. Staff or graduate students at an Australian university. 3. Individually recommended for nomination by the Local Correspondents. The candidate will usually have an honours degree or equivalent, or an outstanding record of achievement, and be not more than 36 years of age. Applications close early August.</td>
</tr>
</tbody>
</table>

*Application forms must be obtained from the Australian representative of the Fund, Mr L. T. Hince, Reserve Bank of Australia, Box 3947, GPO, Sydney, NSW 2001.*

†Application forms available from The British Council, PO Box 88, Edgecliff, NSW 2077.
Graduate Scholarships (continued)

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
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<tbody>
<tr>
<td><strong>General (continued)</strong></td>
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</tr>
<tr>
<td>Frank Knox Memorial Fellowships at Harvard University</td>
<td>Stipend of $4000 pa plus tuition fees</td>
<td>1, sometimes 2 years</td>
<td>Applicants must be British subjects and Australian citizens, who are graduates or near graduates of an Australian University.</td>
</tr>
<tr>
<td>The Rhodes Scholarship†</td>
<td>Approximately £4000 stg pa</td>
<td>2 years, may be extended for a third year</td>
<td>Unmarried male and female Australian citizens, between the ages 19 and 25 who have been domiciled in Australia at least 5 years and have completed at least 2 years of an approved university course. Applications close in early September each year.</td>
</tr>
<tr>
<td>Rothmans Fellowships Award‡</td>
<td>$14000 pa</td>
<td>1 year, renewable up to 3 years</td>
<td>The field of study is unrestricted. Applicants must have at least 3 years graduate experience in research. Applications close in July.</td>
</tr>
</tbody>
</table>

| Engineering | | | |
| Harold G. Conde Memorial Fellowship | $5120 plus allowances | 1 year, Renewable up to 3 years | Applicants should be honours graduates permanently domiciled in Australia. The Fellowship is for graduate study or research in a field related to the electricity industry, including management. |
| University Fellowship in Highway Engineering | $4620 pa plus allowances | Course Work: 1 year, Research: 1 year, renewable | The Fellowship enables scholars to complete a Master of Engineering Science Course in Highway Engineering, or alternatively undertake research leading to a Master of Engineering or PhD degree. |
| Australian Institute of Nuclear Science and Engineering Studentships | Single students: $5105 pa, Dependent spouse allowance $2220 pa, $520 for each dependent child, plus some University expenses | 1-3 years | Applicants must be graduates in Nuclear Science or Engineering. At least one quarter of the period of tenure must be spent at the Institute at Lucas Heights, NSW. |

†Applications to Mr H. McCredie, Secretary of the NSW Committee, University of Sydney, NSW 2006.
‡Applications to The Secretary, Rothmans University Endowment Fund, University of Sydney, NSW 2006.
Graduate Scholarships (continued)

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
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</thead>
<tbody>
<tr>
<td>Engineering (continued)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Joseph Barling Fellowship</td>
<td>Not less than $8500</td>
<td>Maximum of 3 years</td>
<td>Candidates should be electrical engineering graduates of the University of New South Wales (in special circumstances mechanical and industrial engineering graduates may apply). The Fellowship is for full-time study for the award of the degree of Master of Business Administration, Master of Public Administration or Doctor of Philosophy at the University. Applications close 30 November.</td>
</tr>
<tr>
<td>Shell Scholarship in Science or Engineering</td>
<td>Approximately £4000 stg pa plus travelling expenses</td>
<td>2 years, sometimes 3</td>
<td>Applicants must be Australian citizens, under 25 years of age, with at least 5 years' domicile in Australia and who are completing the requirements for an honours degree in Science or Engineering. The successful candidate will undertake 2 years' graduate study towards the award of a higher degree at a British university.</td>
</tr>
</tbody>
</table>

Prizes

Undergraduate University Prizes

Prizes which are not specific to any School are listed under General. All other prizes are listed under the Faculty or Schools in which they are awarded. Information regarding the establishment of new prizes may be obtained from the Examinations Section located on the Ground Floor of the Chancellery.

