The University of New South Wales 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.

Beaver Press, 189 Liverpool Street, Sydney.
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General Information

In order to minimize the time and effort that you will put into your study 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. The 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 the University and its activities you should consult the University Calendar.

Now, see the following sixteen pages for other general information which may be of value to you.

Some people who can help you

Note: All phone numbers below are University extension numbers. If you are outside the University, dial 663 0351 and ask for the extension or dial 662—and then the extension number.

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 P. O'Brien, and his Administrative Assistant, Mr S. Briand, are located on the first floor of the Chancellery. They will see students who need advice and who have problems and are not sure whom they should see about them. Mr Briand looks after financial assistance matters. Enquire at room 148A, phone 2482 or 3164.

The Assistant Registrar (Examinations and Student Records), Mr J. Warr, is located on the ground floor of the Chancellery. For particular enquiries regarding Student Records (including matters related to illness affecting study) contact Mr. B. Newell (phone 2141), and regarding Examinations, Mr J. Grigg (phone 2143). This section can also advise on matters relating to discontinuation of subjects and termination of courses. General enquiries should be directed to 3711.

The Assistant Registrar (Admissions and Higher Degrees), Mr J. Hill, is located on the ground floor of the Chancellery. For particular enquiries regarding undergraduate courses phone Mr J. Beauchamp on 3319. General enquiries should be directed to 3711.

The Assistant Registrar (Student Employment and Scholarships), Mr J. Foley, is located on the ground floor of the Chancellery. Enquiries should be directed to 2086 (undergraduate scholarships), 2525 (graduate scholarships), and 3259 (employment).

The Housing Officer, Mrs J. Hay, is located in the Student Amenities and Recreation Unit in Hut B at the foot of Basser Steps. For assistance in obtaining suitable lodgings phone 3803.

The Student Health Unit is located in Hut E on College Road. The Director is Dr M. A. Naphthali. For medical aid phone 2679.

The Student Counselling and Research Unit is located at the foot of Basser Steps. The Head is Mr G. Gray. For assistance with educational or vocational problems ring 2600-2605 for an appointment.
The University Librarian is Mr A. Horton. Central Library enquiries should be directed to 2048.

The Chaplaincy Centre is located in Hut F at the foot of Basser Steps. For spiritual aid consult Rev B. W. Wilson (Anglican)—2684; Rev Father J. King or Rev Father M. Fallon (Catholic)—2379; Pastor H. Davis (Church of Christ)—2683; Rev P. Holden (Methodist)—2683; Pastor G. Rollo (Seventh Day Adventist)—2683; Rabbi M. Kantor (Jewish)—3273.

The Students' Union is located on the second floor of Stage III of the University Union where the SU full-time President or Education Vice-President are available to discuss any problems you might have. In addition the SU offers a range of diverse services including legal advice (full-time solicitor available), clubs and societies services, second-hand bookshop (buy or sell), new records/tapes at discount, food co-op, a professional nursery/kindergarten (House at Pooh Corner), a typesetting service, electronic calculators (bulk purchasing), health insurance and AUS insurance, an information referral centre (the Infakt Bus) and publications such as Tharunka, Orientation Magazine, Concessions Book and counter-course handbooks. For information about these phone 2929.

### Calendar of Dates

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<td>March 1 to May 9.</td>
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<td>May 17 to June 13</td>
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<td>Midyear Recess: June 14 to July 18</td>
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<td>July 19 to August 22</td>
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<td>August Recess: August 23 to August 29</td>
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<td>Thursday 1</td>
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<td>Friday 9</td>
<td>New Year's Day—Public Holiday</td>
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<td>Last day for application for review of results of annual examinations</td>
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<td>Timetables for deferred examinations available</td>
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<td>Last day for acceptance of applications by Admissions Office for transfer to another course within the University</td>
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<td>Australia Day—Public Holiday</td>
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<td>Deferred examinations begin</td>
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<td>February</td>
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<td>Saturday 7</td>
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<td>Deferred examinations end</td>
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<td>Monday 16</td>
<td>Enrolment period begins for new students and students repeating first year</td>
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<td>Tuesday 17</td>
<td>Last day for appeal against exclusion by students who infringed re-enrolment rules at annual examinations</td>
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<td>Enrolment period begins for second and later year students</td>
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<td>March</td>
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<td>Monday 1</td>
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<td>Friday 12</td>
<td>Last day for acceptance of enrolments by new students (late fee payable)</td>
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<td>Thursday 18</td>
<td>Last day for appeal against exclusion by students who infringed re-enrolment rules at deferred examinations</td>
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<td>Thursday 25</td>
<td>Last day for acceptance of enrolments by students re-enrolling in second and later years (late fee payable)</td>
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<td>Last day for students other than those attending the University for the first time to discontinue without failure subjects which extend over Session 1 only</td>
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<td>May</td>
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<td>Last day for students other than those attending the University for the first time to discontinue without failure subjects which extend over the whole academic year</td>
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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 as well as short recesses of one week within each of the sessions.

Session 1 commences on the first Monday of March.
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 1975 the University had 18,128 students and 3,984 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 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 42 members representative of the professions, commerce and industry, the legislature, employee organizations, rural, pastoral and agricultural interests, and the academic staff of the University. Its graduates and students.

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

The Chairman of the Council is the Chancellor, Sir Robert Webster, and the Deputy Chancellor is the Hon. Sir Kevin Ellis.

The Professorial Board

The Professorial Board is one of the two chief academic units 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 Faculties

The Dean, who is also a professor, is the executive head of the Faculty. Members of each Faculty 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 in General Education fulfils a function similar to that of the faculties. The Board of Studies in Science is responsible for the academic administration of the Science 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 professorial Head of the School in which you will be studying will be 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, Professor Rupert Myers, is charged with managing and supervising the administrative, financial and other activities of the University.

He is assisted in this task by three Pro-Vice-Chancellors, Professor J. B. Thornton, Professor R. E. Vowels and Professor A. H. Willis; the Deans and the three heads of the administrative divisions.

General Administration

The administration of general matters within the University comes mainly within the province of the Registrar, Mr C. G. Flowman, the Bursar, Mr T. J. Daly, and the Business Manager (Property), Mr R. K. Fletcher.

The Registrar’s Division is concerned chiefly with academic matters such as the admission of students, and the administration of examinations as well as the various student services (health, employment, amenities, and counselling).

The Bursar’s Division is concerned with the financial details of the day-to-day administration and matters to do with staff appointments, promotions, etc. The Property Division is concerned with the maintenance of buildings and grounds and equipment, and includes the University Architect’s office.

Student Representation on Council and Faculties

Three members of the University Council may be students elected by students. All students who are not full-time members of staff are eligible to stand for a two-year term of office. The students who are elected to the Council are eligible for election to the Committees of Council.

Students proceeding to a degree or a graduate diploma may elect one of their number to a Faculty for each 500 registered students, with a minimum of three students per Faculty. Elections take place towards the end of the academic year for a one-year term of office.
Open Faculty Meetings

If you wish you may attend a Faculty meeting. You should seek advice at the office of the Faculty whose meeting you wish to attend, as different faculties have their own rules for the conduct of open meetings.

Identification of Subjects by Numbers

For information concerning the identifying number of each subject taught in this faculty, turn to the first page of the main section below entitled Subject Descriptions and Textbooks.

See the Calendar for the full list of identifying numbers and subjects taught in the University.

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 publishes its own Handbook which is available free of charge. All enquiries about General Studies should be made to the General Studies Office, Room G54, Morven Brown Building (663 0351 Extn. 3478).

Student Services and Activities

The University Library

The University Library is on the upper campus adjacent to the Chancellery, the Sciences Building, the Goodsell and the Morven Brown Buildings. The Biomedical Library is in the western end of the Sciences Building with a branch at Prince Henry Hospital, telephone 661 0111. The University Library buildings house the Law Library, the Physical Sciences Library, the Social Sciences and Humanities Library and the Undergraduate Library.

There are services at other centres:


Water Reference Library: Manly Vale. Phone: 948 0261.

Each library provides a reference and lending service for staff and students, and is open in both Sessions 1 and 2 during day and evening periods, except the Water Reference Library which is only open during the day.

Staff and students must use a machine-readable identification card to borrow from the main University Library. Personal identification is required in the other libraries listed. For students a current Union card is acceptable. Staff must apply to the Library for a library card.

New students can collect temporary borrowing cards at the Library in Orientation Week. It is recommended that students attend the Introduction to the Library held during Orientation Week and the first week of Session 1.

Specific library problems should be referred to the Reader Assistance Unit located in the foyer of the Library. Copies of the Library Guide are available on request.

Accommodation

There are seven residential colleges on campus which offer accommodation to male and female students. The philosophy of the management, the residence fees and facilities vary from college to college. In addition to the basic fees charged most colleges make additional minor charges such as a registration fee and a power charge. It is anticipated that the fees in most colleges will be increased for 1976. Assistance is also provided in finding off-campus accommodation.

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 staff members. Fees are payable on a session basis. Apply in writing to the Master, Warrane College, Anzac Parade, Kensington, NSW 2033.

International House International House accommodates over 120 students from Australia and twenty other countries. Preference is given to more senior undergraduates and graduate students. Apply in writing to the Warden, International House, PO Box 88, Kensington, NSW 2033.

New College This Church of England College is open to all students without regard to race or religion. It has accommodation for approximately 220 students and is co-educational. Enquiries should be addressed to the Master, New College, Anzac Parade, Kensington, NSW 2033.

Shalom College Shalom College 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. Apply in writing to the Master, Shalom College, The University of New South Wales, PO Box 1, Kensington, NSW 2033.

Warrane College An affiliated Roman Catholic residential college, Warrane provides accommodation for 200 men students, both graduate and undergraduate. Non-resident membership is available to male students who wish to participate in College activities and make use of its facilities. Fees are payable on a session basis. Apply in writing to the Master, Warrane College, PO Box 123, Kensington, NSW 2033.

Off-campus Housing The Student Amenities and Recreation Unit maintains an up-to-date record of different types of off-campus housing including hostels, full board, bed and breakfast, flats and houses for rent. For information and assistance apply to the Housing Officer, Hut B, at the foot of Basser Steps (extension 3260).
Student Employment

The Student Employment Unit offers assistance with career employment for final year students and graduates of the University. This service includes the mailing of regular job vacancy notices to registered students and a campus interview program for final year students.

Careers advice and assistance is also available to undergraduates. Assistance is offered in finding vacation employment which gives either course-related experience or industrial training experience, where this is a course requirement. Information and advice regarding cadetships, undergraduate and graduate scholarships is also available.

The service is located in the Chancellery on the ground floor.

Phone extension 3259 for employment and careers advice, or extension 2086 for cadetships and industrial training information.

Student Health

The Student Health Unit, staffed by qualified medical personnel, offers free medical and first-aid services to male and female students. The service is not intended to replace private or community health services and thus if chronic or continuing conditions are revealed or suspected you will be advised and referred to your own doctor or an appropriate hospital. The health service is not responsible for fees incurred in these instances. Confidential appointments can be made at Hut E at the foot of Basser Steps between 9 am and 5 pm Monday to Friday. Phone extension 2679 or 3275.

Student Counselling and Research

The Student Counselling and Research Unit provides individual and group counselling for all students—prospective, undergraduate and graduate. If you have any personal needs, worries or confusion use this free, informal, personal service to help you sort out the basic issues. If the counsellor can't help you himself he usually knows someone who can.

Counselling appointments are available during sessions and recesses between 9 am and 7 pm. Phone 663 0351 extensions 2696 and 2600 to 2605, or call during Unit office hours, 8.30 am to 5.30 pm. Urgent interviews are possible on a walk-in basis between 9 am and 5 pm. Group counselling programs are offered both day and evening between 9 am and 9 pm by special arrangement.

Student Amenities and Recreation

This Unit, working in close liaison with the Sports Association, assists various recognized clubs by arranging and providing facilities and by handling on their behalf all inquiries and applications for membership.

It also provides a recreational program for students and staff at the Physical Education and Recreation Centre; liaises with the Public Transport Commission of New South Wales on matters concerning student travel concessions; and assists students in finding suitable accommodation off the campus.

Concessional application forms for all types of travel may be obtained at the Student Amenities and Recreation Unit or at the Information Desk in the Chancellery.

The Student Amenities and Recreation Unit is located in Hut B at the foot of Basser Steps. The various services may be contacted by phone on the following extensions: Sports Association, 2235; Physical Education and Recreation Centre, 3271; Travel, 2617; Accommodation, 3260.

Physical Education and Recreation Centre

The Physical Education and Recreation Centre consists of eight squash courts and a main building. The latter has a large gymnasium and ancillary practice rooms for fencing, table tennis, judo, weight-lifting and a physical fitness testing room. The Supervisor of Physical Recreation is responsible for the Centre and provides a recreational program for both students and staff. If you would like to take part in any of the programs contact the Supervisor on extension 3271.

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 at $45 per year for all registered students and is open to all members of staff and graduates of the University.

The full range of facilities provided by the Union includes a cafeteria service and other dining facilities, a large shopping centre, cloak room, banking and hairdressing facilities, showers, a women's lounge, common, games, reading, meeting, music, practice, craft and dark rooms. 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. Exhibitions are held in the John Clark Gallery.

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.

The Students' Union

The Students' Union is run by students and represents them on and off campus. Presidential elections are by
popular vote and all students who have completed two years at the University are eligible for election.

Membership is compulsory at $10 per annum.

The activities of the Students’ Union include:
1. Infakt—a student-run information referral service. If you want someone to talk to or need help of any kind see the people at Infakt located in the bus at the foot of Basser Steps.
2. A casual employment service.
3. Organization of Orientation Week.
4. Organization of Foundation Day.
5. A nursery/kindergarten, “The House at Pooh Corner”.
6. Publication of the student paper “Tharunka”.
7. A free legal service run by a qualified lawyer employed by the Students’ Union Council.

The Students’ Union is affiliated with the Australian Union of Students (AUS) which represents students on the national level.

The Students’ Union is located on the second floor, Stage III, the Union.

Chaplaincy Centre

This service is provided for the benefit of students and staff by five Christian Churches and by the Jewish congregation. Chaplains are in attendance at the University at regular times. A Chapel is also available for use by all denominations. For further details, turn to page 2.

Student Clubs and Societies

CASOC All clubs and societies on campus (except sporting clubs) are loosely organized under the umbrella of CASOC, which is a committee of the Students’ Union. Some of these clubs are: the Motor Cycle Club; Chess Club; Dramsoc; Opunka; Ngunnagan Club; Kite Club and the Jazz Society.

The Sports Association The Sports Association caters for a variety of competitive sports for both men and women. Membership of the Association is compulsory for all registered students and the annual subscription is $6.

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

Financial Assistance to Students

Tertiary Education Assistance Scheme

Under this scheme, which is financed by the Australian Government, assistance is available as follows:

- for full-time study in approved courses
- subject to a means test
- on a non-competitive basis
- to students who are not bonded
- to students who are permanent residents of Australia.

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

- Undergraduate and graduate degree courses
- Graduate diplomas
- Approved combined Bachelor degree courses
- Master’s qualifying courses where the course is the equivalent of an honours year and the student has not attempted an honours year.

Benefits

Means-tested Living Allowance The maximum rates of living allowances are $1,000 per annum for students living at home and $1,600 per annum for students living away from home. The maximum rates of living allowance will be paid where the adjusted family income is equal to or less than $7,600 per annum. The adjusted family income is assessed by subtracting from the gross income of both parents their business expenses and an amount of $450 for each dependent child other than the student.
When the adjusted family income exceeds $7,600 p.a. the amount of living allowance will be reduced by $2 for every $10 of income until the family income exceeds $15,200 per annum. After this level, the living allowance will be reduced by $3 for every $10 of income.

A concession may be made where there are other children in the family undertaking tertiary education with scholarship assistance from schemes other than the Tertiary Education Assistance Scheme of less than $600 pa.

Students qualifying for living allowance will also receive the following allowances where appropriate:

Incidentals Allowance The Incidentals Allowance of $100 is designed to help the student meet the cost of those fees which have not been abolished—the Students' Union, University Union and Sports Association fees, and other expenses associated with their studies.

Travel Allowance Students whose home is in the country may be reimbursed the cost of three return trips per year, during vacation time.

Dependants' Allowance This is made up of allowances of $15 per week for a dependent spouse and $7 per week for each child.

How to Apply If you were a 1975 Higher School Certificate candidate or a tertiary student receiving an allowance, you were sent forms last October. Other students may obtain forms from the Admissions Section or the Student Employment and Scholarships Unit, or from the Regional Director, Department of Education, Central Square, 323 Castlereagh Street, Sydney, N.S.W. 2000 (Telephone 218 8800). The administrative closing date for 1976 applications was 31 October 1975.

Scholarships, Cadetships, Prizes

1 Undergraduate Scholarships In addition to finance provided under the Australian Government's Tertiary Education Assistance Scheme there are a number of scholarships, cadetships, prizes and other forms of assistance available to undergraduate students. Details of procedures for application for these awards are contained in the Calendar.

There are also special scholarships not administered by the University, information about which may be obtained from the School office.

Further information and advice regarding scholarships is available from the Student Employment and Scholarships Unit in the Chancellery Building.

2 Graduate Awards An honours degree is generally an essential requirement for gaining one of the many graduate scholarships which are available at the University. Therefore gifted students should not neglect the opportunity to qualify for honours and thus become eligible for an award.

Details of graduate awards are contained in the University Calendar.

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 the Students' Union, the University Union and other 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 Australian 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.

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.

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

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

Financial Assistance to Aboriginal Students

Financial assistance is available from a number of sources to help Aboriginal students. Apart from the Australian Government's Tertiary Education Assistance Scheme there is a Commonwealth Aboriginal Study Grant Scheme. Furthermore, the University may assist Aboriginal students with some essential living expenses in exceptional circumstances.

All inquiries relating to this scheme should be made at the office of the Deputy Registrar (Student Services), Room 148A, in the Chancellery.

Rules and Procedures

The University, in common with other large organizations, has some agreed ways of doing things in order...
to operate efficiently and equitably for the benefit of all members. The rules and procedures listed below will affect you at some time or another. In some cases there are penalties (e.g. fines or exclusion from examinations) for failure to observe these procedures and therefore they should be read with care.

The information is arranged as answers to questions most asked by students. The first group of questions concerns admission and enrolment, the second fees and other money matters, the third examinations, and the remainder more general matters such as student conduct on campus.

**Admission and Enrolment**

How do I qualify for admission? In order to enter an undergraduate course you must qualify for matriculation to the University; satisfy requirements for admission to the course of subjects chosen; and be selected for admission to the faculty or course you wish to enter. Full details of matriculation and admission requirements are contained in a pamphlet obtainable at the Admissions Office and in the Calendar.

All students, except those enrolling in graduate research degrees (see below), must lodge an authorized enrolment form with the Cashier on the day the enrolling officer signs the form.

All students, except those enrolling in graduate research degrees and those exempted (see below), should on that day also either pay the required fees or lodge an enrolment voucher or other appropriate authority.

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 the fees are paid after that time (see below). Payment may be made through the mail in which case it is important that the student registration number be given accurately.

**New Undergraduate Enrolments** Persons who are applying for entry in 1976 must lodge an application for selection with the Metropolitan Universities Admissions Centre, PO Box 7049, GPO, Sydney 2001, by 1 October 1975.

Those who are selected will be required to complete enrolment at a specified appointment time before the start of Session 1. Compulsory fees must be paid on the day of the appointment. In special cases fees may be paid at the time of the appointment, however, and provided class places are still available, students may be allowed to complete enrolment after the prescribed week, subject to the payment of a penalty (see below).

Application forms and details of the application procedures may be obtained from the Admissions Office.

**First Year Repeat Students** First year students who failed more than half the programme at the 1975 Annual Examinations and who were not granted any deferred examinations should NOT follow the above procedure. They are required to show cause why they should be allowed to continue in the course, and should await instructions in writing from the Registrar as to the procedure.

**Later Year Enrolments** Students should enrol through the appropriate School in accordance with the procedures set out in the current year's booklet, *Enrolment Procedures*, available from the Admissions Office and from School offices.

**New Research Students** Students enrolling for the first time in graduate research degrees 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 and pay the appropriate fees. Completion of enrolment after this time will incur a penalty (see below).

**Re-enrolling Research Students** Students re-enrolling in research degrees should lodge the enrolment form with the Cashier as soon as possible but no later than the end of the second week of Session 1. Completion of enrolment after this date will incur a penalty (see below).

**Submission of Graduate Thesis or Project Report at Commencement of Session 1** A candidate who has completed all the work for a graduate degree except for the submission of a thesis or project report is required to re-enrol and pay fees as outlined above unless the thesis or project report is submitted by the end of the second week of Session 1 in which case the candidate is not required to re-enrol. Those required to re-enrol may claim a refund of fees if able to withdraw (see below).

**Miscellaneous Subject Enrolments** Students may be permitted to enrol for miscellaneous subjects (ie as students not proceeding to a degree or diploma) provided the Head of the School offering the subject considers it will be of benefit to the student and there is accommodation available. Only in exceptional cases will subjects taken in this way count towards a degree or diploma. A student who is under exclusion may not be enrolled in miscellaneous subjects which may be counted towards any course from which he has been excluded.

**Final Dates for Completion of Enrolments** No enrolments for courses occupying Session 2 only will be accepted after the end of the second week of Session 1 (26 March 1976).
How do assisted students (eg scholarship holders) enrol? Scholarship holders or sponsored students who have an enrolment voucher or letter of authority from their sponsor should present it at the time of enrolment. 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 must pay the 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.

What special rules apply if I wish to be considered for admission with advanced standing? If you make application to register as a candidate for any degree or other award granted by the University you may be admitted to the course of study with such standing on the basis of previous attainments as may be determined by the Professorial Board. For complete details regarding “Admission with Advanced Standing” consult the University Calendar.

What happens if I am unable to pay fees at the time of enrolment? If you are unable to pay fees by the due date you may apply in writing to the Deputy Registrar (Student Services) for an extension of time which may be granted in extenuating circumstances.

What happens if I fail to pay the prescribed fees or charges? If you fail to pay prescribed fees or charges or become otherwise indebted to the University and you fail to make a satisfactory settlement of your indebtedness upon receipt of due notice then you cease to be entitled to the use of University facilities. You will not be permitted to register for a further session, to attend classes or examinations, or be granted any official credentials. In the case of a student enrolled for Session 1 only or for Sessions 1 and 2 this disbarment applies if any portion of fees is outstanding after the end of the eighth week of Session 1 (23 April 1976). In the case of a student 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 (27 August 1976).

In very special cases the Registrar may grant exemption from disqualifications referred to in the preceding paragraph upon receipt of a written statement setting out all relevant circumstances.

Can I transfer from one course to another? To transfer from one course to another you must apply on an application form obtainable from the Admissions Office by 16 January. If your application is successful you are required to comply with the enrolment procedures for the year/stage of the new course and, unless otherwise instructed, you should present the letter granting transfer to the enrolling officer. You should also inform the enrolling officer of the school in which you are enrolled of your intention to transfer.

Can I change my course program? If you wish to seek approval to substitute one subject for another, add one or more subjects to your program or discontinue part or all of your program, you must make application to the Registrar through the Head of the School responsible for the course on forms available from the School office. The Registrar will inform you of the decision. Application to enrol in additional subjects must be submitted by the end of the fourth week of Session 1.

It is emphasized that failure to sit for examinations in any subject in which you are enrolled will be regarded as failure to satisfy the examiners in that subject unless written approval to withdraw without failure has been obtained from the Registrar.

Withdrawal from subjects. Students are permitted to withdraw from subjects without being regarded as having failed, provided they apply by the dates indicated.

First Year Students
1. one-session subjects: the end of the eighth week of session;
2. double-session subjects: the end of the second week of Session 2.

For the purpose of this rule a first-year student is defined as one who is attending the University for the first time either on a full- or part-time basis and is enrolled in the first year or first stage of a course.

Other Students
1. one-session subjects: the end of the fourth week of session;
2. double-session subjects: the end of the May Recess.

How do I enrol after an absence of twelve months or more? If you have had a leave of absence for twelve months and wish to resume your course you should follow the instructions about re-enrolling given in the letter granting your leave of absence. If you do not fully understand or have lost these instructions, then you should contact the Admissions Office in December of the preceding year or before October in the year preceding the one in which you wish to resume your course.

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

Are there any 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. A student enrolled for the first time in any undergraduate course in the University shall be required to
show cause why he/she should be allowed to continue the course if that student fails more than half the program in which he/she is enrolled. In order that students may calculate half their program, the weighing of subjects in each course is defined in Schedule A, which may be varied from time to time by the Professorial Board.

Repeated-failure Rule

2. A student shall be required to show cause why he/she should be allowed to repeat a subject which that student has failed more than once. Where the subject is prescribed as part of the student's course he/she shall also be required to show cause why he/she should be allowed to continue that course. Failure in a deferred examination as well as in the initial examination counts for the purposes of this rule as one failure.

General Rule

3. The Re-enrolment Committee may, on the recommendation of the relevant faculty or board of studies, review the academic progress of any student. If that student's academic record seems to demonstrate, in the opinion of the Committee, the student's lack of fitness to pursue a subject or subjects and/or a course or courses, the Committee may require that student to show cause why he/she should be allowed to re-enrol in such subject(s) and/or course(s).

The Session-unit System

4. A student who infringes the provisions of Rules 1 or 2 at the end of Session 1 of any year will not be required to show cause at that time but 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 that course.

B Such a student will be required to show cause at the end of the year, except that a student who has infringed Rule 2 at the end of Session 1, repeats the subject(s) in question in Session 2, and passes it/them, will not be required to show cause on account of any such subject.

Exemption from Rules by Faculties

5. A A faculty or board of studies examination committee may, in special circumstances, exempt a student from some or all of the provisions of Rules 1 and 2.

B Such a student will not be required to show cause under such provisions and will be notified accordingly by the Registrar.

"Showing Cause"

6. A A student wishing to show cause must apply for special permission to re-enrol. Application should be made on the form available from the Examinations and Student Records Section 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.

B Each application shall be considered by the Re-enrolment Committee which shall determine whether the cause shown is adequate to justify the granting of permission to re-enrol.

Appeal

7. A Any student who is excluded by the Re-enrolment Committee from a course and/or subject(s) under the provisions of the Rules 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 he 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.

B The notification to any student of a decision by the Re-enrolment Committee to exclude him/her from re-enrolling in a course and/or subject(s) shall indicate that the student may appeal against that decision to the Appeal Committee. In lodging such an appeal with the Registrar the student should provide a complete statement of all grounds on which the appeal is based.

C The Appeal Committee shall determine the appeal after consideration of the student's academic record, his/her application for special permission to re-enrol, and the stated grounds of appeal. In exceptional circumstances, the Appeal Committee may require the student to appear in person.

Exclusion

8. A A student who is required to show cause under the provisions of Rules 1 or 3 and either does not attempt to show cause or does not receive special permission to re-enrol from the Re-enrolment Committee (or the Appeal Committee on appeal) shall be excluded from re-enrolling in the subject(s) and course(s) on account of which he was required to show cause. Where the subjects failed are prescribed as part of any other course (or courses) he/she shall not be allowed to enrol in any such course.

* It is proposed that under this arrangement, the membership of the Appeal Committee will be Pro-Vice-Chancellor J. B. Thornton (Chairman), Professor D. M. McCallum, Chairman of the Professorial Board, and a member of Council in the category of members elected by the graduates of the University, nominated by the Vice-Chancellor.
B A student who is required to show cause under the provisions of Rule 2 and either does not attempt to show cause or does not receive special permission to re-enrol from the Re-enrolment Committee (or the Appeal Committee on appeal) shall be excluded from re-enrolling in any subject he/she has failed twice. Where the subject failed is prescribed as part of the student's course he/she shall also be excluded from that course. Where the subject failed is prescribed as part of any other course (or courses) he/she shall not be allowed to enrol in any such course.

C A student excluded from a course or courses under the provisions of A or B may not enrol as a miscellaneous student in subjects which may be counted towards any such course.

Re-admission after Exclusion

9. A An excluded student may apply to the Re-enrolment Committee for re-admission after two academic years.

B An application for re-admission after exclusion should be made on the form available from the Examinations and Student Records Section and should be lodged with the Registrar not later than 31 August in the year prior to that for which re-admission is sought. A late application may be accepted at the discretion of the Registrar.

C An application 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 appropriate study in the subject(s) (or the equivalent) on account of which the applicant was excluded.

Restrictions and Definitions

10. A These rules do not apply to students enrolled in programs leading to a higher degree or graduate diploma.

B A subject is defined as a unit of instruction identified by a distinctive subject number.

How do I apply for admission to degree or diploma? Applications for admission to a degree or diploma of the University must be made on the appropriate form by 12 September, in a student's final year. Forms are mailed to all final year students. Don't forget to inform the University if you subsequently change your address so that correspondence related to the ceremony will reach you without delay. Applicants should ensure that they have completed all requirements for the degree or diploma, including industrial training where necessary. Any variation such as cancelling of application in order to proceed to an honours degree or submission of an application following discontinuation of honours program, must be submitted in writing to the Registrar no later than 30 January.

Fees*

Do I have to pay fees for tuition? No. There are no fees for tuition but other fees and charges are payable.

What other fees and charges are payable? These include those charges raised to finance the expenses incurred in operating student activities such as the University Union, the Students' Union, the Sports Association and the Physical Education and Recreation Centre. Penalties 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 which are lent to students for their personal use during attendance in certain subjects. Accommodation charges, costs of subsistence on excursions, field work, etc., and for hospital residence (medical students) are payable in appropriate circumstances.

How much is my contribution to student activities and services on campus? All students (with the exceptions noted below) will be required to pay the following fees if enrolling for a program involving two sessions. Those enrolling for only one session will pay one-half of the Student Activities Fees, but the full University Union entrance fee, if applicable.

University Union entrance fee—$20 payable on first enrolment

Students Activities Fees:
University Union—$45 annual subscription
Sports Association—$6 annual subscription
Students' Union:
Students enrolling in full-time courses—$10 annual subscription
Students enrolling in part-time courses—$8 annual subscription
Miscellaneous—$25 annual fee.
(The miscellaneous fee is used to finance expenses generally of a capital nature relating to student activities. Funds are allocated to the various student bodies for projects recommended by the Student Affairs Committee and approved by the University Council.)

Depending on the subject being taken, students may also be required to pay:
Pathology Instrument Kit—$10
(Refundable return in satisfactory condition)

Who is exempt from payment of fees?
1. Life members of University Union, 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 Students Activities Fees and the University Union entrance fee.

* Fees quoted are current at the time of publication and may be amended by the Council without notice.
3. University Union fees and subscriptions may be waived by the Deputy Registrar (Student Services) for students enrolled in graduate courses in which the academic requirements require either no or minimal attendance on the Kensington campus.

4. Students who while enrolled at another university in Australia in a degree or diploma course are given approval to enrol at the University of New South Wales but only in a miscellaneous subject or 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.

5. 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.

6. 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.

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

How much will textbooks and special equipment (if any) cost? You must allow quite a substantial sum for textbooks. This can vary from $200 to $600 depending on the course taken. These figures are based on the cost of new books. The Students' Union operates a second-hand 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.

Are fees charged for examinations? Generally there are no charges associated with examinations; however, two special examination fees are applied:

Examinations conducted under special circumstances—for each subject $11
Review of examination result—for each subject $11

What penalties exist for late payment of fees? The following additional charges will be made in 1976 when fees are paid late:

Failure to lodge enrolment form according to enrolment procedure $20
Payment of fees after end of second week of session $20
Payment of fees after end of fourth week of session $40

Will I receive any refund if I withdraw from a course?
Yes. The following rules apply:

1. If you withdraw from a course you are required to notify the Registrar in writing.

2. Where notice of withdrawal from a course is received by the Registrar before the first day of Session 1 a refund of all fees paid will be made. After that time only a partial refund will be made. See the Calendar for details.

Examinations

When are examinations held? Most annual examinations are held in November-December but examinations in many subjects are also held during the Midyear Recess.

Provisional timetables indicating the dates and times of examinations and notices of the location of examinations are posted on the central notice boards in the Biological Sciences Building, the Chancellery, Central Lecture Block, Dalton Building (Chemistry), Main Building (Mining and Physics), and in the Western Grounds Area on 4 May and 21 September. You must advise the Examinations Unit (Chancellery) of a clash in examinations by 17 May and 1 October. Final timetables are displayed and individual copies are available for students on 1 June and 19 October.

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

In the assessment of your progress in University courses, consideration is 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.

How are examination passes graded? Passes are graded: High Distinction, Distinction, Credit and Pass. A Pass Conceded may be granted to a student whose mark in a subject is slightly below the standard required for a pass but whose overall satisfactory performance warrants this concession.

A Terminating Pass may be granted where the mark for the subject is below the required standard. A terminating pass will not permit a student to progress further in the subject or to enrol in any other subject for which a pass in the subject is a co-requisite or prerequisite. A student given a terminating pass may attempt a deferred examination, if available, to improve his performance but should he fail in such attempt, the terminating pass shall stand.

When are examination results available? Final examination results will be posted to your term address (which can be altered up to 30 November) or to your vacation address (fill in a form obtainable at the Information Desk, Chancellery, also by 30 November). Results are also posted on School notice boards and in the foyer of the Sir John Clancy Auditorium. No examination results are given by telephone.

Can examination results be reviewed? Examination results may be reviewed for a fee of $11 a subject, which is refundable in the event of an error being discovered.
This review consists mainly of ensuring that all questions attempted have been marked and checking the total of the marks awarded. Applications for review must be submitted on the appropriate form to the Examinations and Student Records Section together with the necessary fee by the following dates:

Annual examinations held in November/December 1976 — Friday 7 January 1977.
Deferred examinations held in January/February 1977 — Tuesday 22 February 1977.

Are allowances made if students are sick before or during an examination? A student who through serious illness or other cause outside his control is unable to attend an examination is required to bring the circumstances (supported by a medical certificate or other evidence) to the notice of the Registrar not later than seven days after the date of the examination, and may be required to submit to medical examination.

A student who believes that his performance in a subject has been affected by serious illness during the year or by other cause outside his control, and who desires these circumstances to be taken into consideration in determining his standing, is required to bring the circumstances (supported by a medical certificate or other evidence) to the notice of the Registrar as soon as the circumstances are known but not later than seven days after the date of the examination.

All medical certificates should be as specific as possible concerning the severity and duration of the complaint and its effect on the student’s ability to take the examinations.

A student who attempts an examination, yet claims that his performance is prejudiced by sickness on the day of the examination must notify the Registrar or Examination Supervisor before, during, or immediately after the examination, and may be required to submit to medical examination.

A student suffering from a physical disability which puts him at a disadvantage in written examinations should apply to the Registrar in writing for special provision when examinations are taken. The student should support his request with medical evidence.

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 under special circumstances.

How are examinations conducted? 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 ten 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. No candidate shall be admitted to an examination after thirty minutes from the time of commencement of the examination.
5. No candidate shall be permitted to leave the examination room before the expiry of thirty minutes from the time the examination commences.
6. No candidate shall be re-admitted to the examination room after he has left it unless during the full period of his absence he has been under approved supervision.
7. A candidate shall not by any improper means obtain, or endeavour to obtain, assistance in his work, give, or endeavour to give, assistance to any other candidate, or commit any breach of good order.
8. Smoking is not permitted during the course of examinations.
9. All answers must be in English unless otherwise directed. Foreign students who have the written approval of the Officer-in-Charge of Examinations may use standard translation dictionaries.
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.

Should I list my sources? Students are expected to acknowledge the sources of ideas and expressions that they use in essays. To provide adequate documentation is not only an indication of academic honesty but also a courtesy enabling the marker to consult your sources with ease. Failure to do so may constitute plagiarism which is subject to a charge of academic misconduct.

Under what circumstances are deferred examinations granted? Deferred examinations may be granted in the following cases:

1. When a student through illness or some other acceptable circumstance has been prevented from taking the annual examination or has been placed at a serious disadvantage during the annual examinations.
2. To help resolve a doubt as to whether a student has reached the required standard in a subject.
3. To allow a student by further study to reach the required standard in a subject.
4. Where a student’s progression or graduation is inhibited by his failure in one subject only, a deferred examination may be granted notwithstanding his failure otherwise to qualify for this concession.
In the Faculties of Arts, Commerce and Law special circumstances apply in the granting of deferred examinations. Details in each circumstance are given in the section Faculty Information in the respective handbooks for these faculties, or in the Calendar.

Deferred examinations must be taken at the centre at which the student is enrolled, unless he has been sent on compulsory industrial training to a remote country centre or interstate. In this case the student must advise the Registrar, on a form available from his school or the Information Desk, the Chancellery, of relevant particulars, before leaving for his destination, in anticipation that deferred examination papers may have to be forwarded to him. Normally, the student will be directed to the nearest university for the conduct of the deferred examination.

Can I buy copies of previous examination papers? Yes—for 5c each from the Union Shop in the University Union.

Student Conduct on Campus

Is there a detailed code of rules related to the general conduct of students? No. The University has not considered it necessary to formulate a detailed code of rules relating to the general conduct of students.

However, now that you have become a member of the University you should understand that this involves an undertaking on your part to observe its rules, by-laws and other requirements, and to pay due regard to any instructions conveyed by any officer of the University.

What are the rules related to attendance at classes? You are expected to be regular and punctual in attendance at all classes in the course or subject in which you are enrolled. All applications for exemption from attendance at lectures or practical classes must be made in writing to the Registrar.

In the case of illness or of absence for some other unavoidable cause you 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.

Applications for exemption from lectures (leave of absence) should be addressed to the Registrar and, where applicable, should be accompanied by a medical certificate. If examinations have been missed, state this in your application.

If you fail a subject at the annual examinations in any year and re-enrol in the same course in the following year, you must include in your program of studies for that year the subject in which you failed. This requirement will not be applicable if the subject is not offered the following year; 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.

If you attend less than eighty per cent of your possible classes, you may be refused permission to sit for the examination in that subject.

Why is my University Union card important? All students are issued with a University Union membership card. Your card must be carried during attendance at the University and shown on request.

The number appearing on the front of the card above your name is your 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 some inconvenience in completing re-enrolment.

If you lose your Union card it is important to notify the University Union as soon as possible.

New students will be issued with University Union cards on enrolment.

Why should I inform the University if I change my address? If you change your address you should notify the Student Records Section of the Registrar’s Division as soon as possible. Failure to do this could lead to important correspondence (including examination results) not reaching you. The University cannot accept responsibility if official communications fail to reach students who have not notified their change of address. Change of Address Advice Forms are available at Faculty and School offices and at the Information Counters on the Ground Floor of the Chancellery Building.

These will be accepted up to 30 November, except for final year students who may advise changes up to four weeks before their graduation ceremony.

Will the University release information to third parties without my permission? In general, no. The University treats examination results 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, there are sometimes accusations made that the University has revealed information, including addresses (especially to insurance companies). All students should be aware that students’ addresses are eagerly sought by various commercial agents and that sometimes tricks are used to obtain them. For example, from time to time 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 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.

How are student records kept up to date? Enrolment details forms will be sent to all students on 26 April and 30 August. It is not necessary to return these forms unless any information recorded thereon is incorrect. Amended forms must be returned to the Examinations and Student Records Section within fourteen days. Amended forms 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.

Is there any rule related to the ownership of students' work? Yes. 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 you as part of your courses, or submitted for any award or competition conducted by the University.

Can I get a permit to park on campus? Because of the limited amount of parking space available, only the following categories of students may apply for a permit: motor cycle owners (annual fee $3.90; masters and doctoral candidates (ballotted issue, annual fee $7.80); graduate, and senior undergraduate students who have completed two or three years of a full-time or part-time course (annual fee $3.90—only a limited number of permits available for students who have completed two years). A permit will allow access to the campus between 5 pm and 11 pm on weekdays and during library hours on Saturdays, Sundays and public holidays. Enquiries should be made to the Property Section, Room 240, the Chancellery, or phone 663 0351, extension 2920. It should be noted that increasing demand for parking space may require the imposition of further restrictions and that rates may change for 1976.

Lost Property? All enquiries concerning lost property should be made to the Superintendent on extension 3580 or to the Lost Property Office at the Union.

Further Information
Where can I get further information concerning courses, admission requirements, scholarships and enrolment procedure?
Foreword

This handbook is primarily for undergraduate students in the Faculty of Engineering and aims to provide information concerning the requirements for admission, enrolment and re-enrolment, conditions for the award of the different Bachelor degrees in the Faculty and the subject matter of the courses offered, including textbooks. 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.

At the same time, it is appreciated that a student’s choice in regard to course and other matters remains to be discussed with members of the academic staff. Some students do not need to make their final choice of degree course before the start of third year. Students should consult the Heads of Schools about this; where the Heads cannot be available, they have nominated colleagues to deal with enquiries.

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

Skills
- 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.

Communication
- 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.

Creativity
- 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 undergraduates. 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. Good opportunities exist for this in Faculty Hour, a voluntary series of lectures and discussions on topics touching on the interaction of the engineer and society. This takes place at noon on Mondays in the Electrical Engineering Theatre LG1. All third and fourth year students, and some others also, will find their timetables free of formal classes at noon on Mondays. Students are urged to use Faculty Hour to broaden their approach to their studies.

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Faculty of Engineering
Staff

Comprises Schools of Civil, Electrical, Highway, Mechanical and Industrial, Nuclear, Surveying, and Transportation and Traffic.

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Farrokh Mistree, BTech I.T. Kharagpur, MS PhD Calif.
Donald Zabez Stephen Mudge, BSc Lond., CEng, MIMechE, MIEAust, WhSc
Boris Osman, BE Adel., FSASM, MIEAust
Hugh Lithgow Stark, BSc PhD Strath., CEng, MIMechE, MIEAust
Jae Lin Woo, BSc Seoul, SM M.I.T.

Tutors
Henry Adrian Hart, BScEng N.S.W.
David Malcolm Jenkins, BE Syd.
Lyle John McLean, BScEng N.S.W., GradIEAust
Hoong Gheow Wong, BE N.S.W.

Senior Lecturers
John Frederick Campbell Close, BSc BE Syd., ME N.S.W., MIEE, SMAIE, MIEAust
Michael Geoffrey Stevenson, BSc(Tech) PhD N.S.W., ASTC, CEng, MIEAust, MiProdE

Lecturers
Leonard Edward Farmer, BE MEngSc PhD N.S.W.
Daniel Goodridge, DipEngChim l'Aurore, Shanghai, DipEng N.S.W.
Thomas Richard Jefferson, MSc Tor., PhD Northwestern
Grier Cheng Lin, DipEngChim P. I.T., Taiwan, PhD N.S.W., MIEAust
Raymond Norman Roth, BE PhD N.S.W., CEng, MIEAust
Carlton Henry Scott, BSc Qld., PhD N.S.W.
Graham Smith, BE MEngSc N.S.W., ASTC, MIEAust

Department of Fluid Mechanics and Thermodynamics

Includes Aeronautical Engineering and Naval Architecture.

Associate Professors
Richard Douglas Archer, BSc Melb., BE Syd., MS PhD Minn., FBIS, MIEAust, MAIA, MRAeS
Graham de Vahl Davis, BE Syd., PhD Camb., CEng, FIMechE, FIEAust, MASME

Senior Lecturers
Reginald Edward Corbett, DIC, ASTC, CEng, MIMechE, MIEAust
Michael Richard Davis, BSc(Eng) PhD St John's, MRAeS CEng
John Newton Hool, BE Syd., DPhd Oxon., ASTC, CEng, FIMechE, MIEAust
Owen Francis Hughes, SB SM(NavArch) M.I.T., PhD N.S.W., MIEAust, MRINA, MSNAME
Robert Taggart Black McKenzie, MS ME Purdue, ARCS/ES(Glas.), CEng, FIMechE
Charles Matthew Sapsford, BSc(Eng) Lond., ME N.S.W., CEng, FIMechE, MIEAust
Robert John Tuft, ASTC, CEng, FRINA, MIEAust

Lecturers
Lawrence Julian Doctors, BE MEngSc Syd., PhD Mich., AMCASl, AMNAME, MIEAust
Brian Edward Milton, BE PhD N.S.W., MSc Birm., CEng, MIEAust, MRAE
Graham Lindsay Morrison, BE PhD Melb.
Janis Osvalds Muznieks, DiplIng Latvia, Dr LingAer Rome
John Arthur Reizes, ME PhD N.S.W., MIEAust

Department of Agricultural Engineering

Senior Lecturer
Harold Glenn Bowditch, ME N.S.W., ASTC, MIEAust, MAgrE, MemASAE

Department of Industrial Engineering

(including Operations Research and Production Engineering)

Associate Professor
Jack Taylor, BSc Nott., CEng, FIMechE

School of Nuclear Engineering

Professor of Nuclear Engineering and Head of School
James Joseph Thompson, BE PhD Syd.

Associate Professor
Zdenek Josef Holy, DiplIng Prague, MSc Birm., MEngSc PhD N.S.W., MIEAust

Senior Lecturer
Paul Robert Barrett, MSc PhD Birm., FAIP, MInstP

Lecturers
Olaf Oscar Carlos Alexander Bils, DiplIng Berl., PhD N.S.W.
Leslie George Kemery, BE Syd., MIEAust
Engineering

Teaching Fellow
Peter Thomas Bath, BE MEngSc N.S.W.

Professional Officer
Peter Yo Pin Chen, BSc MEngSc ME PhD N.S.W., ASTC

School of Surveying

Professor of Surveying, Head of School and of Department of Geodesy
Peter Vincent Angus-Leppan, BSc(Eng) Rand., PhD DipTP Natal, FISAust, MILS (Natal), MAIC

Professor of Surveying and Head of Department of Photogrammetry

Associate Professor of Surveying and Head of Department of Surveying
George Gordon Bennett, MSurv Melb., PhD N.S.W., LS(N.S.W.), FISAust

Administrative Assistant
Joseph Valentine Fonseka, BA.Lond.

Department of Geodesy

Associate Professor
Ronald Sunthereraj Mather, BSc Ceyl., PhD N.S.W., FISAust

Lecturers
Arthur Harry William Kearsley, BSurv MSurvSc N.S.W., MAIC, MISAust
Arthur Stoil, BSurv PhD N.S.W., LS(N.S.W.), MISAust
Friedrich Karl Brunner, Dipling Dr techn T.H. Vienna, MISAust

Department of Photogrammetry

(including Land Studies and Cartography)

Senior Lecturers
John Charles Trinder, BSurv PhD N.S.W., MSc T.H. Delft, LS(N.S.W.), MISAust
Bruce Crosby Forster, MSurv Melb.
George James Forster Holden, ARICS, DipPhoto. Lond., PhD N.S.W., FRGS, MISAust, MAIC

Lecturers
Leonard Berlin, BSc(LS) Cape T., BSc T.H. Delft, MISAust
Pratap Shivabhai Amin, BSc T.H. Delft, MSc Lond., MISAust, MISK, CLSEA, ARICS

Senior Tutor
Salvatore Umberto Nasca, DottScGeol Florence, DipTop&Cart (Istituto Geografico Militare) MGAS, AMAIMM

School of Transportation and Traffic

Professor of Traffic Engineering and Head of School
William Ross Blunden, BSc BE Syd., FCIT(Lond), MITE(U.S.A.), MIEAust, MStatSocAust, MAustSocOpRes

Senior Lecturers
Rossi Donald Munro, BSc W Aust., BA Melb.
John Irwin Tindall, BE Old., BCom ME N.S.W.
Harold James Arthur Turner, BSc Lond., ME N.S.W., MIEE, ARCS

Lecturers
Michael Clarence Dunne, BSc PhD Adel.
John Andrew Black, BA Manc., PhD Brad.

Senior Project Scientist
Alex James Fisher, BSc Lond.

Professional Officers
Roger Roy Hall, BSc A.N.U.
Colin John Wingrove, BSc N.S.W.

Department of Surveying

Associate Professor
John Stuart Allman, BSurv PhD N.S.W., MISAust, MAIC

Senior Lecturer
Arthur Paul Heinz Werner, Dipling Bonn, FISAust

Lecturers
Anthony John Robinson, BSurv PhD N.S.W., LS(N.S.W.), MISAust, MAIC
Sabapathy Ganeshan, BSc Ceyl.
Klaas Ids Groenhout, BSurv N.S.W., LS(N.S.W.), MISAust, AMIC
Gregory Justin Hoar, BSurv PhD N.S.W., MISAust
Jean Mark Rueger, Dipling. ETH Zurich

Senior Tutor
Robert Campbell Patterson, BSurv MSurv Sc N.S.W.

Professional Officers (School)
Colin Edward Wardrop, BSurv N.S.W.
Warren William Kent, BSurv N.S.W.
The Faculty of Engineering

The Faculty consists of seven Schools: Civil Engineering, Electrical Engineering, Highway Engineering, Mechanical and Industrial Engineering, Nuclear Engineering, Surveying, and Transportation and Traffic.

School of Civil Engineering

The School of Civil Engineering consists of four departments, Water Engineering, Civil Engineering Materials, Structural Engineering and Engineering Construction and Management. The School conducts both part-time and full-time undergraduate courses in Civil Engineering. In addition, all departments conduct graduate courses and carry out graduate research programs in many fields.

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

School of Electrical Engineering

The School of Electrical Engineering comprises five departments—Communications, Computer Science, Electric Power Engineering, Solid State Electronics, and Systems and Control Engineering.

Each department carries out research in its own field and offers lecture and laboratory courses in its own field and offers lecture and laboratory courses at the undergraduate and graduate levels. Subjects of common interest are provided by the School as a whole.

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

Graduate courses are offered, leading to the degree of Master of Engineering Science and to a Postgraduate Diploma, in which road location and geometrics, properties of road materials, construction techniques, bridge design and traffic engineering are studied.

The School has well-equipped laboratories for studying the properties of soils, road aggregates, bitumen and cement concrete, and active studies on these subjects are in progress. Members of the School use a 1620 IBM computer as part of their course, and studies are being made of its utilization in all phases of highway engineering. They also have access to a very large central computing network.

School of Mechanical and Industrial Engineering

Full-time undergraduate courses leading to the degree of Bachelor of Engineering are offered in Mechanical, Industrial, and Aeronautical Engineering, and in Naval Architecture. Part-time courses leading to the degree of Bachelor of Science (Engineering) are offered in the same four fields. Either degree may be taken out by a combination of full-time/part-time study, subject to approval by the Head of School.

The first two years of the full-time degree, and the first four stages of the part-time degree are common to all 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 Stage 4 for part-time students.

Formal graduate courses of study are available, with a wide choice of subjects, leading to the degree of Master of Engineering Science. There are special Master of Engineering Science courses in Refrigeration and Air Conditioning, and in Industrial Engineering. The Department of Industrial Engineering within the School offers a course leading to a Graduate Diploma.