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sydney Technical College Union Award</td>
<td>50.00 and medal</td>
<td>Leadership in the development of student affairs, and academic proficiency throughout the course</td>
</tr>
<tr>
<td>University of New South Wales Alumni Association</td>
<td>Statuette</td>
<td>Achievement for community benefit — students in their final or graduating year</td>
</tr>
</tbody>
</table>
## Undergraduate University Prizes (continued)

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Faculties of Engineering and Applied Science</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institution of Engineers, Australia</td>
<td>Medal and 100.00</td>
<td>The most proficient final year (or last 2 years part-time) student in the Bachelor of Engineering (or Bachelor of Science (Engineering)) Degree courses offered by the following Schools: Civil Engineering, Electrical Engineering, Mechanical and Industrial Engineering, Chemical Engineering, Mining Engineering, Textile Technology (Engineering option only)</td>
</tr>
<tr>
<td>The John Fraser Memorial Award</td>
<td>130.00</td>
<td>Excellence in the first year or equivalent part-time years of a bachelor's degree course offered by the Faculty of Engineering</td>
</tr>
</tbody>
</table>

## School of Civil Engineering

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian Conservation Foundation</td>
<td>50.00</td>
<td>Outstanding performance in subjects which develop environmental management concepts</td>
</tr>
<tr>
<td>Australian Welding Institute</td>
<td>30.00</td>
<td>Best design using a welding process for students in Years 2, 3 or 4</td>
</tr>
<tr>
<td>The Association of Consulting Structural Engineers of New South Wales</td>
<td>100.00</td>
<td>General proficiency — Structures in the Bachelor of Engineering degree course in Civil Engineering</td>
</tr>
<tr>
<td></td>
<td>100.00</td>
<td>General proficiency — Structures in the Bachelor of Science (Engineering) degree course in Civil Engineering</td>
</tr>
<tr>
<td>Aztec Transport Services</td>
<td>100.00</td>
<td>8.301 Systems Engineering</td>
</tr>
<tr>
<td>Chamber of Manufactures of New South Wales</td>
<td>15.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>Crawford Munro Memorial</td>
<td>150.00</td>
<td>Highest proficiency in 8.582 Water Resources II taken for the first time</td>
</tr>
<tr>
<td>Department of Civil Engineering Materials Staff</td>
<td>50.00</td>
<td>Best aggregate mark in the subjects 8.273 Civil Engineering Materials II and 8.274 Civil Engineering Materials III</td>
</tr>
</tbody>
</table>
# Undergraduate University Prizes (continued)

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
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</thead>
<tbody>
<tr>
<td><strong>School of Civil Engineering (continued)</strong></td>
<td></td>
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</tr>
<tr>
<td>Dillingham Australia Pty Ltd</td>
<td>150.00</td>
<td>Academic and professional excellence shown in the field of Construction Estimating</td>
</tr>
<tr>
<td>Hornibrook</td>
<td>100.00</td>
<td>Proficiency in Engineering Construction and Management</td>
</tr>
<tr>
<td>James Hardie Co Pty Ltd</td>
<td>100.00</td>
<td>Highest proficiency in 8.571 Hydraulics I taken for the first time</td>
</tr>
<tr>
<td>Water Board Gold Medal</td>
<td>Medal</td>
<td>Public Health Engineering</td>
</tr>
<tr>
<td><strong>School of Electrical Engineering and Computer Science</strong></td>
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<tr>
<td>Austral Crane</td>
<td>37.50</td>
<td>Bachelor of Engineering degree course in Electrical Engineering, Year III</td>
</tr>
<tr>
<td>Chamber of Manufactures of New South Wales</td>
<td></td>
<td>Power or Control elective</td>
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<tr>
<td>Electricity Supply Engineers Association of New South Wales</td>
<td>15.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>J. Douglas Maclurcan</td>
<td>40.00</td>
<td>Overall performance including proficiency in Electric Power Distribution in third year full-time or equivalent part-time degree course</td>
</tr>
<tr>
<td>The Wilfred Holmes Memorial Award</td>
<td>120.00</td>
<td>Control Systems</td>
</tr>
<tr>
<td><strong>School of Mechanical and Industrial Engineering</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atlas Copco</td>
<td>100.00</td>
<td>General proficiency in Bachelor of Engineering course in Mechanical Engineering</td>
</tr>
<tr>
<td>Austral Crane</td>
<td>75.00</td>
<td>Full-time Year 3 Mechanical Engineering</td>
</tr>
<tr>
<td>Babcock Aust Ltd</td>
<td>30.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>Chamber of Manufactures of New South Wales</td>
<td>15.00</td>
<td>Highest proficiency in Final Year of Naval Architecture course</td>
</tr>
<tr>
<td>CSR Limited</td>
<td>60.00</td>
<td>Best undergraduate or graduate thesis making a contribution to Computer-Based Engineering Design in the School of Mechanical and Industrial Engineering</td>
</tr>
<tr>
<td>Ford Motor Co of Aust Ltd</td>
<td>75.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>David Carment Memorial</td>
<td>350.00 and medal</td>
<td></td>
</tr>
<tr>
<td>The Computer-Based Engineering Design</td>
<td>75.00</td>
<td></td>
</tr>
<tr>
<td>Harbin Polytechnical Alumni Association</td>
<td>100.00</td>
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</tr>
</tbody>
</table>
### Undergraduate University Prizes (continued)