Graduates with a good first degree may register for the higher degrees of Master of Engineering and Doctor of Philosophy. Current research fields are as follows—Aerodynamics, Agricultural Engineering, Applied Plasticity, Automatic Control, Bio-mechanics, Dynamics, Gas Dynamics, Heat Transfer, Fluid Mechanics, Metal Cutting, Naval Hydrodynamics, Refrigeration and Air Conditioning, and Two-phase Flow.

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.

School of Nuclear Engineering

The School of Nuclear Engineering in the University of New South Wales was established in 1961. The School presently 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 for the research degrees of Master of Engineering and Doctor of Philosophy, the School offers a formal graduate course leading to 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.

The School is presently situated in the Electrical Engineering building at Kensington. Library, workshop, digital and analogue computing facilities are available. 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 Engineering Research Division at Lucas Heights.

School of Surveying

The School of Surveying offers a full-time course and a sandwich course leading to the degree of Bachelor of Surveying. The full-time course is of 4 years duration while the sandwich course may be completed in 6 or 7 years. Until 1975, a part-time evening course of 7 years' duration was also available but this is now being phased out and replaced by the sandwich course. The graduate courses offered are Master of Surveying Science, a two year part-time or one year full-time course; and the research degrees Master of Surveying and Doctor of Philosophy.

The School is located in the Civil Engineering Building. Facilities include four Photogrammetry laboratories with plotting instruments of various types, an observing platform for Positional Astronomy and a comprehensive range of field equipment for Surveying and Geodesy. Computing facilities include programmable calculators and a library of programmes for use on the University's computers.
Current research is in the fields of physical geodesy, photogrammetry, geometrical geodesy, error theory, computer applications and land systems studies.

School of Transportation and Traffic

The School of Transportation and Traffic is located at Randwick, and is associated with the School of Highway Engineering.

The establishment of the School followed the endowment of a Chair by the Australian Automobile Association, which had long been concerned with the need for a centre for training traffic engineers and specialists. The School is assisting this object by conducting courses in traffic and transport planning and control, and offering opportunities for research into the technical problems created by the motor vehicle and other forms of transport and on their interaction with land use activity.

The research activities of the School cover a wide range of transport and traffic phenomena, viz. traffic flow theory—queueing, traffic stream structure, saturation flow, transportation planning—land use and transport interaction, system parameters, synthetic models for growth, distribution and assignment of desire lines; public enterprise economics; and human factors and road safety. Research in these fields can be undertaken for the ME, MSc, and PhD degrees. Formal courses, one year full-time and two years part-time, leading to the degree of Master of Engineering Science are also offered in Transport and Traffic. A part-time Transport graduate course offered over four sessions leads to a Graduate Diploma.

In addition to the academic research activities the School has an Applied Research Division which undertakes project research for national bodies and institutions.
Faculty Information

Faculty of Engineering Course Advisory Centre

The Faculty of Engineering is participating in the Course Advisory Centre which is located in Unisearch House. Members of Academic Staff are available to advise students about careers in the various fields of engineering and about undertaking a course in engineering in this university. The Centre opens from 10.00 am to 4 pm (closed 12 noon to 2 pm) from Wednesday 7 January to 9 January, 1976. (663 0351, Extn. 2218.) Prospective students are advised to take advantage of this facility.

Course in Civil Engineering and Course in Surveying
Students should obtain enrolment information and a form to nominate General Studies and Technical Electives from the School Office before end of lectures, Session 2.

Course in Electrical Engineering
By the end of Session 2 students must obtain their personal Enrolment Form, the Proposed Program Form EE76, information sheet and timetable from the School Office. After results are notified, the Proposed Program Form and Enrolment Form (completed as far as possible) should be forwarded to the School Office by Friday 16 January. Completion of enrolment takes place in February with attendance at the enrolment centre.

School of Civil Engineering

Enrolment Timetable

1. Full-time Courses
A. Students progressing into a complete year as shown in the Handbook.

<table>
<thead>
<tr>
<th>Year 2</th>
<th>Surnames A to M</th>
<th>Surnames N to z</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9.00 am to 11.00 am</td>
<td>11.00 am to 1.00 pm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3</th>
<th>Surnames A to M</th>
<th>Surnames N to Z</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9.00 am to 11.00 am</td>
<td>11.00 am to 1.00 pm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 4</th>
<th>Surnames A to M</th>
<th>Surnames N to Z</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9.00 am to 11.00 am</td>
<td>11.00 am to 1.00 pm</td>
</tr>
</tbody>
</table>
B. Students with broken programs NOT progressing into a complete year, as shown in the Handbook.

<table>
<thead>
<tr>
<th>Year 2</th>
<th>Thursday 26 February</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surnames A to M</td>
<td>9.30 am to 11.00 am</td>
</tr>
<tr>
<td>Surnames N to Z</td>
<td>11.00 am to 12.30 pm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3</th>
<th>Wednesday 25 February</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surnames A to M</td>
<td>9.30 am to 11.00 am</td>
</tr>
<tr>
<td>Surnames N to Z</td>
<td>11.00 am to 12.30 pm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 4</th>
<th>Monday 23 February</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surnames A to M</td>
<td>9.30 am to 11.00 am</td>
</tr>
<tr>
<td>Surnames N to Z</td>
<td>11.00 am to 12.30 pm</td>
</tr>
</tbody>
</table>

2. Part-time Courses

A. Students progressing into a complete stage as shown in the Handbook.

<table>
<thead>
<tr>
<th>Stages 2, 3, 4, 5 and 6</th>
<th>Thursday 19 February</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.00 pm to 5.00 pm</td>
</tr>
<tr>
<td></td>
<td>6.00 pm to 8.00 pm</td>
</tr>
</tbody>
</table>

B. Students with broken programs NOT progressing into a complete stage as shown in the Handbook.

<table>
<thead>
<tr>
<th>Stages 2, 3, 4, 5 and 6</th>
<th>Wednesday 25 February</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.00 pm to 4.30 pm</td>
</tr>
<tr>
<td></td>
<td>6.00 pm to 8.00 pm</td>
</tr>
</tbody>
</table>

3. New Students with Advanced Standing

| Thursday 26 February | 6.00 pm to 8.00 pm |

School of Electrical Engineering

Enrolment Timetable

Students should attend the appropriate enrolment centre according to the timetable below and enrol in the approved program.

1. Full-time Courses

<table>
<thead>
<tr>
<th>Year 1 repeats and Year 2 students</th>
<th>Thursday 26 February</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.00 pm to 4.30 pm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3</th>
<th>Tuesday 24 February</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.00 pm to 4.30 pm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 4</th>
<th>Monday 23 February</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9.30 am to 12.30 pm</td>
</tr>
</tbody>
</table>

2. Part-time Courses

<table>
<thead>
<tr>
<th>Students re-enrolling at all stages</th>
<th>Wednesday 25 February</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6.00 pm to 8.00 pm</td>
</tr>
</tbody>
</table>

3. New Students with Advanced Standing

| Friday 27 February | 9.30 am to 12.30 pm |

General Studies

Students enrolling in general studies electives after completing enrolment in their own Faculty and BEFORE GOING TO THE CASHIER, should proceed to the General Studies enrolment centre in Unisearch House where they will obtain places in electives, complete class admission cards and finalize enrolment forms.

Enrolment Centre

Re-enrolling students

Unisearch House
221 Anzac Parade
(across from Main Campus)

New students with advanced standing

Room G1
Electrical Engineering Building

School of Mechanical and Industrial Engineering

Enrolment Timetable

Unless otherwise indicated students enrolling in the courses offered by the School are required to attend Room 106 in the School's Building in accordance with the following timetable:

1. Full-time Courses

<table>
<thead>
<tr>
<th>Year 2 and Year 1 repeats</th>
<th>Monday 23 February</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.00 pm to 6.00 pm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3</th>
<th>Tuesday 24 February</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9.00 am to 12 noon</td>
</tr>
</tbody>
</table>
Engineering

Year 4

Monday 23 February
9.00 am to 12 noon

2. Part-time Courses
Stages 2, 3 and Stage 1 repeats
Monday 23 February
2.00 pm to 6.00 pm
Stages 4, 5 and 6
Tuesday 24 February
2.00 pm to 5.00 pm
6.00 pm to 8.30 pm

3. New Students with Advanced Standing
Friday 27 February
2.00 pm to 5.00 pm

4. Note: To avoid congestion during Enrolment Week, students enrolling in years 2 to 4 full-time and stages 3 to 6 part-time who are not subject to Show Cause Rules or awaiting results of deferred examinations may complete their enrolment early in February. Students wishing to enrol early should make an appointment at the School’s General Office commencing 20 October 1975.

General Studies
Students enrolling in general studies electives after completing enrolment in their own Faculty and BEFORE GOING TO THE CASHIER, should proceed to the General Studies enrolment centre in Unisearch House where they will obtain places in electives, complete class admission cards and finalize enrolment forms.

Enrolment Centre
7th Floor
Civil Engineering Building

Enrolment in Miscellaneous Subjects
(Students not proceeding to a degree or diploma)

Students may be accepted for enrolment in miscellaneous subjects provided the University considers that the subject/s will be of benefit to the student and there is accommodation available. Only in exceptional circumstances will subjects taken in this way count towards a degree or diploma.

Students seeking to enrol in miscellaneous subjects should obtain a letter of approval from the Head of the appropriate School or his representative permitting them to enrol in the subject concerned. The letter should be given to the enrolling officer at the time of enrolment.

Students who have obtained written permission to enrol may attend the Unisearch House enrolment centre on
Friday 27 February
9.30 am to 12.30 pm

or they may enrol by attending the Admissions Office, Chancellery, at the times shown below.

Week Commencing 1 March
Monday to Friday
9.30 am to 1.00 pm
2.00 pm to 4.30 pm
5.30 pm to 7.00 pm

School of Surveying

Enrolment Timetable

1. Full-time Courses
Year 2
Monday 23 February
9.30 am to 12.30 pm
Year 3
Tuesday 24 February
9.30 am to 12.30 pm
Year 4
Friday 27 February
9.30 am to 12.30 pm

2. Part-time Courses
Students re-enrolling at all Stages
Wednesday 25 February
2.00 pm to 6.00 pm

3. New Students with Advanced Standing
Full-time
Tuesday 24 February
9.30 am to 12.30 pm
Part-time
Wednesday 25 February
2.00 pm to 6.00 pm

School of Electrical Engineering
Persons who wish to obtain a letter of approval to enrol as Miscellaneous Students in graduate subjects in the School of Electrical Engineering are required to attend Room G3, School of Electrical Engineering, on Friday 20 February, 2.00 pm to 5.00 pm and 6.00 pm to 8.00 pm.

School of Civil Engineering
Students who wish to obtain a letter of approval to enrol as Miscellaneous Students in graduate subjects in the School of Civil Engineering are required to attend Room 109, School of Civil Engineering, on Friday 20 February, 9.30 am to 11.30 am and 6.00 pm to 8.00 pm.
Students who wish to obtain a letter of approval to enrol as Miscellaneous Students in undergraduate subjects should attend the School Office on Friday 27 February, 9.30 am to 11.30 am.

**Late Enrolments**

Students are strongly advised to attend for enrolment during Enrolment Week as those who fail to do so not only miss initial classes but disrupt lecture, tutorial and practical work programs and cause considerable inconvenience to lectures and the punctual students.

There are two late enrolment sessions:

**First Late Enrolment Period**
Wednesday 3 March

**Second Late Enrolment Period**
Wednesday 10 March

The times and locations for late enrolment in the Faculty of Engineering are shown below:

<table>
<thead>
<tr>
<th>Faculty of Engineering</th>
<th>Civil Engineering</th>
<th>Surveying</th>
<th>Electrical Engineering</th>
<th>Mechanical, Aeronautical, Industrial Engineering and Naval Architecture</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Office, 4th Floor</td>
<td>Civil Engineering Building</td>
<td>Room 112, Civil Engineering Building</td>
<td>School Office, Room G1</td>
<td>Room 103</td>
</tr>
<tr>
<td>5.00 pm to 7.00 pm</td>
<td>By arrangement with the School</td>
<td>Electrical Engineering Building</td>
<td>School of Mechanical and Industrial Engineering</td>
<td>5.00 pm to 7.00 pm</td>
</tr>
</tbody>
</table>

**Location of Laboratories outside Kensington Campus**

**Randwick**
The Schools of Highway and Transportation and Traffic and the Structures Laboratory of the School of Civil Engineering occupy new buildings on the site of the old Tramway Depot at King Street, Randwick.

**Manly Vale**
The Water Research Laboratory of the School of Civil Engineering.

**The Undergraduate Society of Engineers**

All engineering students are automatically members of the Undergraduate Society of Engineers (USE) on enrolment in the faculty. The USE Committee, elected annually at the General Meeting, is responsible for the administration of the society.

The committee organizes numerous social and sporting events and prints NODUS, the newspaper for engineering students. In addition, it is asked to nominate students to sit on education committees, visiting committees and other associated bodies, which provide a valuable forum for student opinion on a wide range of topics.

The General Meeting is usually held in about the third week of Session 1 and students are encouraged to attend.

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

IAESTE is an organization to facilitate overseas work in technical areas in 48 different countries throughout the world for students or recent graduates. It organizes visas, work periods for as little as a 6 week holiday up to 12 months; lodging and an initial welcome.

In Australia IAESTE has a permanent Executive Director, and volunteer local committees made up of interested students at each university. At the University of New South Wales the local committee is associated with the Undergraduate Society of Engineers.

For more information write to the Executive Director at Australian National Committee, Box 55, Alexandria, N.S.W. 2015 or contact the local committee through the USE.

**The Institution of Engineers, Australia**

The Institution of Engineers, Australia is the professional body for engineering in this country. Its aim is to promote the science and practice of engineering. In doing this it protects engineering standards as well as running such activities as lectures, conferences and seminars. The Graduates and Students Section (GAS) of the Institution represents all student and graduate members, and organizes general activities such as film nights, site tours, a public speaking competition and a harbour cruise.

Student Membership, which is open to all engineering students, allows concessions to Institution functions as well as providing the various publications produced by the Institution. Membership application forms and more information may be obtained from Engineering School Offices, GAS representatives, or the Institution Headquarters.
Undergraduate Study

Undergraduate Courses

The Faculty of Engineering consists of seven Schools—Civil, Electrical, Mechanical and Industrial, Highway, Nuclear, Transportation and Traffic, and surveying. The Schools of Civil, Electrical, and Mechanical and Industrial 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 a full-time, part-time and sandwich course leading to the degree of Bachelor of Surveying. The Schools of Highway Engineering, Nuclear Engineering and Transportation and Traffic Engineering offer graduate courses only.

All the graduate activities of the Faculty are co-ordinated under the Graduate School of Engineering. For full details of such activities please see the Graduate School of Engineering Handbook and the University Calendar, or contact the appropriate school.

Common First Year

The Schools of Civil, and Mechanical and Industrial Engineering have similar first year courses in physics, mathematics and chemistry, facilitating the transfer of students from one Bachelor of Engineering course to another within these schools at the end of their first year without loss of standing.

The first year courses in the Schools of Electrical Engineering and Surveying differ from the courses offered by the Schools of Civil Engineering and Mechanical and Industrial Engineering. However, notwithstanding the fact that the courses are not identical, sympathetic consideration will be given to requests by students who have completed first year to transfer to an allied course without loss of standing. When such transfer is desired an application must be made with the Registrar.

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 time-tabled 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 all subjects of the first year to be completed by the end of two years of full-time (or four years of part-time) study.

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.
Undergraduate Courses

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 degree of Bachelor of Engineering. A four-year full-time course in Surveying is offered by the School of Surveying leading to the degree of Bachelor of Surveying.

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. In nearly all cases substantial or complete recognition is accorded to these courses by overseas engineering institutions.

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

Since 1961 the Schools of the Faculty have offered six-year part-time courses in a variety of engineering fields leading to the degree of Bachelor of Science (Technology). From 1971 the name of this degree became Bachelor of Science (Engineering) but is not awarded retrospectively. Courses for the BSc(Eng) degree are offered in Civil, Electrical, Industrial and Mechanical Engineering and in Naval Architecture and Aeronautical Engineering (these two being offered by the School of Mechanical and Industrial Engineering.) No enrolments are now accepted for the BSc(Eng) course in Civil Engineering; the last initial enrolment year was 1974.

The General Studies program is the same for part-time as for full-time students, except that part-time students do not do an Advanced Elective.

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. However, recognition after 1980 is currently being reviewed by the Institution of Engineers, Australia.

Recognition by overseas engineering institutions varies in the different branches of engineering, and particular 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) award 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 BSc(Eng) award 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.

The School of Surveying offers a part-time course of seven years' duration for the degree of Bachelor of Surveying. The existing part-time course is being phased out over the period 1975-1980, and replaced by a sandwich course.

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 degree of BSc(Eng) shall:

A comply with the requirements for admission;

B follow the prescribed course of study in the appropriate school and pass the necessary examinations;

C 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.

---

### Conditions for Award of Degree of Bachelor of Surveying

1. A candidate for the degree of Bachelor of Surveying shall:
   
   **A** comply with the requirements for admission;
   
   **B** follow the prescribed course of study in the appropriate School, and satisfy the examiners in the necessary subjects;
   
   **C** 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, excursions and field camps 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 shall be required to complete the first year of the course in not more than two years. Re-enrolment thereafter will be governed by the general regulations of the Professorial Board.

4. A student may be granted advanced standing by the Professorial Board on the recommendation of the Faculty of Engineering, but in each case must complete an adequate period of approved industrial training before being eligible for the degree. 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.

5. The degree 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

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### Conditions for the Award of the Degree of Bachelor of Engineering

1. A candidate for the degree of Bachelor of Engineering shall:
   
   **A** comply with the requirements for admission;
   
   **B** follow the prescribed course of study in the School of Electrical Engineering, where such training is recommended but not required. In addition to the above requirements a student coming from another institution must follow an approved course of study in this University for at least two years.

---

### Faculty of Applied Science

The Faculty of Applied Science offers courses to students desiring a career in a specialized technology with an engineering element. These courses are as follows:

<table>
<thead>
<tr>
<th>Course</th>
<th>Full-time</th>
<th>Part-time</th>
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</thead>
<tbody>
<tr>
<td>Chemical Engineering</td>
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<td>BE</td>
</tr>
<tr>
<td>Ceramic Engineering</td>
<td>BSc</td>
<td>BSc(Tech)</td>
</tr>
<tr>
<td>Metallurgy</td>
<td>BSc</td>
<td>BSc(Tech)</td>
</tr>
<tr>
<td>Metallurgical Engineering</td>
<td>BE</td>
<td>—</td>
</tr>
<tr>
<td>Mining Engineering</td>
<td>BE</td>
<td>BSc(Eng)t</td>
</tr>
<tr>
<td>Textile Engineering</td>
<td>BSc</td>
<td>—</td>
</tr>
</tbody>
</table>

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34
Entrance to these courses, which are of four years’ duration full-time (pass or honours) and six years’ duration part-time, is conditional upon completion of the full subject Chemistry I. Except in the case of Mining Engineering, transfer should be made at the end of the first year to achieve maximum standing. Full-time engineering students may enter the Mining Engineering course after the second year of courses in Mechanical, Electrical or Civil Engineering without loss in standing of subjects completed.

Part-time engineering students may enter the courses offered by the Schools of Chemical Engineering, Chemical Technology and Metallurgy after the second stage part-time or the full-time first year. They may enter the Mining Engineering course after the fourth stage. In all cases the requirements for the degree of BSc(Tech) demand three years approved concurrent industrial training.

In the case of Chemical Engineering the part-time course, spread over seven years, leads to the award of the degree of BE.

Holders of the degrees of BSc in Textile Technology (Textile Engineering course) of BE (pass or honours) in Chemical Engineering and BSc(Eng) in Mining Engineering are recognized by the Institution of Engineers of Australia as being eligible for Corporate Membership without further examination.

Ceramic Engineering
Ceramics are inorganic, non-metallic materials which usually require the use of high temperatures in their processing. Products of the industry include glass, refractories, bricks, tiles, pipes, abrasives, cement, plaster, nuclear ceramics, whitewares, enamels and electric insulators, dielectrics and magnetic materials. The ceramic engineer is concerned with the relationship between the atomic and crystal structure of materials and their chemical, physical and engineering properties, as well as the methods of their manufacture and fabrication into useful shapes.

Graduates in Ceramic Engineering take positions in the fields of research and development, production control, product evaluation and technical service.

Chemical Engineering
Chemical Engineering is the application of the principles of the physical sciences, together with principles of economics and human relations to fields in which matter undergoes a change in state, energy content or composition. The chemical engineer is generally responsible for the design, construction and operation of plant and equipment used in the chemical processing industries.

Metallurgy and Metallurgical Engineering
Metallurgy deals with the nature, production, properties and uses of metals. Its importance today is associated with the demands for better materials for aircraft, rockets, and nuclear reactors, as well as the more conventional engineering structures, machines and appliances. Metallurgists are also closely involved with the development of new and more efficient processes for extracting metals from their ores and contributing to mineral production.

The BSc course in Metallurgy is a general one covering all aspects of the production, structure and properties of metallic materials. The BE course is more specialized in the final two years and provides preparation for careers in the metallurgical process industries.

The School of Metallurgy has excellent facilities for teaching and research. Emphasis in these courses is on the application of science to technological problems and in this respect there is a close relationship between metallurgy and engineering. Information on the Metallurgy courses and on opportunities for graduate work for engineering graduates in the School of Metallurgy may be obtained from the Faculty of Applied Science Handbook or from Professor Hugh Muir at the School of Metallurgy.

Mining Engineering
The aim of the training is to give students a thorough foundation in Mining Engineering and so permit them to enter quarrying, coal mining, metalliferous mining or the petroleum industry, and to be employed in any of the phases of these industries ranging from exploration to production.

During the undergraduate course, students will spend portion of the long vacations obtaining practical experience in mining. Mining companies prepare programs so that the students obtain a comprehensive experience in many aspects of the profession. This experience is important and it is related to the academic training received in the School. Practical experience in mining, gained as a student, can contribute to the experience record of mining engineers when making application for a statutory certificate of competency from one of the Australian State Government Departments of Mines.

At Broken Hill the School of Mining Engineering offers a part-time course in Mineral Processing, leading to the degree of Bachelor of Science (Technology) and a part-time course in Mining Engineering, leading to the degree of Bachelor of Science (Engineering).

Textile Engineering
The textile industry, being a manufacturing one, depends on many types of machinery and engineering services to produce its products. In order to cope with technological problems in production, quality control and research, a competent textile engineer must have a good understanding of the fundamental sciences and extensive theoretical and practical knowledge of the applied textile and engineering sciences.

There are many challenging positions for textile engineers in industry and research.

Full details of the above courses may be obtained from the Faculty of Applied Science Handbook.

† A part-time course in Mining Engineering leading to the award of the BSc(Eng) degree is available at Broken Hill as well as a part-time course in Mineral Processing leading to the award of the BSc(Tech) degree.
The School of Civil Engineering offers two degree courses in Civil Engineering: the Bachelor of Engineering (BE) course 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; and the Bachelor of Science (Engineering (BSc(Eng)) course, which is a part-time program, comprising the first six stages of the 7-stage Bachelor of Engineering course. The requirements for the BE degree include a period of at least sixty working days of approved industrial experience prior to enrolment in the final year; the requirements for the BSc(Eng) degree include a period of at least three years of suitable engineering experience (8.002 Industrial Experience) concurrent with the University course. Students should enroll in the subject 8.002 Industrial Experience in the year in which they expect to satisfy the requirements, and upon completion, submit to the school evidence from their employers of such industrial training. No enrolments are now accepted for the BSc(Eng) course in Civil Engineering; the last initial enrolment year was 1974.

A student who has completed the requirements for the award of the BSc(Eng) degree in Civil Engineering but has not taken out the degree by formal graduation may apply to the Head of School for enrolment on a part-time basis in the BE degree course.

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 1, and Class 2 in two divisions, and the award and grade of Honours are made in recognition of superior performance throughout the course. The degree of Bachelor of Science (Engineering) may be awarded with Merit in recognition of superior performance throughout the course.

### Civil Engineering—Full-time Course

#### Bachelor of Engineering

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<tr>
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<td>8.172</td>
<td>Mechanics of Solids II</td>
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<tr>
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<td>8.272</td>
<td>Civil Engineering Materials I</td>
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<tr>
<td>8.301</td>
<td>Systems Engineering</td>
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<tr>
<td>8.571</td>
<td>Hydraulics I</td>
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<td>8.671</td>
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<tr>
<td>10.022</td>
<td>Engineering Mathematics II</td>
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<tr>
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<td>Engineering Surveying</td>
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<td>29.491</td>
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* See this footnote on next page, below Stage 4.
† Students are required to attend a one-week Survey Camp, equivalent to 40 class contact hours.
## Course Outlines

### Year 3

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*See this footnote below Stage 4.

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*See this footnote below Stage 4.

### Stage 3

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</table>

**42 hours of Saturday fieldwork is an essential part of this subject.

*Students are required to attend a one-week Survey Camp, equivalent to 40 class contact hours.

### Stage 4

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<thead>
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*Of ten required electives at least four are in General Studies and at least four are technical electives. Two of the General Studies electives are taken prior to Year 4 or Stage 6.

**Approved technical electives for Year 2 are: 8.040 Advanced Engineering Geology, 8.044 Electrical Instrumentation, 8.045 Electrical Machinery, 8.047 History of Civil Engineering.

**Approved technical electives for Year 3 include those listed for Year 2 and 8.018 Construction Engineering, 8.021 Environmental Aspects of Civil Engineering, 8.023 Hydrodynamics, 8.026 Systems Methods in Civil Engineering, 8.027 New Materials I.

**Approved technical electives for Year 4 include those listed for Year 2 and Year 3 and 8.011 Projects, 8.012 Elements of Architecture, 8.013 Bridge Engineering, 8.014 Computer Applications in Civil Engineering, 8.015 Road Engineering, 8.016 Hydraulics, 8.017 Transportation Engineering, 8.019 Railway Engineering, 8.020 Hydrology, 8.022 Elasticity and Plasticity, 8.024 Foundation and Dam Engineering, 8.025 Structural Failures, 8.032 Law for Builders, 8.033 Industrial Law and Arbitration, 8.037 Optimum Design of Structures, 8.038 Special Topics in Reinforced Concrete, 8.043 Public Health Engineering.

### Stage 5

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<td>1½</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11</td>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>

*See this footnote below Stage 4.
Stage 6*
8.174 Structural Analysis II  
8.191 Structural Engineering  
8.274 Civil Engineering Materials III  
8.573 Hydraulics III  
8.581 Water Resources I  
8.582 Water Resources II  
Two Electives  
<table>
<thead>
<tr>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S1</strong></td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>1 1/2</td>
</tr>
<tr>
<td>13 1/2</td>
</tr>
</tbody>
</table>

*Available in 1977 for the first time.

Stage 7*
8.001 Industrial Training  
8.051 Design Projects I  
8.052 Design Projects II  
8.553 Water Resources III  
8.673 Planning & Management II  
8.674 Planning & Management III  
Four Electives  
<table>
<thead>
<tr>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S1</strong></td>
</tr>
<tr>
<td>2 1/2</td>
</tr>
<tr>
<td>2 1/2</td>
</tr>
<tr>
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<tr>
<td>3</td>
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<tr>
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</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>14</td>
</tr>
</tbody>
</table>

*Available in 1978 for the first time.

### School of Electrical Engineering

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, Solid State Electronics, and Systems and Control Engineering. A number of interdepartmental and specialized groups (such as Digital Systems, Acoustics, Biomedical Engineering, Measurements etc.) are also active.

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.

The School of Electrical Engineering offers a full-time course of four years duration leading to the degree of Bachelor of Engineering (pass or honours), and a six year part-time course for the degree of Bachelor of Science (Engineering). Each subject of the BSc(Eng) course is generally identical with a subject of the BE program and the requirements of these subjects can be completed by either day or evening study in most cases: a part-time student is expected to be able to attend classes on at least one afternoon a week. Thus provided prerequisites are met and the program can be timetabled, a student in either course may, with the approval of the Head of the School, complete the requirements by a combination of full-time and part-time study.

The School's teaching and research programs are constantly under review to meet the ever changing challenges of present and future needs. Individual student needs can be further met by quite extensive substitution provisions within the course programs.

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.

### Industrial Experience

All students in the BSc(Eng) course must complete three years of concurrent appropriate industrial training. Students should enrol in the subject 6.902 Industrial Experience in the year in which they expect to satisfy their requirements and, upon completion, submit to the School evidence from their employers to such industrial training.

All students in the BE course are expected to seek practical experience in the long vacations. This is strongly recommended and students are warned that they may not be eligible for graduate membership of the Institution of Engineers (Australia) until they have completed at least 12 weeks of such training, preferably concurrently with their course.

### 364 Electrical Engineering—Full-time Course

#### Bachelor of Engineering

**BE**

**Year 1 (Revised for 1976)**

<table>
<thead>
<tr>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S1</strong></td>
</tr>
<tr>
<td>1.001 Physics I*</td>
</tr>
<tr>
<td>5.030 Engineering C</td>
</tr>
<tr>
<td>6.010 Electrical Engineering I</td>
</tr>
<tr>
<td>10.001 Mathematics I*</td>
</tr>
<tr>
<td><strong>Either</strong></td>
</tr>
<tr>
<td>2.001 Chemistry I</td>
</tr>
<tr>
<td>or</td>
</tr>
<tr>
<td>2.021 Chemistry IE and</td>
</tr>
<tr>
<td>5.010 Engineering A</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>24</td>
</tr>
</tbody>
</table>

*Students who have achieved a certain standard may attempt similar material at a higher level.*
### Year 2 (Revised for 1976)

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.112A Electromagnetism*</td>
<td>0  6</td>
</tr>
<tr>
<td>1.112C Waves in Continuous Media and Thermodynamics*</td>
<td>2  2</td>
</tr>
<tr>
<td>6.021A Basic Circuit Theory</td>
<td>4  0</td>
</tr>
<tr>
<td>6.021B Power</td>
<td>0  4</td>
</tr>
<tr>
<td>6.021C Electronics</td>
<td>0  4</td>
</tr>
<tr>
<td>6.021E Digital Logic</td>
<td>4  0</td>
</tr>
<tr>
<td>6.022 EE</td>
<td>0  4</td>
</tr>
<tr>
<td>10.111A Pure Mathematics II (Linear Algebra)*</td>
<td>2  2</td>
</tr>
<tr>
<td>10.111B Pure Mathematics II (Analysis)*</td>
<td>2  2</td>
</tr>
<tr>
<td>10.211A Applied Mathematics II (Mathematical Methods)*</td>
<td>2  2</td>
</tr>
<tr>
<td>One General Studies Subject Either</td>
<td></td>
</tr>
<tr>
<td>1.112B Modern Physics*</td>
<td>6  0</td>
</tr>
<tr>
<td>or 6.601A† Introduction to Computing</td>
<td>5  0</td>
</tr>
<tr>
<td></td>
<td>24  26</td>
</tr>
<tr>
<td></td>
<td>25</td>
</tr>
</tbody>
</table>

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

†In 1977, 6.601A is replaced by a 4 hour subject 6.021D which builds on the new computing strand in 5.030.

### Year 3 (Old Course)

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.661 Mechanical Engineering III</td>
<td>3  3</td>
</tr>
<tr>
<td>10.033 Electrical Engineering Maths III</td>
<td>2  2</td>
</tr>
<tr>
<td>10.361 Statistics SE</td>
<td>1½  1½</td>
</tr>
<tr>
<td>Electrical Engineering III</td>
<td></td>
</tr>
<tr>
<td>6.031A Systems and Circuit Theory</td>
<td>4  4</td>
</tr>
<tr>
<td>6.031B Energy Conversion, Transmission and Utilization</td>
<td>4  4</td>
</tr>
<tr>
<td>6.031C Electronic Circuits and Signal Processing</td>
<td>4  4</td>
</tr>
<tr>
<td>6.031D† Computing</td>
<td>0  4</td>
</tr>
<tr>
<td>6.031E Electron Physics and Devices</td>
<td>4  0</td>
</tr>
<tr>
<td>Two General Studies Subjects</td>
<td>3  3</td>
</tr>
<tr>
<td></td>
<td>25½  25½</td>
</tr>
</tbody>
</table>

†In 1977, 6.031D will be dropped for students having done 6.021E, and replaced by a new subject tentatively titled Basic Engineering Science. This will be part of a wider ranging revision of Year 3.

### Year 4 (Old Course)

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.911 or 6.931 Individual (or Group) Thesis*</td>
<td></td>
</tr>
<tr>
<td>One General Studies Subject Electrical Engineering IV (6 Electives)†</td>
<td></td>
</tr>
</tbody>
</table>

* Thesis

In Session 1 two hours per week and in Session 2 three days per week are devoted to directed laboratory and research work on an approved subject under the guidance of members of the lecturing staff. Generally, the project 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 last Monday in November.

†Electrical Engineering IV

Four Electives are taken in Session 1 and two in Session 2. Each Department offers specialized electives and a number of general electives are also available. Not all electives are offered every session: students are advised each year which electives are available. Each elective is 5 hours per week for one session. The list of electives is:

- 6.041 Fields and Measurements
- 6.042 Circuits, Signals and Information Theory
- 6.044 Electrical Product Design and Reliability
- 6.202 Power Engineering Systems I
- 6.212 Power Engineering Utilization
- 6.222 High Voltage and High Current Technology
- 6.303 Communication Electronics
- 6.313 Wave Radiation and Guidance
- 6.322 Electronics
- 6.323 Signal Transmission
- 6.333 Communication Systems
- 6.383 Biomedical Engineering
- 6.412 Automatic Control
- 6.413 Modern Control Engineering
- 6.432 Computer Control and Instrumentation
- 6.512 Advanced Semiconductor Device Theory
- 6.522 Translator and Integrated Circuit Design
- 6.612 Computer Systems Engineering
- 6.622 Computer Application and Systems

The program selected by each student must be approved by the Head of School.

### 365 Electrical Engineering—Part-time Course

Bachelor of Science (Engineering) BSc(Eng)

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1  S2</td>
</tr>
<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></td>
<td>12  12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 2 (Revised for 1976)</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1  S2</td>
</tr>
<tr>
<td>6.010 Electrical Engineering I</td>
<td>6  0</td>
</tr>
<tr>
<td>5.030 Engineering C Either</td>
<td>0  6</td>
</tr>
<tr>
<td>2.001 Chemistry I or 2.021 Chemistry IE and</td>
<td>6  6</td>
</tr>
<tr>
<td>5.010 Engineering A</td>
<td>6  0</td>
</tr>
<tr>
<td></td>
<td>12  12</td>
</tr>
</tbody>
</table>
Stage 3 (Revised for 1976)

6.021 A Basic Circuit Theory
6.021 B Power
6.021 C Electronics
1.112C Waves in Continuous Media and Thermodynamics
10.111A Pure Mathematics I (Linear Algebra)
10.111B Pure Mathematics I (Analysis)

Stage 4 (Old Course)

1.112A Electromagnetism
1.112B Modern Physics
6.031A Systems & Circuit Theory
10.211A Applied Mathematics I (Mathematical Methods)

Stage 4 (Revised for 1976)

6.021 A Basic Circuit Theory
6.021 B Power
6.021 C Electronics
1.112C Waves in Continuous Media and Thermodynamics
10.111A Pure Mathematics I (Linear Algebra)
10.111B Pure Mathematics I (Analysis)

Stage 5 (Old Course)

4.921 Material Science
6.031B Energy Conversion Transmission & Utilization
6.031C Electronic Circuits and Signal Processing
Two General Studies Subjects

Stage 5 (Revised for 1976)

4.921 Material Science
6.031B Energy Conversion Transmission & Utilization
6.031C Electronic Circuits and Signal Processing
Two General Studies Subjects

Stage 6 (Old Course)

6.031D Computing
6.043 Measurements
Two Professional Electives* Either
6.031E Electron Physics and Devices or
5.661 Mechanical Engineering

Stage 6 (Revised for 1976)

6.031D Computing
6.043 Measurements
Two Professional Electives* Either
6.031E Electron Physics and Devices or
5.661 Mechanical Engineering

Transition Arrangements into Revised Programs

There are no transition problems for students who progress normally. Students with broken programs may consult the School office for their detailed status: no student will lose credits for any subjects completed. Note that 6.021 is replaced by 6.021A, 6.021B and 6.021C; 6.031D becomes 6.021E; 8.113/4.921 will be replaced by 6.022 and a new subject on Basic Engineering Science in 1977.

Electrical Engineering—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 of the same length and level as the prescribed subject it replaces; and

2. The resulting overall program of study is suited to the award of either the BE or BSc(Eng) as applicable.

Examples are:

A Replacement of two General Studies subjects by an approved Arts subject;

B Replacement of two General Studies subjects by an approved (by the Head of the Department of General Studies) subject from areas such as:

Life Sciences;
Earth Sciences;
Accounting and Business Administration;
Law;
Economics;
Industrial Management.

C If students proposing to attempt the BSc BE pattern include additional (computer Science or Applied Mathematics in their Second Year Electrical Engineering program they open up a wider choice of subjects in their Science Third Year. This can be substituted for 8.113, or 4.921 General Studies. Subjects omitted may be required to be taken in the student's Third Year of Electrical Engineering;

D The normal Fourth Year of the BE program includes 6 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.

Double Degrees

Double Degree of BSc BE in Electrical Engineering

Students in Electrical Engineering may qualify for this double degree in five years of full-time study. Having completed the first and second year of the Electrical Engineering course, students with a creditable performance may transfer to Science (this is subject to the recommendation of the Head of the School of Electrical Engineering and the approval of the Deans of the Faculties of Engineering and Science) and do the appropriate General Studies subjects and four Level III units chosen from related disciplines and no less than four other units of either Level II or Level III chosen in accordance with the Science Course regulations.
In their fourth year the students revert to the Faculty of Engineering. Depending on the program followed in their year in Science they will have already completed parts of the normal third year program of the Electrical Engineering course, and they will be required to omit these from their program and to include an equivalent amount of other courses chosen with the approval of the Head of School. In their fifth year they will complete the fourth year of the Electrical Engineering course.

372 Double Degree BA BE in Electrical Engineering

The double degree BA BE in Electrical Engineering may be gained by a five-year course of combined study. Students wishing to enrol for this double degree may do so:

1. by initially enrolling as a student proceeding to the double degree, or

2. by transferring to the BA BE program with advanced standing after partially completing the requirements of either degree, provided that suitable courses have been studied.

Any students wishing to enrol in, transfer into or continue in the double degree course BA BE shall have complied with all the requirements for prerequisite study and academic attainment of both the Faculties concerned. Students wishing to enrol in or to transfer into the double degree course may do so only after receiving the approval of the respective Deans of the Faculties of Arts and Engineering. Guidance should be sought from the School of Electrical Engineering, the relevant schools in the Faculty of Arts and the Arts Faculty Office.

1. Initial Enrolment for BA BE

A student enrolling initially for the double degree shall pursue a program for four years in which he completes subjects equivalent to 18 units in accordance with the regulations of the Faculty of Arts, provided that he includes:

A the subjects in Table A below, and

B a major sequence of subjects available within the Faculty of Arts (see that Faculty’s regulations) in addition to his studies in the School of Mathematics.

In addition he shall also study concurrently subjects selected from Course 364 in accordance with an acceptable program loading.

To complete his studies he must satisfy the requirements of a normal BE program in Electrical Engineering, less

1. the General Studies subjects,

2. the equivalent of ONE non-electrical engineering subject of the BE course,

3. strand E of Electrical Engineering III, and

4. one of the six units of Electrical Engineering IV.

Table A*

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.001</td>
<td>Mathematics I</td>
</tr>
<tr>
<td>10.111A</td>
<td>Pure Mathematics II (Linear Algebra)</td>
</tr>
<tr>
<td>10.111B</td>
<td>Pure Mathematics II (Analysis)</td>
</tr>
<tr>
<td>10.211A</td>
<td>Applied Mathematics II (Mathematical Methods)</td>
</tr>
<tr>
<td>1.001</td>
<td>Physics I</td>
</tr>
<tr>
<td>1.112A</td>
<td>Electromagnetism</td>
</tr>
<tr>
<td>1.112B</td>
<td>Modern Physics</td>
</tr>
<tr>
<td>1.112C</td>
<td>Thermodynamics &amp; Mechanics</td>
</tr>
</tbody>
</table>

The requirements of the appropriate Schools in respect to prerequisites, sequencing or substitutions shall be adhered to.

2. Subsequent Transfer to BA BE Course

Students wishing to pursue this route shall at the time of transfer and subsequently comply with the requirements for students initially enrolling in the double degree BA BE.

3. Honours Degree in Arts

Students wishing to gain an Honours degree in Arts as part of their combined BA BE double degree program shall meet all the relevant requirements of the Faculty of Arts and of the appropriate Schools. Such students may enrol for the Honours year in Arts only after receiving the approval of the respective Deans of the Faculties of Arts and Engineering.

School of Mechanical and Industrial Engineering

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.

The study of the basic sciences—Mathematics, Physics and Chemistry—together with an introduction to Engineering, comprises the first year. In the second year further mathematical studies are undertaken together with a study of the Engineering Sciences—Thermodynamics, Fluid Mechanics, Engineering Mechanics, Mechanics of Solids and their application in the field of Design.

The full-time courses of Mechanical, Industrial and Aeronautical Engineering and of Naval Architecture have common subjects for the first two years. The third and fourth years contain a number of common core subjects together with specific departmental requirements. In the fourth and final year, in addition to core subjects and departmental requirements, provision is made for a limited degree of specialization in one or more elective subjects. Each full-time 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.

*Students who have achieved a certain standard may attempt similar material at a Higher level.
Industrial experience is an integral part of the full-time 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, and irrespective of their specialization, are strongly recommended to gain as much industrial training as possible between Years 1 and 2.

The full-time courses in Aeronautical, Industrial and Mechanical Engineering and in Naval Architecture are of four years' duration and lead to the degree of Bachelor of Engineering (BE).

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. With the approval of the Head of School, students may proceed to the BE degree via a combination of full-time and part-time study.

Part-time courses of six years' duration leading to the degree of Bachelor of Science (Engineering) are offered in the same four fields as the full-time courses.

Part-time courses may also be completed by a combination of part-time and of full-time study. Students proceeding to 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 BSc(Eng) in the Calendar).

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.

A student who has successfully completed the first two stages of any of the Bachelor of Science (Engineering) courses mentioned above may transfer to the second year of any of the full-time BE courses offered by the School. A part-time student will be able to transfer at the end of Stage 4 of his course to the third year of the corresponding BE course. The BSc(Eng) degree may be awarded 'With Merit' to students whose performance in the course is superior.

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 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.

### 368
**Mechanical Engineering—Full-time Course**

**Bachelor of Engineering BE**

<table>
<thead>
<tr>
<th>Year</th>
<th>Course Description</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>S1</td>
</tr>
<tr>
<td>Year 1</td>
<td>Physics I or Higher Physics I</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Chemistry IE*</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Engineering A*</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Engineering B</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Engineering C*</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Mathematics I or</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Higher Mathematics I</td>
<td>6</td>
</tr>
<tr>
<td>Year 2</td>
<td>Experimental Engineering II</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Technical Orientation</td>
<td>½</td>
</tr>
<tr>
<td></td>
<td>Mechanical Engineering Design I</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Mechanical Engineering Mechanics</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Fluid Mechanics/Thermodynamics I</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Electrical Engineering</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Mechanics of Solids</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Properties of Materials</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Engineering Mathematics II</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
<td>1½</td>
</tr>
<tr>
<td></td>
<td></td>
<td>26</td>
</tr>
<tr>
<td>Year 3</td>
<td>Experimental Engineering III</td>
<td>1½</td>
</tr>
<tr>
<td></td>
<td>Industrial Training I</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Engineering Analysis</td>
<td>3½</td>
</tr>
<tr>
<td></td>
<td>Mechanical Engineering Design II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Dynamics of Machines I</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Mechanics of Solids</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Fluid Mechanics/Thermodynamics II</td>
<td>3½</td>
</tr>
<tr>
<td></td>
<td>Electrical Engineering*</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Industrial Engineering IA or</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Industrial Engineering IB</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
<td>3</td>
</tr>
<tr>
<td>Year 4</td>
<td>Industrial Training II</td>
<td>0</td>
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<td></td>
<td>Thesis</td>
<td>6</td>
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<td></td>
<td>Communications</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Automatic Control Engineering</td>
<td>3</td>
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<tr>
<td></td>
<td>General Studies Elective</td>
<td>1½</td>
</tr>
</tbody>
</table>

**Plus 12 hours per week from the following technical electives:**

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials Science</td>
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<td>Mechanics of Solids II</td>
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<td>Fluid Mechanics III</td>
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<td>Thermodynamics III</td>
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<td>Systems Methods in Civil Engineering</td>
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<tr>
<td>Industrial Engineering IIA</td>
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<tr>
<td>Industrial Engineering IIB</td>
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<td>Design for Production</td>
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<td>Operations Research</td>
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<tr>
<td>Nuclear Power Technology</td>
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*One session only. Students will take this subject in either Session 1 or Session 2.
369 Mechanical Engineering—Part-time 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

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<td>10.001</td>
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*Not available in the evening in 1976.

Stage 2

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<td>Engineering A*</td>
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<td>Engineering C*</td>
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*One session only. Students will take this subject in either Session 1 or Session 2.
†Broken Hill students take 5.031 Engineering Mechanics (1 —) in lieu of 5.020.

Stage 3

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Stage 4

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<td>5.611</td>
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Stage 5

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<td>5.112</td>
<td>Mechanical Engineering Design II</td>
<td>3</td>
</tr>
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<td>5.331</td>
<td>Dynamics of Machines I</td>
<td>2</td>
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<td>5.412</td>
<td>Mechanics of Solids I</td>
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<td>5.612</td>
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Stage 6

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<td>Automatic Control Engineering</td>
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*See the introduction of School of Mechanical and Industrial Engineering.

361 Aeronautical Engineering—Full-time Course
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.

Year 3

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<td>5.412</td>
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<td>6.802</td>
<td>Electrical Engineering*</td>
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*One session only. Students will take this subject in either Session 1 or Session 2.

Year 4

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<td>5.051</td>
<td>Thesis</td>
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<td>5.062</td>
<td>Communications</td>
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<td>5.801</td>
<td>Aircraft Design</td>
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<td>5.812</td>
<td>Aerodynamics II</td>
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<td>Analysis of Aerospace Structures II</td>
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<td>Aircraft Propulsion</td>
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Plus one of the following technical electives:

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<td>8.026</td>
<td>Systems Methods in Civil</td>
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<td>18.022</td>
<td>Industrial Engineering II</td>
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23½

360 Aeronautical Engineering—Part-time 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 course.

Stage 5

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<td>Mechanical Vibrations</td>
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<td>Mechanics of Solids I</td>
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<td>5.811</td>
<td>Aerodynamics I</td>
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12 10½
Stage 6

<table>
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<th>Course</th>
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<td>5.812 Aerodynamics II</td>
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<td>5.823 Analysis of Aerospace Structures II</td>
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<td>5.831 Aircraft Propulsion</td>
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370
Naval Architecture—Full-time Course
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 degree course at any other Australian university 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>
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<tr>
<td>5.071 Engineering Analysis</td>
<td>3½</td>
</tr>
<tr>
<td>5.303 Mechanical Vibrations</td>
<td>1½</td>
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<tr>
<td>5.412 Mechanics of Solids I</td>
<td>2</td>
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<tr>
<td>5.911 Naval Architecture</td>
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<td>5.921 Ship Structures I</td>
<td>2</td>
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<td>5.931 Principles of Ship Design IA</td>
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<td>5.932 Principles of Ship Design IB</td>
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Year 4

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<td>5.062 Communications</td>
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<td>5.922 Ship Structures II</td>
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<td>5.933 Principles of Ship Design II</td>
<td>3</td>
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<td>5.934 Ship Design Project</td>
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<td>5.941 Ship Propulsion and Systems</td>
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<td>Plus one of the following technical electives:</td>
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<td>4.913 Materials Science</td>
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371
Naval Architecture—Part-time 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 course.

Stage 5

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Stage 6

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<td>5.934 Ship Design Project</td>
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<tr>
<td>5.941 Ship Propulsion and Systems</td>
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<td>General Studies Elective</td>
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Department of Industrial Engineering

The Department of Industrial Engineering offers a full-time and a part-time course in industrial engineering leading to the degree of Bachelor of Engineering and Bachelor of Science (Engineering) respectively. These courses are designed for students with engineering ability whose interests lie in the planning, developing and control of manufacturing or service operations.

The first two years of the full-time course and the first four years of the part-time course 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. Finally, the problems associated with the practical economics of manufacturing operations are studied. These three fields of study provide the student with the training 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

*See the introduction to School of Mechanical and Industrial Engineering.

*See the introduction to School of Mechanical and Industrial Engineering.
Fundamental scientific studies of manufacturing processes such as metal machining, forming and casting are continually being made to improve their efficiency.

4. Methods Engineering
Methods engineering is particularly concerned with the co-ordination of men, materials and machines, so that an enterprise will run at maximum efficiency. A considerable, knowledge of engineering in general, as well as an understanding of human factors and materials science, is necessary for methods engineering work. Time and motion study is part of methods engineering. In many cases the methods engineer works in close co-operation with the design department and executives engaged in industrial economic analysis.

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.

366 Industrial Engineering—Full-time Course
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.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<td>Engineering Analysis</td>
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<td>Dynamics of Machines I</td>
<td>2</td>
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<td>5.412</td>
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*One session only.
†Half-session only.
Engineering

Year 4

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Plus one elective chosen from:

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<tr>
<td>5.413</td>
<td>Mechanics of Solids II</td>
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Year 5

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<th>Course</th>
<th>Hours per week</th>
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<td>5.112</td>
<td>Mechanical Engineering Design II</td>
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<td>Industrial Engineering IA</td>
<td>2</td>
</tr>
<tr>
<td>18.021</td>
<td>Industrial Engineering IB</td>
<td>2</td>
</tr>
</tbody>
</table>

Stage 6

<table>
<thead>
<tr>
<th>Code</th>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.042</td>
<td>Industrial Experience*</td>
<td>0</td>
</tr>
<tr>
<td>18.022</td>
<td>Industrial Engineering IIB</td>
<td>3</td>
</tr>
<tr>
<td>18.432</td>
<td>Design of Production Systems</td>
<td>6</td>
</tr>
<tr>
<td>18.551</td>
<td>Operations Research</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
<td>1½</td>
</tr>
</tbody>
</table>

|       | Total                         | 13½   |

367
Industrial Engineering—Part-time Course
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 course.

Stage 5

<table>
<thead>
<tr>
<th>Code</th>
<th>Course</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>5.071</td>
<td>Engineering Analysis</td>
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<tr>
<td>5.112</td>
<td>Mechanical Engineering Design II</td>
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<tr>
<td>5.331</td>
<td>Dynamics of Machines I</td>
<td>2</td>
</tr>
<tr>
<td>14.001</td>
<td>Introduction to Accounting A*</td>
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</tr>
<tr>
<td>14.002</td>
<td>Introduction to Accounting B†</td>
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</tr>
<tr>
<td>18.011</td>
<td>Industrial Engineering IA</td>
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</tr>
<tr>
<td>18.021</td>
<td>Industrial Engineering IB</td>
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**One session only.**
**Half-session only.**

Stage 6

<table>
<thead>
<tr>
<th>Code</th>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.042</td>
<td>Industrial Experience*</td>
<td>0</td>
</tr>
<tr>
<td>18.022</td>
<td>Industrial Engineering IIB</td>
<td>3</td>
</tr>
<tr>
<td>18.432</td>
<td>Design of Production Systems</td>
<td>6</td>
</tr>
<tr>
<td>18.551</td>
<td>Operations Research</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
<td>1½</td>
</tr>
</tbody>
</table>

**See the introduction to School of Mechanical and Industrial Engineering.**

School of Surveying

The School of Surveying offers a full-time course and a sandwich course leading to the Degree of Bachelor of Surveying. The full-time course is of four years' duration and is divided into eight parts of one session each. The sandwich course also consists of eight parts of one session each and may be completed in six or seven years. Until 1975, a part-time course of seven years duration was available for those who wished to attend classes in the evenings. This course is now being phased out and is being replaced by the sandwich course.