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School of Mechanical and Industrial Engineering (continued)</strong></td>
<td></td>
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<tr>
<td>Jeremy Hirschhorn</td>
<td>20.00</td>
<td>Theory of Machines</td>
</tr>
<tr>
<td>Royal Institution of Naval Architects</td>
<td>50.00</td>
<td>Bachelor of Engineering or Bachelor of Science (Engineering) degree course in Naval Architecture, final year or stage</td>
</tr>
<tr>
<td>Staedtler (Pacific) Pty Ltd</td>
<td>100.00 (open order)</td>
<td>General proficiency in Bachelor of Engineering Course in Mechanical Engineering, Year 2</td>
</tr>
<tr>
<td><strong>Department of Industrial Engineering</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Austral Crana</td>
<td>75.00</td>
<td>Bachelor of Engineering degree course in Industrial Engineering, Year 3</td>
</tr>
<tr>
<td>Chamber of Manufactures of New South Wales</td>
<td>15.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>R. E. Jefferies Memorial</td>
<td>250.00</td>
<td>Performance in final year/stage of Bachelor of Engineering degree course in Industrial Engineering</td>
</tr>
<tr>
<td>TRW Australia Ltd</td>
<td>20.00</td>
<td>Bachelor of Science (Engineering) degree course in Industrial Engineering, Stage 6</td>
</tr>
<tr>
<td><strong>School of Surveying</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Board of Surveyors Medal</td>
<td>Medal</td>
<td>Bachelor of Surveying degree course, Final Year</td>
</tr>
<tr>
<td>R. S. Mather Memorial</td>
<td>75.00</td>
<td>Most outstanding student in Geodesy</td>
</tr>
<tr>
<td><strong>Graduate University Prizes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>School of Civil Engineering</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institute of Advanced Motorists</td>
<td>20.00</td>
<td>Traffic Planning and Control</td>
</tr>
<tr>
<td>Wabco Aust Pty Ltd</td>
<td>400.00</td>
<td>Most distinguished graduate in the Master of Engineering Science degree course in Highway Engineering</td>
</tr>
</tbody>
</table>
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Peter Geoffrey Longrigg, BA P.N.G., DipLib Canberra C.A.E., ALAA

Mathematics

Senior Lecturer
Dennis William Trenerry, BSc PhD Adel.

Mechanical Engineering

Lecturers
Llewellyn Ramsay Jones, BSc N.Z., DipAm MEng Shaf., PhD Wales, MIEAust, MIMechE
Chakravarti Varadachar Madhusudana, BE Mys., ME I.I.Sc., PhD Monash, MIEAust

Mining Engineering

Senior Lecturer
Venkata Satyanarayana Vutukuri, BSc(Eng) BIan., MS Wis., MMGI, AIME, AUSIMM

Mineral Science

Senior Lecturer
Barenya Kumar Banerji, MSc Patna, PhD Leeds, AUSIMM

Physics

Senior Lecturer
Kenneth Reid Vost, BSc Glas., MSc N.S.W., AUSIMM
The University of New South Wales  Kensington Campus  1983

Theatres
Biomedical Theatres  E27
Central Lecture Block  E19
Classroom Block (Western Grounds)  H3
Rex Vowels Theatre  F17
Keith Burrows Theatre  J14
Main Building Theatrette  K14
Chemistry Theatres  D23
Parade Theatre  E3
Science Theatre  F13
Sir John Clancy Auditorium  C24

Buildings
Affiliated Residential Colleges
New (Anglican)  L6
Shalom (Jewish)  N9
Warrane  M7
Applied Science  F10
Architecture  H14
Arts (Morven Brown)  C20
Banks F22
Barker Street Gatehouse N11
Basser College  C18
Biological Sciences  D26
Central Store  813
Chancellery  022
Architecture  H14
Applied Science  F10
Biomedical Sciences (Faculty Office)  D26
Biomedical Library  F23
Biotechnology  D26
Botany  D26