The course is designed to provide the appropriate academic training for a professional surveyor working in any of the many branches of surveying. Since these branches cover a wide range, the course is broad in its scope. Parts 1-4 of the course are concerned mainly with the basic sciences, but the basic surveying subjects are also included. In Parts 5 and 6, the major surveying subjects appear: geodesy, photogrammetry, astronomy and land studies. With the addition of some elective courses these are continued into Part 8. Part 7 comprises professional training and a survey camp. The graduate can take up cadastral or property surveying, engineering surveying, geodetic surveying, photogrammetry, cartography or hydrographic surveying. The course is also an appropriate first qualification for those wishing to specialize in astronomy, satellite geodesy, geodynamics, computing and systems analysis, town and regional planning, land and resources development or environmental sciences.

The course has undergone comprehensive revision in recent years. Features of the revisions include: decreased lecture time to allow use of teaching methods which involve more student participation; an extended period of professional experience in the final year; Land Studies, a group of subjects designed to provide a broad understanding of the ecology of land and its development; and a survey camp of four weeks in the final year. 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. As far as possible each stage of the part-time course is equivalent to one part (one session) of the full-time course. However Stage 7 includes the Survey Camp of Part 7 as well as subjects of Part 8.

Students attending the sandwich course will attend full-time for one session per year, and will be free to undertake full-time employment for the remainder of the year, approximately 35 weeks. The standard time for completion of the sandwich course will be seven years. It will also be possible for a student in the sandwich course to attend for both sessions in a year, thus decreasing the length of his course by one year.

During the period that the part-time course is being phased out the transition arrangements are as follows: part-time students who commenced before 1973 will be unaffected. Those who commenced in 1973 and 1974 will move into the sandwich system in 1975 and 1976 respectively and each year from then on will attend full-time for one session of each year. Students commencing the sandwich course in...
1976 either attend full time for one year in 1976 and switch to Part 3 of the sandwich course in 1977 or take part-time classes in 1976 and 1977 (part-time Stages 1 and 2) and switch to Part 3 of the sandwich course in 1978. Thereafter they will follow the pattern of the sandwich course. See diagram below: Method of Implementation of the Sandwich Course.

Part 1 and Parts 5-8 of the sandwich course are not offered in 1976.

The Bachelor of Surveying 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 has been 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.

### Year 2

<table>
<thead>
<tr>
<th>Session</th>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Part 3)</td>
<td>Engineering Mathematics II</td>
<td>4</td>
</tr>
<tr>
<td>1 (Part 3)</td>
<td>Statistics SU</td>
<td>1.5</td>
</tr>
<tr>
<td>1 (Part 3)</td>
<td>Surveying II</td>
<td>6</td>
</tr>
<tr>
<td>1 (Part 3)</td>
<td>Survey Computations I</td>
<td>6</td>
</tr>
<tr>
<td>1 (Part 3)</td>
<td>Geometrical Optics</td>
<td>3</td>
</tr>
<tr>
<td>1 (Part 3)</td>
<td></td>
<td>20.5</td>
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</table>

### Year 2

<table>
<thead>
<tr>
<th>Session</th>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 (Part 4)</td>
<td>Electronics</td>
<td>3</td>
</tr>
<tr>
<td>2 (Part 4)</td>
<td>Engineering for Surveyors</td>
<td>3</td>
</tr>
<tr>
<td>2 (Part 4)</td>
<td>Engineering Mathematics II</td>
<td>4</td>
</tr>
<tr>
<td>2 (Part 4)</td>
<td>Statistics SU</td>
<td>1.5</td>
</tr>
<tr>
<td>2 (Part 4)</td>
<td>Surveying II</td>
<td>3</td>
</tr>
<tr>
<td>2 (Part 4)</td>
<td>Survey Camp*</td>
<td></td>
</tr>
<tr>
<td>2 (Part 4)</td>
<td>Physical Geography for Surveyors†</td>
<td>4</td>
</tr>
<tr>
<td>2 (Part 4)</td>
<td>Hydrographic Surveying I</td>
<td>2</td>
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<tr>
<td>2 (Part 4)</td>
<td>Cartography Elective</td>
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</tr>
<tr>
<td>2 (Part 4)</td>
<td>General Studies Elective</td>
<td>23.5</td>
</tr>
</tbody>
</table>

*Students are required to attend a two-week survey camp, which is equivalent to 80 class contact hours.

†A one-day field tutorial is an essential part of this course.

### Year 3

<table>
<thead>
<tr>
<th>Session</th>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Part 5)</td>
<td>Engineering for Surveyors</td>
<td>3</td>
</tr>
<tr>
<td>1 (Part 5)</td>
<td>Astronomy I</td>
<td>3</td>
</tr>
<tr>
<td>1 (Part 5)</td>
<td>Photogrammetry I</td>
<td>6</td>
</tr>
<tr>
<td>1 (Part 5)</td>
<td>Land Studies II†</td>
<td>5</td>
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<tr>
<td>1 (Part 5)</td>
<td>Town Planning</td>
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</tr>
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<td>1 (Part 5)</td>
<td>General Studies Elective</td>
<td>22</td>
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†A one-day field tutorial is an essential part of this course.

### Year 4

<table>
<thead>
<tr>
<th>Session</th>
<th>Course</th>
<th>Hours per week</th>
</tr>
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<tbody>
<tr>
<td>1 (Part 7)</td>
<td>Professional Training</td>
<td>5 months</td>
</tr>
<tr>
<td>1 (Part 7)</td>
<td>Survey Camp*</td>
<td>2 weeks: Field</td>
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<tr>
<td>1 (Part 7)</td>
<td>Survey Camp*</td>
<td>2 weeks: Office</td>
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</table>

*Students are required to attend a four week survey camp, equivalent to 160 hours of class contact.
Year 4
Session 2 (Part 8)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>8.713</td>
<td>Management for Surveyors</td>
<td>2</td>
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<tr>
<td>29.212</td>
<td>Geodesy I</td>
<td>3</td>
</tr>
<tr>
<td>29.312</td>
<td>Astronomy II</td>
<td>3</td>
</tr>
<tr>
<td>29.512</td>
<td>Photogrammetry II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>General Studies Advanced Elective†</td>
<td>3</td>
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<tr>
<td></td>
<td>Two Electives†</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>20</td>
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</table>

†Electives chosen from:
29.162 Hydrographic Surveying*
29.183 Cartography Advanced Elective*
29.213 Geodesy III
29.313 Astronomy III
29.513 Photogrammetry III
29.615 Land Studies
29.173 Project
*Not offered in 1976.

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Surveying—Sandwich Course
Bachelor of Surveying
BSurv

Students commencing the Sandwich Course in 1976 either attend full time for one year in 1976 and switch to Part 3 of the sandwich course in 1977 or take part-time classes in 1976 and 1977 (part-time Stages 1 and 2) and switch to Part 3 of the sandwich course in 1978. See diagram below.

1. Full-time
See Year 1, full-time course.

2. Part-time

Stage 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
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</thead>
<tbody>
<tr>
<td>1.001</td>
<td>Physics I</td>
<td>6</td>
</tr>
<tr>
<td>10.001</td>
<td>Mathematics I</td>
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<tr>
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Stage 2

<table>
<thead>
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<tr>
<td>5.010</td>
<td>Engineering A*</td>
<td>6</td>
</tr>
<tr>
<td>5.030</td>
<td>Engineering C**</td>
<td>0</td>
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<tr>
<td>29.001</td>
<td>Surveying IA</td>
<td>6</td>
</tr>
<tr>
<td>29.002</td>
<td>Surveying IB</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Total S1</td>
<td>11½</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11½</td>
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</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.010</td>
<td>Engineering A*</td>
<td>6</td>
</tr>
<tr>
<td>5.030</td>
<td>Engineering C**</td>
<td>0</td>
</tr>
<tr>
<td>29.001</td>
<td>Surveying IA</td>
<td>5½</td>
</tr>
<tr>
<td>29.002</td>
<td>Surveying IB</td>
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<tr>
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<td>Total S2</td>
<td>11½</td>
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</table>

*4.901 Materials Option.
**Introduction to Systems and Computers Option.

3. Sandwich Course

Part 2
Offered in Session 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>1.201</td>
<td>Physics I (Part 2)</td>
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<td>5.010</td>
<td>Engineering A†</td>
<td>6</td>
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<td>10.001/2</td>
<td>Mathematics I (Part 2)</td>
<td>6</td>
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<tr>
<td>29.002</td>
<td>Surveying IB</td>
<td>6½</td>
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<td>Total</td>
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†4.901 Materials Option.

Part 3
Offered in Sessions 1 and 2

<table>
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<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>10.022</td>
<td>Mathematics II</td>
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<tr>
<td>10.342A</td>
<td>Statistics SU</td>
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<tr>
<td>29.102</td>
<td>Surveying II</td>
<td>9</td>
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<td>29.151</td>
<td>Survey Computations I</td>
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<td>31.212</td>
<td>Geometrical Optics</td>
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Part 4
Offered in Session 1

<table>
<thead>
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<th>Course Title</th>
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<tbody>
<tr>
<td>6.822</td>
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<td>3</td>
</tr>
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<td>10.342A</td>
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</tr>
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<td>8.711</td>
<td>Engineering for Surveyors</td>
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</tr>
<tr>
<td>10.022</td>
<td>Engineering Mathematics II</td>
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<tr>
<td>29.192</td>
<td>Survey Camp**</td>
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<td>27.295</td>
<td>Physical Geography for Surveyors†</td>
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<tr>
<td>29.161</td>
<td>Hydrographic Surveying or</td>
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<td>29.182</td>
<td>Cartography Elective</td>
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<td>General Studies</td>
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</tr>
</tbody>
</table>

*Students who passed in 10.341 Statistics in 1975 do not take this subject.
**Students are required to attend a two-week survey camp, equivalent to 60 class contact hours during Session 2 along with the full-time students.
†A one-day field tutorial is an essential part of this course.

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Surveying—Part-time Course
Bachelor of Surveying
BSurv

Stages 3 and 4
No longer offered.

<table>
<thead>
<tr>
<th>Stage 5</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>8.712</td>
<td>Engineering for Surveyors</td>
</tr>
<tr>
<td>29.211</td>
<td>Geodesy I</td>
</tr>
<tr>
<td>29.311</td>
<td>Astronomy I</td>
</tr>
<tr>
<td>29.612</td>
<td>Land Studies II†</td>
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<tr>
<td>36.411</td>
<td>Town Planning</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
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<tr>
<td></td>
<td>General Studies Elective</td>
</tr>
<tr>
<td></td>
<td>Total</td>
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</table>

†A one-day field tutorial is an essential part of this course.

3. Sandwich Course

Part 6

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>29.103</td>
<td>Surveying III</td>
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</tr>
<tr>
<td>29.152</td>
<td>Survey Computation II</td>
<td>1½</td>
</tr>
<tr>
<td>29.511</td>
<td>Photogrammetry I</td>
<td>3</td>
</tr>
<tr>
<td>29.613</td>
<td>Land Studies III</td>
<td>1</td>
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<td>29.614</td>
<td>Land Studies Project</td>
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<tr>
<td></td>
<td>General Studies Elective</td>
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<tr>
<td></td>
<td>General Studies Advanced Elective</td>
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</table>

†4.901 Materials Option.
Course Outlines

Stage 7*

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Hours per week</th>
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</thead>
<tbody>
<tr>
<td>29.212</td>
<td>Geodesy II</td>
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<tr>
<td>29.312</td>
<td>Astronomy II</td>
<td>1 1/2</td>
</tr>
<tr>
<td>29.512</td>
<td>Photogrammetry II</td>
<td>1 1/2</td>
</tr>
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<tr>
<td>29.194</td>
<td>Survey Camp†</td>
<td>3</td>
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</table>

*Students normally must fulfill the academic requirements of the subject, 29.193 Professional Training, before attempting Stage 7.

§Electives chosen from

- 29.162 Hydrographic Surveying II
- 29.183 Cartography Advanced Elective

(Not offered in 1976)

- 29.213 Geodesy III
- 29.313 Astronomy III
- 29.513 Photogrammetry III
- 29.615 Land Studies
- 29.173 Project

| Two Electives§ |

<table>
<thead>
<tr>
<th>Class and Commencing Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1  Stage 1</td>
</tr>
<tr>
<td>Year 2  Stage 2</td>
</tr>
<tr>
<td>Year 3  Stage 1</td>
</tr>
<tr>
<td>Year 4  Stage 2</td>
</tr>
</tbody>
</table>

Note: The horizontal lines in the Table indicate the normal progression from Part to Part. A student may however change from one line to another in order to take the next part in the course, if he wishes to reduce the period of time required to complete the course.

Definitions:

- 'Year' means a 'year' in the full-time course
- 'Stage' means a 'stage' in the part-time course
- 'Part' means a 'part' in the sandwich course

Bachelor of Surveying

Method of Implementation of the Sandwich Course

S1 S2 S1 S2 S1 S2 S1 S2 S1 S2 S1 S2 S1 S2

Class Commencing in
1973 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8
1974 Stage 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8
2. Stage 1 Stage 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8
3. Year 1 Stage 1 Stage 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8
1976 1. Year 1 Stage 1 Stage 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8
2. Year 1 Stage 1 Stage 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8

Note: The student is required to attend a four-week survey camp, equivalent to 160 hours of class contact. Academic subjects are arranged so as not to clash with the camp.

Definitions:

- 'Year' means a 'year' in the full-time course
- 'Stage' means a 'stage' in the part-time course
- 'Part' means a 'part' in the sandwich course

Bachelor of Surveying

Method of Implementation of the Sandwich Course

S1 S2 S1 S2 S1 S2 S1 S2 S1 S2 S1 S2 S1 S2

Class Commencing in
1973 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8
1974 Stage 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8
2. Stage 1 Stage 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8
3. Year 1 Stage 1 Stage 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8
1976 1. Year 1 Stage 1 Stage 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8
2. Year 1 Stage 1 Stage 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8

Note: The horizontal lines in the Table indicate the normal progression from Part to Part. A student may however change from one line to another in order to take the next part in the course, if he wishes to reduce the period of time required to complete the course.

Definitions:

- 'Year' means a 'year' in the full-time course
- 'Stage' means a 'stage' in the part-time course
- 'Part' means a 'part' in the sandwich course

Bachelor of Surveying

Method of Implementation of the Sandwich Course

S1 S2 S1 S2 S1 S2 S1 S2 S1 S2 S1 S2 S1 S2

Class Commencing in
1973 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8
1974 Stage 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8
2. Stage 1 Stage 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8
3. Year 1 Stage 1 Stage 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8
1976 1. Year 1 Stage 1 Stage 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8
2. Year 1 Stage 1 Stage 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8

Note: The student is required to attend a four-week survey camp, equivalent to 160 hours of class contact. Academic subjects are arranged so as not to clash with the camp.

Definitions:

- 'Year' means a 'year' in the full-time course
- 'Stage' means a 'stage' in the part-time course
- 'Part' means a 'part' in the sandwich course

Bachelor of Surveying

Method of Implementation of the Sandwich Course

S1 S2 S1 S2 S1 S2 S1 S2 S1 S2 S1 S2 S1 S2

Class Commencing in
1973 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8
1974 Stage 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8
2. Stage 1 Stage 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8
3. Year 1 Stage 1 Stage 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8
1976 1. Year 1 Stage 1 Stage 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8
2. Year 1 Stage 1 Stage 2 Part 3 Part 4 Part 5 Part 6 Part 7 Part 8

Note: The student is required to attend a four-week survey camp, equivalent to 160 hours of class contact. Academic subjects are arranged so as not to clash with the camp.

Definitions:

- 'Year' means a 'year' in the full-time course
- 'Stage' means a 'stage' in the part-time course
- 'Part' means a 'part' in the sandwich course
Graduate Enrolment Procedures

Graduate Study

Higher Degree Research Programs

New Students
Students seeking admission to Higher Degree (Research) must make application on the appropriate form which should be submitted to the Registrar. Successful applicants will be advised by letter concerning the method of enrolment.

Re-enrolling Students
Candidates registered for Higher Degrees (Research) are required to re-enrol at the commencement of each academic year. Unless advised to the contrary* candidates should obtain re-enrolment forms and advice on procedure and fees from the office of the appropriate School after 1 January 1976. Each candidate must complete a re-enrolment form and submit it to the Cashier. (See Enrolment Procedures earlier in this handbook.)

A candidate who has completed all the work for a graduate degree except for the submission of a thesis is required to re-enrol as above unless the thesis is submitted by 13 March 1976 in which case the candidate is not required to re-enrol.

*Masters and Graduate Diploma Courses

Note: All formal masters and graduate diploma students must lodge an authorised enrolment form with the Cashier on the day the enrolling officer signs the form. (For further details see the Enrolment Procedures and Fees section.)

New Students
Students seeking admission to formal masters courses and graduate diploma courses are required to apply on the appropriate form and by the closing date specified for the particular course (see the relevant Faculty Handbook). Unless advised to the contrary successful applicants are required to attend for enrolment at the appropriate time and place as listed below. The letter offering a place must be taken to the enrolment centre.

Re-enrolling Students
Candidates continuing formal graduate courses including those who have completed their formal examination but have not submitted their project report are required to attend for re-enrolment at the appropriate time and place as listed below:

Master of Engineering Science, Master of Surveying Science and Graduate Diploma Courses

Students are required to attend for enrolment on Friday 20 February at the locations and times specified below:

<table>
<thead>
<tr>
<th>Civil Engineering (MEngSc)</th>
<th>Room 109</th>
</tr>
</thead>
<tbody>
<tr>
<td>School of Civil Engineering</td>
<td>2.00 pm to 5.00 pm</td>
</tr>
<tr>
<td></td>
<td>6.00 pm to 8.00 pm</td>
</tr>
<tr>
<td>Qualifying Programs (for admission to Higher Degree Candidature)</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Students may only enrol in such programs after approval has been obtained from the relevant Higher Degree Committee.</td>
<td></td>
</tr>
<tr>
<td>Unless advised to the contrary successful applicants are required to attend for enrolment at the appropriate time and place as listed below. The letter offering a place must be taken to the enrolment centre.</td>
<td></td>
</tr>
<tr>
<td>Candidates who are continuing a qualifying program are required to attend for re-enrolment at the appropriate time and place as listed below.</td>
<td></td>
</tr>
<tr>
<td>Note: All qualifying students must lodge an authorised enrolment form with the Cashier on the day the enrolling officer signs the form. (See the Enrolment Procedures earlier in this handbook.)</td>
<td></td>
</tr>
</tbody>
</table>
Graduate School of Engineering

Graduate Study

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

The Faculty of Engineering provides facilities for well-qualified graduates to engage in advanced studies and research leading to the award of the degrees of Doctor of Philosophy, Master of Engineering or Master of Surveying in all seven schools. In addition the degree of Master of Science is available through the Schools of Civil Engineering, Electrical Engineering, Highway Engineering, Mechanical & Industrial Engineering, and Transportation & Traffic.

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 together with the possibility of interdisciplinary studies.

In 1976 a new set of faculty-wide regulations for graduate diplomas will be introduced, which includes provision for interdisciplinary study in the new Graduate Diploma in Engineering Developments, as well as more flexibility in the Graduate Diplomas in Highway Engineering, Human Communication, Industrial Engineering and Transport.

Students are advised to consult the Graduate Handbook for further information.

The conditions for the award of the various higher degrees and graduate diplomas are given in the Calendar.

The degrees of Master of Engineering Science and Master of Surveying Science may be gained by:

1. formal course work; or
2. a combination of formal course work and the completion of a report on a project or a research thesis; or
3. completion of a research thesis.

The number of credits for a project report shall be 9, and for a research thesis 18 or 36.

Candidates proceeding to the degree of Master of Engineering Science and Master of Surveying Science are encouraged to develop interdisciplinary attitudes and, with the approval of the Head of School, 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 the approval of the Head of School, is able to select a program of studies best suited to his needs.

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

The subjects which may be available for candidates proceeding to the degree of Master of Engineering Science or Master of Surveying Science are listed below under the various Schools. Not all electives will necessarily be offered in any particular year.

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.701G</td>
<td>Decision Making in Civil Engineering</td>
<td>3</td>
</tr>
<tr>
<td>8.702G</td>
<td>Network Methods in Civil Engineering</td>
<td>3</td>
</tr>
<tr>
<td>8.703G</td>
<td>Optimization Techniques in Civil Engineering</td>
<td>3</td>
</tr>
<tr>
<td>8.704G</td>
<td>Stochastic Methods in Civil Engineering</td>
<td>3</td>
</tr>
<tr>
<td>8.705G</td>
<td>Systems Modelling</td>
<td>3</td>
</tr>
<tr>
<td>8.706G</td>
<td>Experimental Methods in Engineering Research</td>
<td>3</td>
</tr>
<tr>
<td>8.708G</td>
<td>Finite Element Methods in Civil Engineering I</td>
<td>3</td>
</tr>
<tr>
<td>8.709G</td>
<td>Finite Element Methods in Civil Engineering II</td>
<td>3</td>
</tr>
<tr>
<td>8.710G</td>
<td>Advanced Topics in Optimization in Civil Engineering</td>
<td>3</td>
</tr>
<tr>
<td>8.714G</td>
<td>Advanced Topics in Systems Modelling</td>
<td>3</td>
</tr>
<tr>
<td>8.723G</td>
<td>Construction Design</td>
<td>3</td>
</tr>
<tr>
<td>8.724G</td>
<td>Construction Technology</td>
<td>3</td>
</tr>
<tr>
<td>8.725G</td>
<td>Construction Accounting and Control Practice</td>
<td>3</td>
</tr>
<tr>
<td>8.726G</td>
<td>Construction Law and Professional Practice</td>
<td>3</td>
</tr>
<tr>
<td>8.727G</td>
<td>Construction Planning and Estimating</td>
<td>6</td>
</tr>
<tr>
<td>8.728G</td>
<td>Design of Construction Operations</td>
<td>6</td>
</tr>
<tr>
<td>8.752G</td>
<td>Terrain Engineering</td>
<td>6</td>
</tr>
<tr>
<td>8.753G</td>
<td>Soil Mechanics I</td>
<td>3</td>
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<tr>
<td>8.754G</td>
<td>Soil Mechanics II</td>
<td>3</td>
</tr>
<tr>
<td>8.755G</td>
<td>Materials of Construction I</td>
<td>3</td>
</tr>
<tr>
<td>8.756G</td>
<td>Materials of Construction II</td>
<td>3</td>
</tr>
<tr>
<td>8.758G</td>
<td>Soil Mechanics III</td>
<td>3</td>
</tr>
<tr>
<td>8.759G</td>
<td>Rock Mechanics</td>
<td>6</td>
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<tr>
<td>8.760G</td>
<td>Materials Construction III</td>
<td>3</td>
</tr>
<tr>
<td>8.761G</td>
<td>Advanced Rock Mechanics</td>
<td>6</td>
</tr>
<tr>
<td>8.763G</td>
<td>Rock Mechanics Investigation</td>
<td>3</td>
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<tr>
<td>8.764G</td>
<td>Composites in Civil Engineering</td>
<td>3</td>
</tr>
<tr>
<td>8.766G</td>
<td>Welding in Structural Engineering</td>
<td>3</td>
</tr>
<tr>
<td>8.768G</td>
<td>Fracture Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>8.771G</td>
<td>Foundation Engineering</td>
<td>6</td>
</tr>
<tr>
<td>8.802G</td>
<td>Elastic Stability I</td>
<td>3</td>
</tr>
<tr>
<td>8.803G</td>
<td>Elastic Stability II</td>
<td>3</td>
</tr>
<tr>
<td>8.804G</td>
<td>Vibrations of Structures I</td>
<td>3</td>
</tr>
<tr>
<td>8.805G</td>
<td>Vibrations of Structures II</td>
<td>3</td>
</tr>
<tr>
<td>8.806G</td>
<td>Prestressed Concrete I</td>
<td>3</td>
</tr>
<tr>
<td>8.807G</td>
<td>Prestressed Concrete II</td>
<td>3</td>
</tr>
<tr>
<td>8.808G</td>
<td>Prestressed Concrete III</td>
<td>3</td>
</tr>
<tr>
<td>8.809G</td>
<td>Reinforced Concrete I</td>
<td>3</td>
</tr>
<tr>
<td>8.810G</td>
<td>Reinforced Concrete II</td>
<td>3</td>
</tr>
<tr>
<td>8.811G</td>
<td>Reinforced Concrete III</td>
<td>3</td>
</tr>
<tr>
<td>8.812G</td>
<td>Plastic Analysis and Design of Steel Structures I</td>
<td>3</td>
</tr>
<tr>
<td>8.813G</td>
<td>Plastic Analysis and Design of Steel Structures II</td>
<td>3</td>
</tr>
<tr>
<td>8.814G</td>
<td>Analysis of Plates and Shells</td>
<td>3</td>
</tr>
<tr>
<td>8.815G</td>
<td>Computer Analysis of Frames I</td>
<td>3</td>
</tr>
<tr>
<td>8.816G</td>
<td>Computer Analysis of Frames II</td>
<td>3</td>
</tr>
<tr>
<td>8.817G</td>
<td>Experimental Structural Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>8.818G</td>
<td>Bridge Design I</td>
<td>3</td>
</tr>
<tr>
<td>8.819G</td>
<td>Bridge Design II</td>
<td>3</td>
</tr>
<tr>
<td>8.830G</td>
<td>Hydromechanics</td>
<td>3</td>
</tr>
<tr>
<td>8.901G</td>
<td>Civil Engineering Elective I</td>
<td>3</td>
</tr>
<tr>
<td>8.902G</td>
<td>Civil Engineering Elective II</td>
<td>3</td>
</tr>
<tr>
<td>8.909G</td>
<td>Project</td>
<td>9</td>
</tr>
<tr>
<td>8.918G</td>
<td>Research Project</td>
<td>18</td>
</tr>
<tr>
<td>8.936G</td>
<td>Research Project</td>
<td>36</td>
</tr>
</tbody>
</table>

A 36 Credit Research Project will not normally be approved in the School of Civil Engineering.

The School of Civil Engineering Graduate Studies Handbook should be consulted for the final list of subjects offered in 1976.

### School of Electrical Engineering

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.050G</td>
<td>Occasional Elective</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>
</tr>
<tr>
<td>6.075G</td>
<td>Electric Contacts</td>
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</tr>
<tr>
<td>6.150G</td>
<td>Communication Elective</td>
<td></td>
</tr>
<tr>
<td>6.160G</td>
<td>Field Theory in Electrical Engineering</td>
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</tr>
<tr>
<td>6.161G</td>
<td>Field Mapping</td>
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<tr>
<td>6.164G</td>
<td>Microwave Radiators and Applications</td>
<td></td>
</tr>
</tbody>
</table>
### School of Highway Engineering

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>20.041G</td>
<td>Road Location and Design Part I</td>
<td>6</td>
</tr>
<tr>
<td>20.042G</td>
<td>Road Location and Design Part II</td>
<td>6</td>
</tr>
<tr>
<td>20.052G</td>
<td>Road Location and Design Part II (Surveyors)</td>
<td>6</td>
</tr>
<tr>
<td>20.121G</td>
<td>Soil Analysis, Pavement and Bridge Foundation Design Part I</td>
<td>3</td>
</tr>
<tr>
<td>20.122G</td>
<td>Soil Analysis, Pavement and Bridge Foundation Design Part II</td>
<td>3</td>
</tr>
<tr>
<td>20.131G</td>
<td>Road Construction Part II (Surveyors) (Civil Engineering for Highways)</td>
<td>6</td>
</tr>
<tr>
<td>20.211G</td>
<td>Road Construction Part I</td>
<td>6</td>
</tr>
<tr>
<td>20.212G</td>
<td>Road Construction Part II</td>
<td>6</td>
</tr>
<tr>
<td>20.213G</td>
<td>Road Construction Part III (Surveyors)</td>
<td>6</td>
</tr>
<tr>
<td>20.221G</td>
<td>Road Construction Part I (Surveyors)</td>
<td>6</td>
</tr>
<tr>
<td>20.311G</td>
<td>Highway Structures Part I</td>
<td>3</td>
</tr>
<tr>
<td>20.312G</td>
<td>Highway Structures Part II</td>
<td>3</td>
</tr>
<tr>
<td>20.421G</td>
<td>Law and Administration</td>
<td>6</td>
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<tr>
<td>20.430G</td>
<td>Highway Engineering Elective I</td>
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<tr>
<td>20.431G</td>
<td>Highway Engineering Elective II</td>
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<tr>
<td>20.501G</td>
<td>Management for Highway Engineers</td>
<td>6</td>
</tr>
<tr>
<td>20.909G</td>
<td>Project</td>
<td>9</td>
</tr>
<tr>
<td>20.918G</td>
<td>Research Project</td>
<td>18</td>
</tr>
<tr>
<td>20.936G</td>
<td>Research Project</td>
<td>36</td>
</tr>
</tbody>
</table>

### School of Mechanical and Industrial Engineering

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.045-6-7G</td>
<td>Advanced Topics in Mechanical Engineering</td>
<td>2, 2, 2</td>
</tr>
<tr>
<td>5.072G</td>
<td>Ordinary Differential Equations in Mechanical engineering</td>
<td>2</td>
</tr>
<tr>
<td>5.075-6G</td>
<td>Computation Methods in Mechanical Engineering I, II</td>
<td>2, 2</td>
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<tr>
<td>5.077-8G</td>
<td>Analogue Computation in Mechanical Engineering I, II</td>
<td>2, 2</td>
</tr>
<tr>
<td>5.085G</td>
<td>Tensors</td>
<td>2</td>
</tr>
<tr>
<td>5.101-2G</td>
<td>Optimisation Methods for Mechanical Engineers I, II</td>
<td>2, 2</td>
</tr>
<tr>
<td>5.106G</td>
<td>Mechanical Design Against Fatigue</td>
<td>2</td>
</tr>
<tr>
<td>5.110G</td>
<td>Morphology of Design</td>
<td>4</td>
</tr>
<tr>
<td>*5.151-2G</td>
<td>Refrigeration and Air Conditioning Design I, II</td>
<td>3, 3</td>
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<tr>
<td>5.304-5G</td>
<td>Advanced Dynamics I, II</td>
<td>2, 2</td>
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<tr>
<td>*5.321-2G</td>
<td>Automatic Control I, II</td>
<td>2, 2</td>
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<tr>
<td>5.328-9G</td>
<td>Control and Modelling of Mechanical Systems I, II</td>
<td>2, 2</td>
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<tr>
<td>5.335G</td>
<td>Vibrations</td>
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<tr>
<td>5.401G</td>
<td>Experimental Stress Analysis</td>
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<tr>
<td>5.421-2G</td>
<td>Advanced Mechanics of Solids I, II</td>
<td>2, 2</td>
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<tr>
<td>5.423-4G</td>
<td>Advanced Mechanics of Solids III, IV</td>
<td>2, 2</td>
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<tr>
<td>5.428-9G</td>
<td>Advanced Mechanics of Materials I, II</td>
<td>2, 2</td>
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<tr>
<td>5.491-2G</td>
<td>Biomechanics I, II</td>
<td>2, 2</td>
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<tr>
<td>5.621-2G</td>
<td>Gasdynamics I, II</td>
<td>2, 2</td>
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<tr>
<td>5.631-2G</td>
<td>Lubrication Theory and Design I, II</td>
<td>2, 2</td>
</tr>
</tbody>
</table>

*Nine credit projects are not normally approved by the School of Electrical Engineering.*
Course Outlines

Credits

• 5.712-3G Convection Heat Transfer I, II 2, 2
5.718G Conduction Heat Transfer 2
5.719G Radiation Heat Transfer 2
5.725G Statistical Thermodynamics 2
5.735G Direct Energy Conversion 2
• 5.751-2G Refrigeration, Air Conditioning and Cryogenics I, II 2, 2
• 5.758G Refrigeration and Air Conditioning Applications 4
5.909G Project 9
5.912-3G Naval Hydrodynamics I, II 2, 2
5.918G Research Project 18
† 5.936G Research Project 36

* Candidates wishing to specialize in Refrigeration and Air Conditioning should select these subjects.

† A 36 credit Research Project will not normally be approved in the School of Mechanical and Industrial Engineering.

Department of Industrial Engineering

Credits

18.061G* Industrial Experimentation I 3
18.062G* Industrial Experimentation II 3
18.073G* Ergonomics 2
18.171G* Inspection and Quality Control 3
18.271G* Theory of Machining and Forming Processes 3
18.272G* Technology of Machining and Forming Processes 3
18.371G* Factory Design and Layout 3
18.461G* Design for Production 4
18.462G* Industrial Design 2
18.463G* Tool Design 4
18.471G* Design Communication 2
18.472G* Engineering Design Analysis 6
18.571G Operations Research I 6
18.574G Operations Research II 3
18.671G Decision Theory 2
18.761G Simulation in Operations Research 3
18.770G Stochastic Control 2
18.772G Information Processing Systems in Organisations 2
18.773G Optimal Control in Operations Research 2
18.774G Applied Stochastic Processes 2
18.775G Networks and Graphs 2
18.776G Production and Inventory Control 2
18.777G Time Series and Forecasting 2
18.778G Scheduling and Sequencing 2
18.779G Game Theory 2
18.871G Mathematics for Operations Research 2
18.872G Mathematical Programming A 2
18.873G Mathematical Programming B 2
18.874G Dynamic Programming 2
18.875G Geometric Programming 2
18.876G Advanced Mathematics for Operations Research 2
18.877G Large-scale Optimisation 2
18.960G Production Engineering Seminar 0
18.967G Advanced Topic in Production Engineering 2
18.968G Advanced Topic in Production Engineering 2
18.969G Advanced Topic in Production Engineering 2
18.970G Operations Research Seminar 0
18.977G Advanced Topic in Operations Research 2
18.978G Advanced Topic in Operations Research 2
18.979G Advanced Topic in Operations Research 2
18.980G Project 9
18.989G Research Project 18
18.996G† Research Project 36

Candidates taking their Project in Operations Research will generally be required to take 18.571G, 18.574G, 18.871G and 14.062G Accounting for Engineers.

* Candidates with a Project in Production Engineering will generally be required to take at least two-thirds of the formal credits from these subjects.

† A 36 credit Research Project will not normally be approved in the School of Mechanical and Industrial Engineering.

School of Nuclear Engineering

Each subject counts as three credits.

23.013G Neutron Transport and Diffusion
23.014G Fewgroup Reactor Theories
23.015G Multigroup Reactor Theories
23.016G Neutron Kinetics and Reactor Dynamics
23.023G Reactor Thermal Performance
23.024G Boiling and Two Phase Flow
23.025G Reactor Structural Mechanics
23.026G Reactor Systems Analysis
23.027G Boiling Reactor Dynamics
23.028G Reactor Accident and Safety Analysis
23.032G Mathematics Analysis and Computation
23.033G Matrix Theory and Computation
23.034G Random Processes and Reactor Noise
23.042G Nuclear Fuel and Energy Cycles
23.043G Nuclear Power Costing and Economics
23.044G Nuclear Engineering Optimization
23.045G Uranium Enrichment Technology
23.090G Project 9 credits
23.918G Research Project 18 credits
23.936G Research Project 36 credits
School of Surveying

<table>
<thead>
<tr>
<th>Credits</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>29.106G Special Topic</td>
</tr>
<tr>
<td>6</td>
<td>29.154G Adjustment of Observations</td>
</tr>
<tr>
<td>3</td>
<td>29.163G Mathematical Methods 1</td>
</tr>
<tr>
<td>3</td>
<td>29.164G Mathematical Methods 2</td>
</tr>
<tr>
<td>3</td>
<td>29.165G Mathematical Methods 3</td>
</tr>
<tr>
<td>3</td>
<td>29.215G Geometrical Geodesy</td>
</tr>
<tr>
<td>3</td>
<td>29.216G Geodetic Surveying</td>
</tr>
<tr>
<td>3</td>
<td>29.223G Dynamic Geodesy</td>
</tr>
<tr>
<td>6</td>
<td>29.224G Physical Geodesy</td>
</tr>
<tr>
<td>6</td>
<td>29.314G Geodetic Astronomy</td>
</tr>
<tr>
<td>3</td>
<td>29.517G Theory of Optical-Mechanical Photogrammetric Orientation</td>
</tr>
<tr>
<td>3</td>
<td>29.518G Theory of Analytical Photogrammetric Orientation</td>
</tr>
<tr>
<td>3</td>
<td>29.519G Photogrammetric Instrumentation..</td>
</tr>
<tr>
<td>3</td>
<td>29.520G Photogrammetric Production Processes</td>
</tr>
<tr>
<td>3</td>
<td>29.521G Aerial Triangulation</td>
</tr>
<tr>
<td>3</td>
<td>29.522G Block Adjustment</td>
</tr>
<tr>
<td>3</td>
<td>29.909G Project</td>
</tr>
<tr>
<td>18</td>
<td>29.918G Research Project</td>
</tr>
<tr>
<td>36</td>
<td>29.936G Research Project</td>
</tr>
</tbody>
</table>

School of Transportation and Traffic

<table>
<thead>
<tr>
<th>Credits</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>19.101G Applications and Practice of Traffic Engineering</td>
</tr>
<tr>
<td>6</td>
<td>19.111G Theory of Traffic Behaviour</td>
</tr>
<tr>
<td>6</td>
<td>19.121G Theory and Practice of Statistics for Traffic Engineers</td>
</tr>
<tr>
<td>6</td>
<td>19.131G Land Use and Transport Planning</td>
</tr>
<tr>
<td>6</td>
<td>19.141G Transport System Analysis</td>
</tr>
<tr>
<td>3</td>
<td>19.151G Economics of Transport</td>
</tr>
<tr>
<td>9</td>
<td>19.909G Project</td>
</tr>
<tr>
<td>18</td>
<td>19.918G Research Project</td>
</tr>
<tr>
<td>36</td>
<td>19.936G Research Project</td>
</tr>
</tbody>
</table>

Graduate Diplomas in Engineering

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 Highway Engineering; in Human Communication; in Industrial Engineering; and in Transport. Candidates must complete a program totalling 30 credits, the number of credits for each subject being determined by Faculty on the recommendation of Heads of Schools; normally one credit is equal to attendance for one hour per week for one session. 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. 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 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 specialty, 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 in Engineering Developments is intended for those who wish to take a more general program in several areas of interest. The course may contain subjects from the Division of Postgraduate Extension Studies (by radio, tape correspondence, etc.) 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.

Other subjects which may be available in the graduate diploma course are listed below under the various schools. Not all electives are necessarily offered in any particular year.

School of Highway Engineering

<table>
<thead>
<tr>
<th>Credits</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>20.002G Soil Mechanics applied to Road Engineering</td>
</tr>
<tr>
<td>8</td>
<td>20.003G Road Engineering Practice</td>
</tr>
<tr>
<td>7</td>
<td>20.061G Road Location and Design Part I</td>
</tr>
<tr>
<td>7</td>
<td>20.062G Road Location and Design Part II</td>
</tr>
<tr>
<td>6</td>
<td>20.231G Road Construction</td>
</tr>
<tr>
<td>6</td>
<td>20.232G Highway Materials</td>
</tr>
</tbody>
</table>

School of Mechanical and Industrial Engineering

<table>
<thead>
<tr>
<th>Credits</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>18.081G Industrial engineering I</td>
</tr>
<tr>
<td>10</td>
<td>18.082G Industrial Engineering II</td>
</tr>
<tr>
<td>3</td>
<td>18.681G Engineering Economic Analysis</td>
</tr>
<tr>
<td>6</td>
<td>18.081G Industrial Computations</td>
</tr>
<tr>
<td>2</td>
<td>14.001 Introduction to Accounting A</td>
</tr>
<tr>
<td>1</td>
<td>14.002 Introduction to Accounting B</td>
</tr>
<tr>
<td>2</td>
<td>14.042G Industrial Law</td>
</tr>
<tr>
<td>2</td>
<td>14.062G Accounting for Engineers</td>
</tr>
</tbody>
</table>

School of Transportation and Traffic

<table>
<thead>
<tr>
<th>Credits</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>19.161G Characteristics of Transport</td>
</tr>
<tr>
<td>6</td>
<td>19.171G Fundamentals of Transport Economic</td>
</tr>
<tr>
<td>6</td>
<td>19.181G Introduction to Statistics</td>
</tr>
<tr>
<td>6</td>
<td>19.191G Introduction to Traffic Theory</td>
</tr>
<tr>
<td>6</td>
<td>19.211G Fundamentals of Transport Planning</td>
</tr>
<tr>
<td>6</td>
<td>19.221G Traffic Operation and Control</td>
</tr>
</tbody>
</table>
Course Outlines

Division of Postgraduate Extension Studies*

Human Communication
The following subjects are offered by a combination of attendance at the Kensington campus for studio, laboratory and tutorial sessions and lectures by radio in the Sydney area and by audio tape elsewhere.

<table>
<thead>
<tr>
<th>Credits</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>97.001G</td>
<td>Linguistics and the art and Practice of Written and Spoken Communication</td>
</tr>
<tr>
<td>97.002G</td>
<td>Basic Information Theory</td>
</tr>
<tr>
<td>07.004G</td>
<td>Psychology of Communication</td>
</tr>
<tr>
<td>97.005G</td>
<td>Audio and Video Equipment—Capabilities and Applications</td>
</tr>
<tr>
<td>97.006G</td>
<td>Project</td>
</tr>
<tr>
<td>97.007G</td>
<td>Audio Video Signals in Communication</td>
</tr>
<tr>
<td>97.008G*</td>
<td>Signals-Body in Communication</td>
</tr>
<tr>
<td>97.009G</td>
<td>Presentation of Information</td>
</tr>
</tbody>
</table>

*Half-session only.

Subjects offered by Tape Correspondence

<table>
<thead>
<tr>
<th>Credits</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.075G</td>
<td>Computational Methods in Mechanical Engineering, Part 1</td>
</tr>
<tr>
<td>5.076G</td>
<td>Computational Methods in Mechanical Engineering, Part 2</td>
</tr>
<tr>
<td>6.345G</td>
<td>Active and Adaptive Circuits for Integrated Systems</td>
</tr>
<tr>
<td>6.373G</td>
<td>Semiconductor Devices</td>
</tr>
<tr>
<td>6.376G</td>
<td>Reliability Engineering</td>
</tr>
<tr>
<td>6.377G</td>
<td>Integrated Circuit Design</td>
</tr>
<tr>
<td>6.378G</td>
<td>Solar Energy Conversion</td>
</tr>
<tr>
<td>8.708G</td>
<td>Finite Element Methods in Civil Engineering</td>
</tr>
<tr>
<td>97.031G</td>
<td>Linguistics, and Written and Spoken Communication</td>
</tr>
<tr>
<td>97.032G</td>
<td>Basic Information Theory</td>
</tr>
<tr>
<td>97.034G</td>
<td>Psychology of Communication</td>
</tr>
<tr>
<td>97.035G</td>
<td>Audio Video Equipment</td>
</tr>
<tr>
<td>97.037G</td>
<td>Audio Video Signals in Communication</td>
</tr>
<tr>
<td>97.039G</td>
<td>Presentation of Information</td>
</tr>
<tr>
<td>97.040G</td>
<td>Basic Fortran</td>
</tr>
</tbody>
</table>

*See the Calendar for further information on the Division of Postgraduate Extension Studies.
Subject Descriptions and Textbooks

Reference booklets are not published here, but are available from the various Schools.

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); S1 + S2 (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).

Identification of Subjects by Numbers

Each subject provided by a School has an identifying number. The integer is the identifying number of the School and the numbers after the decimal point distinguish the subject from others conducted by that School, some of which may have the same name. For example, Physics I has several variations. The subject number 1.001 denotes Physics I and is the physics subject included in first year Applied Science, Science and Engineering course programs; 1.011 is the corresponding subject at a higher level; 1.081 is the special Physics I subject included in the first year Medicine course; and so on.

As well as providing a clear means of identifying subjects with the same or similar names, the subject number is also used in the recording of enrolment and examination information on machine data processing equipment. It is therefore emphasized that students should cite both the correct subject name, subject number and course code in all correspondence or on forms dealing with courses.

You should become familiar with the identifying numbers of the subjects listed in this handbook:

<table>
<thead>
<tr>
<th>Identifying Number</th>
<th>School, Faculty or Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>School of Physics</td>
</tr>
<tr>
<td>2</td>
<td>School of Chemistry</td>
</tr>
<tr>
<td>4</td>
<td>School of Metallurgy</td>
</tr>
<tr>
<td>5</td>
<td>School of Mechanical and Industrial Engineering</td>
</tr>
<tr>
<td>6</td>
<td>School of Electrical Engineering</td>
</tr>
<tr>
<td>8</td>
<td>School of Civil Engineering</td>
</tr>
<tr>
<td>10</td>
<td>School of Mathematics</td>
</tr>
<tr>
<td>14</td>
<td>School of Accountancy</td>
</tr>
<tr>
<td>15</td>
<td>School of Economics</td>
</tr>
<tr>
<td>18</td>
<td>Department of Industrial Engineering</td>
</tr>
<tr>
<td>19</td>
<td>School of Transportation and Traffic</td>
</tr>
<tr>
<td>20</td>
<td>School of Highway Engineering</td>
</tr>
<tr>
<td>22</td>
<td>School of Chemical Technology</td>
</tr>
<tr>
<td>23</td>
<td>School of Nuclear Engineering</td>
</tr>
<tr>
<td>27</td>
<td>School of Geography</td>
</tr>
<tr>
<td>29</td>
<td>School of Surveying</td>
</tr>
<tr>
<td>31</td>
<td>School of Applied Physics and Optometry</td>
</tr>
<tr>
<td>36</td>
<td>School of Town Planning</td>
</tr>
</tbody>
</table>

See the Calendar for the full list of subjects and their identifying numbers and for summaries of the disciplines taught in each School or Department.
School of Mechanical and Industrial Engineering

Undergraduate Study

5.010 Engineering A  SS L4T2

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. and either
1. 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.

Textbooks
Svensson N. L. Introduction to Engineering Design NSWUP
Walshaw A. C. SI Units in Worked Examples Longman and
For Introduction to Materials Science:
Gordon J. E. The New Science of Strong Materials, or Why You Don't Fall through the Floor Pelican
Scientific American Materials Freeman

For Introduction to Materials I:
McClimock F. A. & Ali S. eds Mechanical Behaviour of Materials Addison-Wesley
Polakowski N. H. & Ripling E. J. Strength and Structure of Engineering Materials Prentice-Hall
Richards C. W. Engineering Materials Science Chapman & Hall
Wyatt O. & Dew-Hughes D. Metals Ceramics and Polymers C.U.P.
Van Vlack L. H. Elements of Materials Science 2nd ed Addison-Wesley

5.020 Engineering B  SS L4T2
Co-requisite: 5.010.


Textbooks
For Engineering Mechanics II:
Meriam J. L. Statics Wiley
Meriam J. L. Dynamics Wiley
(This book required by students enrolled in 5.311 Engineering Mechanics in Year 2 or Stage III)
For Mechanics of Solids I:
Hall A. S. Introduction to Mechanics of Solids Wiley

5.030 Engineering C  SS L4T2
Engineering Drawing: 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.

and, one of the following options (determined by the course of study)
1. (Mechanical, Industrial and Aeronautical Engineering and Naval Architecture students must take this option) Production Technology: 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.

and Introduction to Engineering Construction: All students are required to visit a nominated construction project as an integral part of the course. Introduction to engineering construction, equipment and methods. The scope of engineering construction, typical projects and decision agents.

3. Introduction to Systems and Computers: Introduction to computers to follow the computer work in Mathematics I. To develop: A familiarity with algorithms; B the use of procedure oriented languages; and C an introduction to computing equipment.

Systems. To give students an appreciation of some of the concepts used in engineering, to relate the concepts to phenomena within their experience, and to illustrate them by case histories and engineering examples. Quantities. Concepts. Components. Systems.

4. (Chemical Engineering students must take this option) Introduction to Chemical Engineering: Routes to and end uses of industrial chemicals. Likely new industrial chemicals. A survey of several Australian chemical industries from the point of view of their historical and economic importance. Examination of the unit operations involved in the industry and the raw materials, equipment and services used. Environmental aspects of the chemical industry.
5. (Metallurgy students must take this option) Introduction to Metallurgical Engineering: 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.

6. (Mining Engineering students must take this option) Mechanics of Solids I: As for 5.020 Engineering B.

7. (Electrical Engineering students must take this option) Introduction to Computing: Introduction to computer program design with emphasis on the design of correct, reliable programs. The subject is organized on a tutorial basis and a number of simple fundamental programming tasks are illustrated. Programs are written in a high-level language which provides facilities for the specifications of algorithms and data structures.

Textbooks
For Engineering Drawing:
Robertson R. G. Descriptive Geometry Pitman
Thomson R. Exercises in Graphic Communication Nelson

For Production Technology:
De Garmo E. P. Materials and Processes in Manufacturing Macmillan

For Introduction to Materials II:
Richards C. W. Engineering Materials Science Chapman & Hall
Street A. Metals in the Service of Man Penguin
or
Polakowski N. H. & Ripling E. J. Strength and Structure of Engineering Materials Prentice-Hall
or
Wyatt O. & Dew-Hughes D. Metals Ceramics and Polymers C.U.P.

For Introduction to Systems and Computers:
Karbowski A. E. & Huey R. M. eds Information, Computers, Machines and Man Wiley

For Introduction to Metallurgical Engineering:
Street A. & Alexander W. O. Metals in the Service of Man Penguin

For Mechanics of Solids I:
Hall A. S. Introduction to the Mechanics of Solids Prentice-Hall

For Introduction to Computing:
Wirth N. Systematic Programming: An Introduction Prentice-Hall

5.032 Experimental Engineering II  S1 + S2 L1T1
Prerequisites: 1.001, 5.010, 5.020, 10.001. Co or prerequisite: 5.311, 6.801, 8.151, 5.611.
A series of lectures, demonstrations and experiments designed to show the theory and techniques of instrumentation in Mechanical Engineering.