Mathews  F23
Mechanical and Industrial Engineering  J17
Medicine (Administration)  B27
Menzies Library  E21
Metallurgy  E8
Morven Brown (Arts)  C20
New College (Anglican)  L6
Newton  J12
Parking Station  H25
Philip Baxter College  D14
Robert Helfron (Chemistry)  E12
Sam Cracknell Pavilion  H8
Shalom College (Jewish)  N9
Sir Robert Webster (Textile Technology)  G14
Squash Courts  B7
Swimming Pool  B4
Unisearch House  L5
University Regiment  J2
University Union
University Union (Blockhouse)  G6
University Union (Squarehouse)  E4
University Union (Roundhouse)  E4
University Union (Hillside)  C27
University Union (Stage III)  E4
Wallace Wuth School of Medicine  C27
Warrane College  B27
Wool and Pastoral Sciences  B8

General
Academic Staff Office  C22
Accountancy  F20
Admissions  C22
Adviser for Prospective Students  C22
Alumni and Ceremonials  C22
Anatomy  C27
Applied Geology  F10
Applied Science (Faculty Office)  F10
Architecture (including Faculty Office)  H14
Arts (Faculty Office)  C20
Australian Graduate School of Management  G27
Barker Street Gatehouse  N11
Biological Sciences (Faculty Office)  D26
Biomedical Library  F23
Biotechnology  D26
Bookshop  G17
Botany  D26
Building  H14
Careers and Employment  C22
Cashier's Office  C22
Centre for Biomedical Engineering  A28
Centre for Medical Education  C22
Research and Development  C27
Centre for Remote Sensing  K17
Chaplains  E15a
Chemical Engineering and Industrial Chemistry  F10
Chemistry  E12
Child Care Centres  N8, O14
Civil Engineering  H20
Closed Circuit Television Centre  F20
Commerce (Faculty Office)  F20
Committee in Postgraduate Medical Education  B27
Community Medicine  D26
Computing Services Unit  E21
Drama  B10
Economics  F20
Education  G2
Electrical Engineering and Computer Science  G17
Energy Research, Development and Information Centre  B6b
Engineering (Faculty Office)  K17
English  C20
Examinations  C22
Fees Office  C22
Food Technology  F10
French  C20
General Staff Office  C22
General Studies  C20
Geography  K17
German Studies  C20
Graduate School of the Built Environment  H14
Health Administration  C22
History  C20
History and Philosophy of Science  C20
Industrial Arts  C1
Industrial Engineering  J17
Institute of Languages  G14
Institute of Rural Technology  B8b
Japanese Economic and Management Studies Centre  G14
Kanga's House  C18
Kindergarten (House at Pooh Corner)  N8
Landscape Architecture  H14
Law (Faculty Office)  E21
Law Library  E21
Librarianship  F23
Library  E21
Lost Property  F20
Marketing  F20
Mathematics  F23
Mechanical Engineering  J17
Medicine (Faculty Office)  B27
Metallurgy  E8
Microbiology  D26
Mining Engineering  K15
Music  B11b
National Institute of Dramatic Art  C15
Nuclear Engineering  G17
Off-campus Housing  C22
Optometry  J12
Organizational Behaviour  F20
Pathology  C27
Patrol and Cleaning Services  F20
Philosophy  C20
Physics  K15
Physical Education and Recreation Centre (PERC)  B5
Physics and Engineering Science  C27
Political Science  C20
Postgraduate Extension Studies (Closed Circuit Television)  F20
Postgraduate Extension Studies (Radio Station and Administration)  F23
Psychology  F23
Public Affairs Unit  C22
Regional Teacher Training Centre  C27
Russian  C20
Science and Mathematics Course Office  F23
Social Work  G2
Sociology  C20
Spanish and Latin American Studies  C20
Sport and Recreation  E4
Student Counselling and Research  E15c
Student Health  E15b
Student Records  C22
Students' Union  E4
Surveying  K17
Teachers' College Liaison Office  F15b
Tertiary Education Research Centre  E15d
Textile Technology  G14
Town Planning  K15
University Archives  C22
University Press  A28
University Union (Blockhouse)  G6
Wool and Pastoral Sciences  B8a
Zoology  D26
This Handbook has been specially designed as a source of reference for you and will prove useful for consultation throughout the year.

For fuller details about the University — its organization, staff membership, description of disciplines, scholarships, prizes, and so on, you should consult the Calendar.

The Calendar and Handbooks also contain a summary list of higher degrees as well as the conditions for their award applicable to each volume.

For detailed information about courses, subjects and requirements of a particular faculty you should consult the relevant Faculty Handbook.

Separate Handbooks are published for the Faculties of Applied Science, Architecture, Arts, Commerce, Engineering, Law, Medicine, Professional Studies, Science (including Biological Sciences and the Board of Studies in Science and Mathematics), the Australian Graduate School of Management (AGSM) and the Board of Studies in General Education.

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