Textbook
Beckwith T. G. & Buck N. L. Mechanical Measurements 2nd ed Addison-Wesley

5.033 Experimental Engineering III  S1 + S2 L1T½
Prerequisites: 5.032. Co or prerequisite: 5.071.
A series of experiments and associated lectures to illustrate some common problems in experimental work.

Textbook
Freund J. E. Mathematical Statistics Prentice-Hall
interval estimation. The standard tests of significance based on the above distributions, with a discussion of power where appropriate. An introduction of linear regression.

Textbooks
Freund J. E. Mathematical Statistics Prentice-Hall
Statistical Tables

5.111 S1 + S2 L2T2
Mechanical Engineering Design I
Prerequisites: 5.010, 5.020. Co- or prerequisite: 5.311, 5.611, 8.151, 8.259.
Introductory lectures illustrating the interdependence of design and technology. Mechanical technology. Interpretation of engineering drawing practice. Philosophy and technique of design. Simple creative design assignments. Basic engineering elements.
Textbook
De Garmo E. P. Materials and Processes in Manufacturing Macmillan

5.112 S1 + S2 L2T1
Mechanical Engineering Design II
Prerequisites: 5.111, 5.311, 8.151, 8.259. Co- or prerequisite: 5.331, 5.412, 5.612.
Design for Production: Principles of tolerance specification, standard procedures for gauging, dimensioning and surface finish specification. Design of Machine Elements: Application of fundamental principles to the design of common machine elements, such as shafts, springs, bearings, power transmission devices.
Textbooks

5.113 S1 + S2 L1½T4½
Mechanical Engineering Design III
Prerequisites: 5.112, 5.331, 5.412. Co- or prerequisite: 5.612.

5.301 Engineering Mechanics S1 + S2 L1T1
Prerequisites: 1.001, 5.010. Co- or prerequisite: 10.001.
Kinematics and kinetics of the plane motion of particles. Rectilinear, curvilinear and relative translational motion; work and energy; impulse and momentum.
Textbook
Meriam J. L. Dynamics Wiley

5.303 Mechanical Vibrations SS L1T½
Prerequisites: 5.311, 10.022.

5.311 Engineering Mechanics SS L1½T1
Prerequisites: 1.001, 5.010, 5.020. Co- or prerequisite: 10.001.
Kinematics and kinetics of the plane motion of rigid bodies. Absolute motion, relative translational motion and relative angular motion; dynamic equilibrium; work and energy; impulse and momentum.
Textbook
Meriam J. L. Dynamics Wiley

5.331 Dynamics of Machines I S1 + S2 L1½T½
Prerequisites: 5.311, 10.022.
Mechanical Vibrations: Simple harmonic motion. One degree of freedom systems, free and forced vibrations, transmissibility and motion isolation. Whirling of shafts. Laplace transform methods and transfer functions.
Textbook
Hirschhorn J. Dynamics of Machinery Nelson

5.324 Automatic Control Engineering S1 + S2 L2T1
Prerequisite: 10.022.

5.332 Dynamics of Machines II S1 + S2 L2T1
Prerequisite: 5.331.
Dynamic Response: Vibration of multiple degree of freedom systems. Time domain analysis of single and multiple degree of freedom systems.
Rigid Body Dynamics: Dynamic effects in machinery. Angular momentum and inertia properties in spatial systems. Equations of motion of spatial systems.
Kinematic Analysis and Synthesis: Analysis of complex mechanisms and an introduction to the synthesis of planar mechanisms.
Textbook
Meriam J. L. Dynamics Wiley
5.412 Mechanics of Solids I

Prerequisites: 8.151, 8.259, 10.022.


Textbook
Timoshenko S. P. & Gere J. M. Mechanics of Materials Von Nostrand

5.413 Mechanics of Solids II

Prerequisite: 5.412.


5.611 Fluid Mechanics/Thermodynamics I

Prerequisites: 1.001, 5.010, 5.020, 10.001. Co- or prerequisite: 5.311, 5.102.


Textbooks
Massey B. S. Mechanics of Fluids Van Nostrand
Wark K. Thermodynamics 2nd ed McGraw-Hill
or
Lee J. F. & Sears F. W. Thermodynamics 2nd ed Addison-Wesley
Reynolds W. Thermodynamics 2nd ed McGraw-Hill

5.612 Fluid Mechanics/Thermodynamics II

Prerequisites: 5.311, 5.611, 10.022.


Textbooks

5.614 Fluid Mechanics III

Prerequisite: 5.612.


Textbook
No set texts.

5.615 Thermodynamics III

Prerequisite: 5.612.


Textbooks
No set texts.

5.661 Mechanical Engineering III

Prerequisites: 1.001, 5.010, 10.211 A.


Textbooks

5.800 Aircraft Design

Prerequisites: 5.311, 5.31, 8.151, 8.259. Co- or prerequisite: 5.412.

Aircraft types and development, overall design process, wing load, shear force, bending moment and torque distributions. Detailed stressing of lugs, sockets, pins, bearings, fittings, hinges, gears, rivetted, welded and bonded joints. Design and drawing of small fittings such as hinge assembly, spar for tailplane, control stick or landing gear component.

Textbook
Bruhn E. F. Analysis and Design of Flight Vehicle Structures Tri-State Offset Co 1965

5.801 Aircraft Design

Prerequisites: 5.303, 5.412, 5.800 (full-time only), 5.811, 5.822. Co- or prerequisite: 5.823.
<table>
<thead>
<tr>
<th>Subject Descriptions and Textbooks</th>
</tr>
</thead>
</table>


2. **Design of Aircraft Structures**: Significance of design requirements: Proof and ultimate load, load and safety factors, interpretation of V-g diagram. Stress cases. Detailed structural and mechanical design of airframe, controls, joints; choice of materials; use of structures data sheets. Practical design of a simple aircraft structural component.

**Textbooks**

- **Aerodynamics I**
  - Prerequisites: 5.311, 5.611, 10.022.

- **Aerodynamics II**
  - Prerequisites: 5.612 or 5.811; 5.303 or 5.331.
  - Compressible flow and high-speed aerodynamics. Hypersonic and highenthalpy flow. Dynamic stability and control.

- **Analysis of Aerospace Structures I**
  - Prerequisites: 5.311, 8.151, 8.259, 10.022. Co- or prerequisite: 5.412.
  - Equilibrium of forces, plane frames, space frames; inertia forces, load factors; beams; two-moment equation, shear and bending-stress distribution in various thin-webbed beams, tapered beams, beams with variable flange areas. Semimonocoque structures. Deflection of structures: Maxwell's and Castigliano's theorems, virtual work method. Statically indeterminate structures; beams, trusses, stiff-jointed frames; methods of superposition, energy, moment distribution, elastic centre; shear distribution in two-cell beam. Aircraft materials, physical properties and their measurement. Dimensionless stress-strain data.

- **Analysis of Aerospace Structures II**
  - Prerequisites: 5.412, 5.822.

- **Aircraft Propulsion**
  - Prerequisites: 5.611, 5.811.

- **Naval Architecture I**
  - Prerequisite: 5.311. Co- or prerequisite: 5.951 (full-time only).

- **Ship Structures I**
  - Prerequisites: 8.151, 8.259, 10.022. Co- or prerequisite: 5.412.

- **Ship Structures II**
  - Prerequisites: 5.071, 5.412, 5.921.
  - Buckling of plates and stiffened panels; combined loads; limit analysis. Structural details. Fatigue and brittle fracture. Design for production.
Engineering

Finite element method. Rational design synthesis: reliability, optimization, computer-aided structural design.

Textbook
As for 5.921.

5.931 Principles of Ship Design IA  S1 L1T½
Modern ship types and developments. The overall design process. Ship structural arrangements.

Textbooks
D'Arcangelo A. M. A Guide to Sound Ship Construction Cornell Maritime P.
D'Arcangelo A. M. Ship Design and Construction Soc of Naval Architects and Marine Engineers NY

5.932 Principles of Ship Design IB  S2 L1T½
Co-requisite: 5.911 (5.931 full-time only).

5.933 Principles of Ship Design II  S1 + S2 L2T1
Prerequisite: 5.932.

Textbooks
D'Arcangelo A. M. Ship Design and Construction Soc of Naval Architects & Marine Engineers NY

5.934 Ship Design Project  S1 + S2 L0T3
Prerequisites: All subjects in Years 1, 2 and 3. Co- or 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, free-board, tonnage, floodable length (if applicable), power requirements, propeller design, investigation of vibration, rudder design and final general arrangement.

Textbook
As for 5.933.

5.941 Ship Propulsion and Systems  S1 + S2 L2½T1½
Prerequisites: 5.071, 5.951 (full-time only).

Textbook
Comstock J. P. Principles of Naval Architecture Soc of Naval Architects & Marine Engineers NY

5.951 Hydrodynamics  SS L1½ T½
Prerequisites: 5.311, 5.611, 10.022. Co- or prerequisite: 5.071.
Kinematics of fluids: stream function, velocity potential and application. Elementary treatment of equations of motion and examples in hydrodynamics.

Graduate Study
5.045G Advanced Topic in Mechanical Engineering
5.046G Advanced Topic in Mechanical Engineering
5.047G Advanced Topic in Mechanical Engineering
Subjects which may be offered by a Visiting Professor for graduate credit.

5.072G Ordinary Differential Equations in Mechanical Engineering
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

5.076G Computational Methods in Mechanical Engineering II
Mathematical formulation of physical problems in mechanical engineering and their solution.
5.077G Analogue Computation in Mechanical Engineering I
Basic operations; computer components; programming methods; problem check procedures; solution of linear, non-linear differential equations; generation of functions of dependent, independent variables; algebraic equations and real roots of polynomials; problem control for slow, high speed repetitive generation, automatic iterative solutions; transfer function simulation.

5.078G Analogue Computation in Mechanical Engineering II
Use of digital logic elements, computers; interface for parallel hybrid operation control facilities run functions and parameter optimization. Full hybrid, direct on line, operation.

5.085G Tensors

5.101G Optimization Methods for Mechanical Engineers I
Mathematical theories of optimization. Calculus of variation.

5.102G Optimization Methods for Mechanical Engineers II
Application of theory with special reference to design of mechanical elements and systems.

5.106G Mechanical Design Against Fatigue

5.110G Morphology of Design
Design strategy illustrated by a major engineering design. Problem recognition; economic analysis; decision making; model formulation and optimization. Design analysis, communication and implementation of solution.

5.151G Refrigeration and Air Conditioning Design I
5.152G Refrigeration and Air Conditioning Design II

5.304G Advanced Dynamics I
5.305G Advanced Dynamics II

5.321G Automatic Control I
5.322G Automatic Control II
Transient state dynamics of refrigeration and air conditioning system components. Frequency response methods. Response functions and controller settings. Analogue simulation of refrigeration and air conditioning systems.

5.328G Control and Modelling of Mechanical Systems I
5.329G Control and Modelling of Mechanical Systems II
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

5.401G Experimental Stress Analysis
Grid technique; Moire fringe method; Strain gauges; photoelasticity; crack detection techniques. Class project.

5.421G Advanced Mechanics of Solids I
5.422G Advanced Mechanics of Solids II
5.423G Advanced Mechanics of Solids III
5.424G Advanced Mechanics of Solids IV

5.428G Advanced Mechanics of Materials I
5.429G Advanced Mechanics of Materials II

5.491G Biomechanics I
5.492G Biomechanics II

5.621G Gasdynamics I
5.622G Gasdynamics II

5.631G Lubrication Theory and Design I
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

5.718G Conduction Heat Transfer
Steady, one-dimensional conduction. Analysis of extended surfaces. Two- and three-dimensional conduction. Unsteady conduction in one or more dimensions; analytical, numerical and analogical methods of solution. Initial value and boundary value problems. Temperature fields with heat sources. Non-homogeneous bodies; anisotropic bodies; variable material properties.

5.719G Radiation Heat Transfer
Thermal radiation properties of materials, black bodies; characteristics of real solids, liquids and gases; radiation exchange between infinite surfaces and between finite surfaces; shape factor for various configurations; radiation in an enclosure; radiation behaviour of gases and vapours. Pyrometry. Solar radiation; solar angles; atmospheric absorptions of solar radiation; direct and diffuse radiation; pyrheliometers.

5.725G Statistical Thermodynamics

5.735G Direct Energy Conversion
Magneto-hydrodynamics (M.H.D.): governing equations, ionisation seeding of working gas; material property limitations; fossil, nuclear fueled M.H.D. generator combined with conventional steam plant. Fuel cells: electro chemical fundamentals; maximum work, Gibbs function, enthalpy of formation, equilibrium constant, e.m.f., limitations, polarization, existing types. Thermoelectric generators: theory of irreversible thermodynamics, Onsager coefficients, coupled phenomena, Peltier, Thomson, Seebeck effects, thermal efficiency, max. power output; design of thermodynamic generator, thermoelectric cooler, magneto-thermoelectricity, radiolotope, solar powered generators, semi conductors, basic ideas of quantum physics, Fermi level and energy bands. Other modes of direct energy conversion: photovoltaic; thermionic. Nernst effect generator.

5.751G Refrigeration, Air Conditioning and Cryogenics I
5.752G Refrigeration, Air Conditioning and Cryogenics II
Thermodynamic principles, diagrams; properties of real fluids, refrigerants. Thermodynamics of change of phase; liquids and dilute solutions; mixtures of liquids; steady 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 refrigerator; 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, Jouleau, 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

5.909G
Research Project

5.912G
Naval Hydrodynamics I

5.913G
Naval Hydrodynamics II
Advanced treatment of topics selected from: ship waves and ship resistance; ship manoeuvrability; ship motion and seakeeping; hydrofoil and propeller theory; aero and hydrodynamics of surface effect machines.

5.918G
Research Thesis

5.936G
Research Thesis

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School of Electrical Engineering

Undergraduate Study

6.010
Electrical Engineering I

An orientation subject to acquaint students with the various areas and problems of Electrical Engineering. Secondary school physics and maths applied to some aspects of energy conversion and transmission; electronics; logic, number systems, and computers; systems and circuit theory; probability, information and communication. Laboratory exercises and project work in these areas including instrumentation and device characteristics.

6.021A
Basic Circuit Theory

Prerequisites: 1.001, 6.010, 10.001.


Textbook
To be advised.

6.021B
Introduction to Electromagnetic Energy Conversion

Prerequisite: 6.021A

An introduction to devices which utilise the interaction of electric and magnetic fields. Topics treated include a revision of three phase circuit analysis, magnetic circuits, transformers, electromagnetic energy conversion, direct-current and alternating-current machines and their applications.

Textbook
To be advised.

6.021C
Electronics

Prerequisite or co-requisite: 6.021A.

The principles of operation of discrete electronic devices, sufficient to permit their effective modelling for the purpose of circuit design. Illustration of device modelling in some specific circuit applications. Digital and analogue integrated circuits, including operational amplifiers, and their application in electronic equipment. Design considerations in equipment, including thermal effects and signal/noise ratio.

Textbook
To be advised.

6.021E
Digital Logic

Prerequisites: 10.001.

Number Systems, codes, error detection. Switching algebra, combinational analysis and synthesis of switching circuits, simplification of switching functions. Clocked sequential circuits, flow diagrams, flow tables; state minimization, secondary assignment. Digital system design at the register-transfer level.

Logical organization of computers. Memory, control units, arithmetic units. Instruction sets in computers, assembler programming.

Textbook
Booth T. L. Digital Networks and Computer Systems Wiley

6.022
Electrical Engineering Materials

A survey of materials and their technology for electrical and electronic devices and systems. Influence of molecular 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. Properties of thin and thick films. Control of material properties through heat-treatment, additives, impregnation, etc. Fabrication, forming and deposition methods. Composite materials, joining and bonding techniques. Failure mechanisms and long-term stability. Effects of environment; corrosion; radiation damage. Stabilising and protective treatments. Example applications to illustrate selection criteria, including cost-effectiveness, for specific purposes, including both traditional applications as well as some of contemporary interest.

Textbook
To be advised.
6.031A Systems and Circuit Theory
Prerequisite: 6.021. Co-requisite: 10.111A, 10.111B.


Textbooks
Deson C. A. & Kuh E. S. Basic Circuit Theory McGraw-Hill

6.031B Energy Conversion, Transmission and Utilization
Prerequisite: 6.021. Co-requisite: 6.031A.

Introduction to energy conversion; electromagnetic machines, transformers. Power transmission, power systems. Utilization of electrical energy; motors and industrial drives; rotating and other high power amplifiers; a.c.-d.c. conversion; rating of plant; tariffs. Eartthing, protection and electrical safety.

Textbook

6.031C Electronic Circuits and Signal Processing
Prerequisite: 6.021. Co-requisite: 6.031A.


Textbooks

6.041 Fields and Measurements
Prerequisite: 6.031A

Fields: Applications of field theory not elsewhere treated in the course, selected from: elements of incompressible fluid magnetohydrodynamics; some engineering applications of magnetostatics; analogies between the telegraphist’s equations and a variety of potential theory problems, particularly non-electrical; superconductivity.

Textbook
To be advised.

Measurements: Principles of electrical measurements of moderate precision using direct currents and alternating currents of frequency such that lumped circuit techniques are satisfactory.

Textbook
Stout M. B. Basic Electrical Measurements Prentice-Hall

6.042 Circuits, Signals and Information Theory
Prerequisites: 6.031A, 10.033, 10.361.

Circuit theory and network synthesis. Signal Analysis and transmission through networks, including theory of noise and stochastic signals. Includes time frequency and mixed domain presentation; transients and other signals; correlation, convolution, etc.; statistical properties of signals; applications. Information Theory of discrete systems including coding and encoding of patterns. Information theory of continuous systems. Mathematical theory of signal detection, including an introduction to decision theory. Signal and system analysis in the light of information theory.

Textbook
Karbowski A. E. Theory of Communication Oliver & Boyd

6.043 Electrical Measurements
Prerequisite: 6.031A.

Measurements section of 6.041 Fields and Measurements.

Textbook
Stout M. B. Basic Electrical Measurements Prentice-Hall
6.044 Electrical Product Design and Reliability

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; interconnection and assembly methods; redundancy; ergonomics; design reviews; fault-free 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.

Textbook
Printed notes will be issued.

6.202 Power Engineering—Systems I

Prerequisites: 6.031A, 6.031B.

An elective emphasizing parameters and performance of power system components; transmission lines, power system overvoltages, transformers, fault calculation, circuit interruption; protection.

Textbook
Stevenson W. D. Elements of Power System Analysis 2nd ed McGraw-Hill

6.203 Power Engineering—Systems II


A subject emphasizing interconnected system operation, performance and control; synchronous machines, power system analysis, operation and control; power systems in society; distribution systems.

Textbook
Stevenson W. D. Elements of Power System Analysis 2nd ed McGraw-Hill

6.212 Power Engineering—Utilization

Prerequisite: 6.031B. Co-requisite: 6.322.

Topics include: Machines and electrical drives, applications and control, a.c. d.c. conversion; rating of plant; industrial heating; frequency changing; illumination. A program of experimental projects and applications of design will accompany the lectures.

6.222 High Voltage and High Current Technology


An elective concerned with aspects of design and testing of high power electrical equipment. Topics selected from: fields and materials in high voltage apparatus; effects of high currents; design testing and measurement; effects of transients, earthing; applications of superconductivity.

6.303 Communication Electronics

Prerequisites: 6.031A, 6.031C, 6.031E.

High frequency and noise performance of active and passive devices and circuits. Includes the following topics: high frequency transistor characterization; transistor noise properties; parametric amplifiers; Gunn and IMPATT diodes; quantum electronics; microwave valves; klystrons, travelling wave tubes, magnetrons.

6.313 Wave Radiation and Guidance

Prerequisite: 6.031A.

A selection from the following topics:

- Guided waves. Types of transmission lines including coaxial and strip lines, surface-wave lines. Waveguides and cavities. Microwave components and signal sources.


6.322 Electronics

Prerequisites: 6.031A, 6.031C.


6.323 Signal Transmission

Prerequisites: 6.031A, 6.031C. Co-requisite: see note.

Transmission System Environment: noise distortion; bandwidth; interference; multipath, fading; transmission media. Analog Transmission: baseband; linear and non linear modulation principles and techniques; Hilbert transforms; envelopes; DSB, SSB, FM, PM; asynchronous and coherent demodulation, threshold. Transmitters and receivers. Pulse modulation; sampling techniques; aliasing; interpolation filters. Digital Transmission: A/D, D/A conversion; quantization errors; compandors PCM; delta modulation. Multilevel transmission; bandwidth; SNR exchange. Elementary detection theory; error probability. Synchronization; regenerative repeaters. Coding. Data transmission: modems; OOK, FSK, PSK; demodulation; matched filters. Intersymbol Interference; equalization; eye patterns. Multiplex Systems: FDM, TDM; random access techniques; noise power ratio.

Note: A working knowledge of elementary Fourier transforms and of elementary probability is assumed. 6.042 is recommended as a co-requisite.
Engineering

6.333 Communication Systems SS L2T3
Prerequisites: 6.031A, 6.031C.


Textbooks

6.383 Biomedical Engineering SS L2T3
Prerequisites: 6.031A, 6.031C.

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 the basic physiology of cells, tissues, organs and organisms, instrumentation and measurement techniques and modelling of various types of biological systems.

6.412 Automatic Control SS L2T3
Prerequisites: 6.031A, 6.031B.

Principles and techniques applicable to the analysis and design of continuous and discrete feedback control systems as encountered in industrial processes. Frequency, transform and time domain methods for compensation and stability analysis of single-input single-output linear systems. Extension to some common nonlinearities.

Textbook
Stapleton C. A. Basic Control—Classic and Modern Univ of N.S.W. or Takahashi Y. et al Control and Dynamic Systems Addison-Wesley

6.413 Modern Control Engineering SS L2T3
Prerequisite: 6.412.

A basis for design of multivariable feedback systems using both state-space and frequency-domain methods. State representation of systems (considering linear/nonlinear, discrete/continuous, lumped/distributed, deterministic/stochastic in both time and frequency domains); canonical forms, controllability, observability; identifiability, stability. Performance indices; state and control constraints, penalty functions; sensitivity. Design techniques for linear, time-invariant multivariable systems.

Textbook
To be advised in class.

6.432 Computer Control and Instrumentation SS L2T3
Prerequisites: 6.031C, 6.031D.

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 discussed from both physical and dynamic response viewpoints. Digital instrumentation. Hybrid devices and analog conversion. Computer organization and interfacing concepts. Peripherals. Introduction to software systems for control applications. Computer control of processes via on-line languages.

Textbook
To be advised in class.

6.512 Advanced Semiconductor Device Theory SS L2T3
Prerequisites: 6.031C, 6.031E.

Semiconductor materials; metal/semiconductor contacts; MIS structures; FETs and their applications; FET models used in computer-aided circuit design; charge-coupled devices; high-frequency bipolar transistor considerations; photodiode semiconductor devices; dynamic characteristics of thyristors.

Textbook
Grove A. S. Physics & Technology of Semiconductor Devices Wiley

6.522 Transistor and Integrated Circuit Design SS L2T3
Prerequisites: 6.031C, 6.031E.

Development of theory of transistor operation including high injection level effects and three dimensional geometry effects. Kinetics of epigrowth, diffusion and oxide growth as far as these are required to permit a student to specify process cycles. Design of transistors in terms of desired diffusion profiles, oxide growth thicknesses, and the specification of process cycles. Extension of the above to passive components as used in integrated circuits. Design aspects of integrated circuits, covering aspects peculiar to integrated circuits such as distributed parameters, parasitic couplings, correlated component tolerances and variations, special D.C. biasing methods.

Textbooks

6.601A Introduction to Computer Science SS L4T1 or S1 + S2 L2T1½
Prerequisites: 6.031, 6.031C.

Introduction to programming, algorithm and data structure design programming in a high level Algo-like language which provides simple, high level program-control and data-structuring facilities. Introduction to data structures. Program verification. Introduction to computer organization; simple machine architecture, logical design, data storage devices; simple operating system concepts.

Textbook
6.801B Assembler Programming and Non-Numeric Processing

Computer structure, machine language, instruction execution, addressing techniques and digital representation of data. Symbolic coding. Manipulation of strings, lists and other data structures.

Textbooks

- PDP11/40 Processor Handbook Digital Equipment Corporation
- Either
- Gray L. D. A Course in APL360 with applications Addison-Wesley
- or Gilman and Rose APL an Interactive approach 2nd ed Wiley
- or Polivka and Pakin APL the language and its usage Printice-Hall

6.612 Computer Systems Engineering SS L2T3

Prerequisites: 6.031D or 6.602A. Analysis and design of clocked-sequential and fundamentally-mode sequential circuits. Introduction to APL as a digital system design and simulation language. Applications to the description, design and simulation of basic computer circuits and organizations. Machine organization and hardware, control units, micro programming, input/output, high-speed arithmetic units.

Textbook


6.622 Computer Application and Software SS L2T3

Topics chosen from the following: simulation, heuristics, numerical analysis, mathematical optimization, data structures, machine organization, high-level languages, compilers and operating systems.

Textbooks

No set Texts.

6.801 Electrical Engineering S1 + S2 L1T2

Prerequisite: 1.001. Illustrates the application of electrical engineering to other disciplines such as mechanical and civil engineering, industrial chemistry and geophysics. The only basic electrical theory considered is that necessary for an understanding of the applications. The course is divided into two sections, each of which contains an inter-disciplinary applications-oriented project.

SESSION 1

Textbook

- Smith R. J. Circuits Devices and Systems 2nd ed Wiley

SESSION 2
Principle of circuit theory. Transformers Electrical machines, their selection, control and application in industrial environments. Elements of the utilization and distribution of electrical power.

Textbook

- Smith R. J. Circuits Devices and Systems 2nd ed Wiley

6.802 Electrical Engineering SS L2T1

Prerequisite: 6.001. Study of electrical and electronic equipment, with emphasis on 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.

Textbook

- Smith R. J. Circuits Devices and Systems 2nd ed Wiley

6.822 Electronics S1 + S2 L1T2

Prerequisite: 1.001. The prime objective of the course is to illustrate the application of electronics to other disciplines, particularly surveying. The only basic electrical theory considered is that necessary for an understanding of the applications. The course contains an interdisciplinary applications-oriented project. The topics covered include: principles of circuit theory and analog computing; amplifiers, their specification and application; modulation; electronic distance measurement.

Textbook

- Smith R. J. Circuits Devices and Systems 2nd ed Wiley

6.902 Industrial Experience

A minimum of three years of appropriate industrial experience must be obtained concurrently with attendance in Course 365. Students are required to submit to the School evidence from their employers confirming completion of the prescribed period of industrial training.

6.911 Thesis

For students in the final year of their BE course.

6.931 Group Thesis

For students in the final year of their BE course.

Graduate Study

6.050G Occasional Elective

This syllabus will change from one occasion to the next, allowing presentation of a modern topic at graduate level, particularly by visiting academics of eminence.

6.053G Advanced Mathematics II

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

Topics include numerical solution of partial differential equations and approximation theory.
6.071G
Electrical Measurements
Electrical measurements of moderate precision. Theory and practice of deflection measurements and null techniques at D.C. and low audio frequencies.

6.073G
Precise Electrical Measurements
An advanced course primarily devoted to the special problems of precision measurements at D.C. and audio frequencies. Establishment of electrical standards.

6.074G
Superconductivity
The theory of superconductivity and its application. Includes loss mechanisms, a.c. losses, flux jumps, superconducting materials, applications to electrical apparatus.

6.075G
Electric Contacts
The theory of stationary electric contacts making use of classical field theory and the modern ideas of electronic conduction. Topics may include constriction and film resistance, elastic and plastic deformation of contacts, thermal behaviour, electron tunnelling through thin films, tarnishing, fritting, formation of whiskers and bridges, material transfer in small contacts.

6.150G
Communications Elective
As for 6.050G.

6.160G
Field Theory in Electrical Engineering
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
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 Radiators and Applications
A selection of the following topics: review of basic theory. Adaptive arrays. Radiotelescopes—primary radiator design. Tolerance theory.

6.166G
Wave Propagation Theory
Topics may include: introduction to propagation theory. Propagation over earth’s surface. Propagation in a plasma. Ionospheric propagation, scatter propagation.

6.167G
Microwave Transmission Theory
A selection of topics from: transmission lines, waveguides, microstrip and striplines, surface waves, resonant and periodic structures, long haul guided propagation, wave propagation in anisotropic media and the application of wave theory to millimetric and optical waves.

6.169G
Microwave Circuits: Theory and Techniques
The theory and design of microwave circuits including a selection from waveguide circuit elements, multiport structures, cavities, filters and the symmetry properties of waveguide junctions. Microwave measurement techniques and applications.

6.170G
Microwave Electronics
A selection of topics covering the principles and application of electron beam and solid-state microwave devices. These include klystrons, travelling wave tubes, backward wave tubes, crossed-field devices, parametric devices, high frequency diodes and transistors, Gunn-effect and IMPATT-type devices.

6.171G
Network Synthesis
A course in passive network synthesis leading on from the circuit theory of current undergraduate courses. Emphasis is placed on the classical realizations and modern filters.

6.172G
Advanced Network Synthesis
Further work in passive network synthesis with more attention to the approximation problem in the frequency domain and including some work on time domain synthesis.

6.224G
Electrical Insulation Engineering
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
Low and high pressure gaseous discharges, both naturally occurring and laboratory produced. Methods of production of discharges. Diagnostic techniques. Arcing in circuit interrupters and methods of control and extinction. Other technological applications of electrical discharges.

6.226G
Electrical Apparatus Design
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.
6.234G
Power System Protection
The theory and application of protective devices and systems, related to the protection of transmission lines, transformers, bus-bars and generators.

6.244G
Power Systems I
An advanced course dealing with topics such as economic despatch, load flow and stability in large power systems.

6.245G
Power Systems II
An advanced course concerned with some of the following topics: modal propagation on H.V. lines, D.C. transmission; power system transients, communication systems etc.

6.246G
Power System Operation & Control

6.250G
Power Elective I
As for 6.050G.

6.251G
Power Elective II
As for 6.050G.

6.254G
Electrical Machines I
6.255G
Electrical Machines II
These two independent options are concerned with the theory, design operation and control of modern electrical machines.

6.256G
Underground Transmission
A specialized course relating to developments and contemporary practices 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
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.

6.341G
Signal Analysis and Transmission Through Network and Systems
Revision of Fourier methods. Signal analysis in time, frequency and mixed domains. Correlation, convolution and analysis of system characteristics. Noise and properties of stochastic signals. Signals in communication systems.

6.342G
Information and Communication Theory

6.343G
Modulation Theory and Application to Systems
Modulation theory including modulation, frequency modulation and other analogue modulation methods. Sampling. Pulse and digital modulation schemes, with particular reference to PCM. Comparative analysis of modulation methods and communication systems.

6.344G
Optimal Design of Communication Systems
Theory of optimal filtering according to Wiener and others. Decision theory, leading to a discussion of optimal receivers for extracting signals from noise (detection and estimation). Optimal signal design. Joint optimization of signal and receiver.

6.345G
Active and Adaptive Circuits for Integrated Systems

6.346G
Acoustics
Electrical, mechanical and acoustical analogies. Velocity of propagation of acoustical energy. Transducers, architectural acoustics. The ear, noise measurement and reduction. Sound as a means of communication.

6.350G
Solid State Electronics Elective
As for 6.050G.

6.370G
Solid State Theory I
6.371G Solid State Theory II

6.373G Semiconductor Devices
Theory and characteristics of semiconductor 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
An account of the modern planar technology of semiconductor device and integrated circuit fabrication.

6.376G Reliability Engineering
Principles and applications of the reliability engineering concept, with particular reference to electronic components and systems.

6.377G Integrated Circuit Design
An advanced course on the design of integrated circuits, including the properties and modelling of integrated circuit elements, d.c. and a.c. design of operational amplifiers, lowpass and bandpass circuits, digital gates and complex functions, computer-aided design.

6.378G Solar Energy Conversion

6.381G Biology and Physiology for Engineers
Attempts to bridge the language barrier between biology and engineering. Some of the problems and techniques of biology and medicine which may be encountered by the biomedical engineer. Cells, tissues and organs, with emphasis on their system, function and characteristics.

6.382G Biomedical Engineering
Includes instruction in the specialized measurement techniques and instrumentation required in biomedicine. Emphasis on signal processing and control system analysis as examples of the application of engineering to biomedicine.

6.452G Principles of Feedback Control
An intensive series of lectures, laboratory and tutorial, for upgrading at the graduate level those students who are deficient in the basics of control. Material covered includes design of continuous and discrete feedback systems, via classical frequency response and time-domain methods, as well as state space techniques. Nonlinear systems and systems with random inputs.

6.453G Optimization in Systems Engineering
The fundamentals of optimization as used in Systems and Control. Topics covered include: constrained and unconstrained minimization of functions; review of search techniques; principle of optimality; dynamic programming; Hamilton Jacobi Bellman equations; calculus of variations; Pontryagin Maximum Principle; two point boundary value problem; linear quadratic problem; Time optimal control; state and control constraints; numerical methods.

6.455G System Identification and Modelling
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 (on-line estimation).

6.456G General Concepts in Formal System Theories
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 representants will be reviewed with discussion based on differential and discrete models, and some form of pulsed automata. Basic concepts presented will include the state properties and basis functions for linear systems; equivalence and reduction, structure, decomposition and interconnection; complexity; accessibility of states and stability considerations.

6.457G Cybernetic Systems Theory
Provides advanced systems concepts relevant to both engineered and natural sensory systems, including a review of fundamental concepts relevant to Cybernetic Engineering, the genesis of cybernetics, coding, learning and neural networks. Special topics treated include: the perception, subsystems of the human brain and "functional" descriptions of a "Cybernetic Brain" and an approach towards industrial robots with reference to their social implications.

6.458G Pattern Recognition Systems
Basic concepts and methods in mathematical pattern recognition and an in-depth study of both nonparametric and parametric methods. Includes such topics as: pattern, feature and classification spaces; feature selection, linear discriminant functions and linearly separable training algorithms; piece-wise discriminant functions; decision rules; the Bayes framework, approximation of probability densities; clustering and dimensionality reduction.
6.459G
Control Computing
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
An advanced treatment of digital, analog and hybrid computer methods, used to control physical plant in real times. Topics include: hardware techniques and software structures as encountered in industrial applications of small computers, hybrid methods for identification and optimization of systems. Students undertake individual project work, involving the planning and computer realization of specific control problems.

6.461G
Large Scale Systems
The special problems in modelling and controlling large scale systems, including numerical problems. Modelling topics include: modelling of large-scale static and dynamical systems; flow-network analysis; solution of large networks by tearing; linear programming using sparsity and other techniques: solution of large sets of normal equations.

Control topics include: multilevel approaches to the control of large-scale systems; simplification of models; aggregation method; pole-shifting techniques for multivariable modal control.

6.464G
Stochastic Processes in Automatic Control
This subject reflects the non-deterministic nature of many control problems. Topics include: random variables and distribution; random processes; Gaussian and Markov processes. Processing of processes through linear systems; correlation functions. Spectral theory; Weiner and Kalman filtering. Least squares estimation; the stochastic regulator problem and separation theorem.

6.466G
Advanced Linear Control Theory

6.470G
Advanced Topics in Control
Advanced topics taught either by visiting academics or staff members with specific research interest. Typical topics are: design case studies; current research problems and review of important papers; game theory; multi-input-output design. Stochastic control theory. Distributed systems (diffusion, display etc.). Functional analysis.

6.650G
Computer Science Elective
As for 6.050G.

6.651G
Digital Electronics
Digital circuits and principles, sub-system organization, microprocessors, memory technology, interface design, graphics, display systems.

6.654G
Switching Theory and Digital Systems
Analysis and design of three different types of sequential circuit; clocked sequential, pulse-mode sequential, and fundamental-mode sequential circuits. Applications to the design of digital computer circuits. Error correcting and detecting binary codes. Linear sequential feedback circuits.

6.655G
Computer Organization and Architecture
Number systems and computer arithmetic—storage, control, input/output. System organization.

6.656G
Software Systems A
A theoretical and practical basis for subject matter within the following areas: compiler organization; date structures (table organization, list structures, trees, stacks, etc.); lexical analysis, syntax analysis, code generation, code optimization. Portability: solutions to the problem of moving software systems between different mechanics. Compiler compilers: translator writing systems designed to provide facilities to aid the compiler writer.

6.657G
Software Systems B
Overview of operating systems, sequential processes, concurrent processes, processor management, store management, scheduling algorithms, resource protection, data communication, case studies.

6.909G
Project

6.918G
REsearch Project

6.936G
Research Project
School of Civil Engineering

Undergraduate Study

8.001 Industrial Training
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 prior to enrolment in the final year.

8.002 Industrial Experience
Requirement for the BSc(Eng)

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 on enrolment in the final year evidence from their employers confirming completion of the prescribed period of industrial training.

8.011 Projects Year IV
Equal to one technical elective.

A minor thesis or research project on any approved topic.

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
Not compatible with 8.019. Prerequisites: 8.174, 8.182.

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.

Textbooks
Beckett D. An Introduction to Structural Design (1) Concrete Bridges Surrey U.P.
Morice P. B. & Little G. The Analysis of Right Bridge Decks Subjected to Abnormal Loading C. & UC.A.

8.014 Computer Applications in Civil Engineering SS L2T1

Revision of fundamentals of FORTRAN (including WATFOR, WATFIV), programming and some advanced techniques such as the use of tapes, discs, etc. and plotting. Introduction to APL programming and Basic Language for Wang mini-computer. Development of some numerical techniques for programming. Applications to problems in structural analysis, geomechanics and water engineering.

Textbooks
Cole R. W. Introduction to Computing McGraw-Hill
Peterson W. W. & Holz J. L. Fortran IV and The IBM 360 McGraw-Hill

8.015 Road Engineering SS L2T1
Prerequisites: 8.272, 8.671, 29.441.

Planning, location and design of roads in urban and rural areas. Properties of bitumen and pavement design. Computer applications and the use of aerial photographs in road design.

8.016 Hydraulics SS L2T1
Prerequisite: 8.573.

Use of hydraulic models for rivers and coastal works. Further studies in open channel flow and estuarine hydraulics.

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
Prerequisite: 8.671.

Advanced construction methods and techniques with special reference to major civil engineering projects under construction in Australia.

8.019 Railway Engineering SS L2T1
Not compatible with 8.013. Prerequisite: 8.672.

First half of subject consists of the Session 1 lectures and tutorials of the Bridge Engineering elective, the second half is devoted to railway engineering. It includes railway geometry, track rails, traffic, railway development.

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.

A project oriented study with the goal of developing professional awareness of environmental implications of civil engineering activities and decisions.

Textbook
Meadows D. H. et al The Limits to Growth Earth Island
8.022 Elasticity and Plasticity  SS L2T1
Prerequisite: 8.174.
Aspects of the elasticity and plasticity theories to solution of stress distribution and stability problems.

8.023 Hydrodynamics  SS L2T1
Prerequisites: 8.571, 10.022.
Equations of continuity, motion and vorticity; \( \phi \) and \( \psi \) functions, Laplace equation, standard flow patterns; practical applications.

8.024 Foundation and Dam Engineering  SS L2T1
Prerequisite: 8.273

8.025 Structural Failures  SS L2T1
Prerequisites: 8.174, 8.182.
Case studies of significant structural failures and distress during concept, design, construction and use. Modes, causes, consequences, responsibilities, corrective procedures.

8.026 Systems Methods in Civil Engineering  SS L2T1
Prerequisite: 8.301.
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 will be required to visit a nominated field site as an integral part of the subject.

8.027 New Materials I  SS L2T1

8.028 New Materials II  SS L2T1
Prerequisites: 8.273, 8.182.

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
Pre- or co-requisite: 8.672.
Civil Engineering Construction organization, management and control.

8.031 Construction Project Finance  SS L2T1
Pre- or co-requisite: 8.672.
Civil Engineering construction project feasibility, financial management, cash flow, cost control, insurance and company finance.

8.032 Law for Builders  SS L2T1
Pre- or co-requisite: 8.672.
Introduction to the law, including brief outline of sources of law in New South Wales and the System of judicial precedent. General principles of law of contract. Some special forms of building contract.

8.033 Industrial Law and Arbitration  SS L2T1
Prerequisite: 8.672.

8.034 Engineering Economy  SS L2T1
Pre- or co-requisite: 8.673.
Economic evaluation of civil engineering projects, including benefit-cost analysis and rate of return analysis.

8.035 Flat Slab Design  SS L2T1
Current design methods for flat slabs and two-way slabs, and the background to and limitation of these methods, problem areas in the design of these floor systems and current research activity and its likely effects on future design methods.

8.036 Philosophy of Limit State Design  SS L2T1
Engineering

8.037 Optimum Design of Structures SS L2T1
Prerequisites: 8.174, 8.182.

8.038 Special Topics in Reinforced Concrete Design SS L2T1
Prerequisite: 8.182.
General design process; analysis and design of flat plates and flat slabs; design for torsion; deep beams and corbels; lateral load analysis of concrete building; water-retaining structures; and a topic of general interest (suggested by students).

8.039 Computer Programming SS L2T1
Introduction to FORTRAN Programming, use of WATFIV compilers, flow charts and simple problems.

8.040 Advanced Engineering Geology SS L2T1

8.041 Geological Engineering SS L2T1

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.

8.043 Public Health Engineering SS L2T1
Prerequisite: 8.581.

8.044 Electrical Instrumentation SS L2T1
The integration of electrical instrumentation into engineering systems. Provides a basis of circuit theory and elementary electronics and treats analog computers, amplifiers, amplifier systems, instrumentation, data processing and process control.

8.045 Electrical Machinery SS L2T1
A user-oriented introduction to the usage of electrical power in industry, covering characteristics and selection of electrical machinery, their interface with the prime power supply, protection electrical safety and compliance with Australian standards.

8.046 Town Planning SS L2T1
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.

8.047 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 Projects I SS L0T2½
Final year design projects in the fields of structural engineering and civil engineering materials.

8.052 Design Projects II SS L0T2½
Final year design projects in the fields of hydraulics, water resources, planning and management.

8.112 Materials and Structures S1 + S2 L1T2

Properties of Materials—Mechanical behaviour of materials; response to static and dynamic loads. Laboratory techniques. Analysis and presentation of experimental results. Use of material properties in analysis and design.

8.113 Civil Engineering for Electrical Engineers SS L0T2½; S2 L1T½


Textbooks
Hall A. S Introduction to the Mechanics of Solids SI ed Wiley 1973
8.152 Structures


Textbooks
White R. N. & Gergely P. Structural Engineering Vol. 2: Intermediate Structures Wiley

8.154 Structures


Textbooks
No set texts.

8.161 Engineering Mathematics


Textbooks
No set texts.

8.171 Mechanics of Solids I

This subject forms part of 5.020 Engineering B and 5.030 Engineering C.

Concepts of stress, strain. Stress and deformation due to axial force; linear and non-linear problems; compound bars. Concepts of stiffness and flexibility. Bending moment and shear force in simple beams. First and second moments of area. Stress and deformation due to bending; linear and non-linear problems; use of step functions.

Textbook
Hall A. S. Introduction to the Mechanics of Solids SI ed Wiley

8.172 Mechanics of Solids II

Structural statics. Bending moments, shear force and torsion. 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.

Textbook
Hall A. S. Introduction to the Mechanics of Solids SI ed Wiley
Engineering

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 I
Prerequisites: 5.010, 5.020, 5.030.

Introduction to design concepts, leading to selection of appropriate structural systems. Behaviour of structural members at service loading and in the overload range up to failure. Safety. Simple beams, tension and compression members and connections in timber, concrete and steel. Proportioning of members and connections from basic principles. The objective is an understanding of structural behaviour, and the ability to produce practical and rational designs based on the elementary theory of mechanics of solids.

8.182 Structural Design II
Prerequisite: 8.181.

Extension of the fundamental concepts developed in Structural Design I to the behaviour and design of more advanced members and structures. Further consideration of safety and design loads including wind and earthquake loading. Some reference to codes of practice, concentrating on the principles behind the more important sections.

Reinforced Concrete: continuous beams and frames; two-way slabs and flat slabs; footings; members subjected to combined axial force and bending moment.

Prestressed Concrete: pre- and post-tensioning; simple beams, design for working loads and ultimate flexural strength; design of end blocks.

Steel: plate girders; moment connections and splices; residual stresses; columns with elastic and restraints; plastic and elastic design of continuous beams and frames.

8.191 Structural Engineering
Prerequisites: 8.174, 8.182.


2. Timber design. Emphasis on special properties of timber affecting the design of timber structures. Introduction to plastic design of steel structures. Application to continuous beams and portal frames.

8.250 Properties of Materials


Textbook
Polakowski N. H. & Ripling E. J. Strength and Structure of Engineering Materials Prentice-Hall

8.252 Civil Engineering Materials
Prerequisite: 8.272.


Textbooks
Lambe T. W. & Whitman R. V. Soil Mechanics Wiley
or
Neville A. Properties of Concrete Pitman

8.253 Civil Engineering Materials

The mechanical behaviour of real materials; elasticity, inelasticity, plasticity, anelasticity, and damping. Multiphase theory of elastic behaviour. Theories of failure.


80
Textbooks

8.254 Civil Engineering Materials SS L3T1
Prerequisite: 8.252.


Laboratory. Examination of concrete and concrete materials; aggregate testing, mix design, mechanical properties of concrete.

Part II—Soil Engineering:

Foundation engineering; bearing capacity theory; allowable settlement, shallow and deep foundations; rafts, pile groups; site investigation as applicable to foundation design. Earth and rockfill dams, types, materials, stability analysis and design, construction problems.

Laboratory. Consolidation and shear strength testing of cohesive and granular soils. Evaluation of simple earth pressure, foundation engineering and earthen dam theory.

Textbooks
As for 8.253.

8.259 Properties of Materials S1 + S2 L1T2
8.250 Properties of Materials, plus the structure and properties of binary alloys; control of structure and properties, commercial alloys, materials selection.

Textbooks
As for 8.250.

8.271 Introduction to Materials
This subject forms part of 5.010 Engineering A and 5.030 Engineering C.

Textbooks
As for 5.010 Engineering A and 5.030 Engineering C.

8.272 Civil Engineering Materials S1 + S2 L1½T2½
Prerequisites: 5.010, 5.020, 5.030


8.273 Civil Engineering Materials II
Prerequisites: 8.172, 8.272.


Textbooks
Terzaghi K. V. & Peck R. B. Soil Mechanics in Engineering Practice Prentice-Hall
Ingles O. G. & Metcalf J. Soil Stabilization Butterworths
Polakowski N. H. & Ripling E. J. Strength and Structure of Engineering Materials Prentice-Hall
McClintock F. A. & Argon S. eds Mechanical Behaviour of Materials Addison-Wesley

8.274 Civil Engineering Materials II
Prerequisite: 8.273.


Textbook
Neville A. M. Properties of Concrete Prentice-Hall

8.301 Systems Engineering S1 + S2 L1½T1½

The systems approach to engineering problem formulation, modelling, and decision analysis is presented in a project format. Relevant system modelling concepts, techniques, and decision models are introduced during project development.

Textbook

8.351 Engineering Mathematics SS L2½T2½
As for 8.161 Engineering Mathematics.
8.531 Water Engineering S1 + S2 L2½ T1½
Hydrology—The hydrologic cycle, the runoff cycle, water balance, energy balance, circulation of atmosphere, dynamic cooling, condensation and precipitation, probability analysis of precipitation and floods, infiltration, chemical water and groundwater hydrology, steam-gauging, hydrograph analysis, flood estimation, yield and storage determination, evaporation, evapo-transpiration.


Textbooks
Giles R. V. Fluid Mechanics and Hydraulics Schaum’s Outline Series Schaum NY
Nemec J. Engineering Hydrology McGraw-Hill
Tebbutt T. H. Y. Principles of Water Quality Control Pergamon

8.532 Water Engineering S1 + S2 L1½ T1½

Part II—Applied Water Engineering: water resources problems and solutions, the systems approach. General principles of regulation and utilisation of water; reservoirs and storage, distribution and transmission, treatment, collection and disposal. Examples of applied water engineering selected from the following fields: water supply, sewerage, irrigation, land drainage, urban drainage, flood control, hydro-electric generation, multi-purpose projects, river channel control, coastal engineering.

Textbook

8.571 Hydraulics I S2 L1½ T1½
Fluid properties: hydrostatics, stability of floating bodies, fluid acceleration; flow patterns, continuity; Euler, Bernoulli, energy and momentum equations.

Textbooks
Giles R. V. Fluid Mechanics and Hydraulics Schaum’s Outline Series Schaum NY

8.572 Hydraulics II SS L1½ T1½
Dimensional analysis, hydraulic model theory, scale effect. Fluid turbulence, velocity distribution, surface resistance in flow past plane boundaries and in pipes and channels. Pipe flow, pipe networks, steady flow in uniform channels.

Textbooks
As for 8.571.

8.573 Hydraulics III SS L1½ T1½

Textbooks
As for 8.571.

8.581 Water Resources I SS L1½ T1½

Textbook
Tebbutt T. H. Y. Principles of Water Quality Control Pergamon

8.582 Water Resources II SS L1½ T1½
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, groundwater.

8.583 Water Resources III SS L1T2
Hydraulics of groundwater systems, application to regional problems. Water resources planning, systems approach, applied aspects of water engineering.

8.631 Civil Engineering S1 + S2 L3½

Part II: Transport Planning and Operations. Definition of a land use/transport system—land use potential, traffic generation, intensity of traffic generation, transport system capacity. Stability and steady state performance—output, specific output. Land use, generation, desire line and assignment models. The transport planning process—systems versus programming approach. Evaluation of operational performance of transport systems—travel time and flow relation-
ships (the queueing model), level of service, network characteristics, transfer terminals. Economic evaluation of transport schemes and plans—criteria, benefits, costs, time streams, discounting, present worth, rates of return, benefit/cost and cost/effectiveness ratios.

Part III: Road Engineering. Route analysis and road location in the rural and urban environment including the location of bridges. Road geometrics and design, its influence on the behaviour of drivers. Landscape aspects of road design. Some examples of road design policies and their application. Types of roads and expressways and their applications, advantages and disadvantages. Types of intersections and interchanges, and some problems in their design. Pavement requirements, thickness design, pavement materials, gravels, stabilisation, cement and bituminous concrete. Function of wearing courses. Road drainage requirements and examples of design, road construction methods and plant. Uses of electronic computation in Highway Engineering.


8.632 Civil Engineering
Comprises Parts I and III, being respectively Regional and Urban Planning and Road Engineering of 8.631 Civil Engineering.

8.670 Introduction to Engineering Construction SS L2T1
This subject forms part of 5.030 Engineering Construction. Introduction to construction engineering, projects and decision agents, construction equipment and methods. Compulsory field excursion to a civil engineer construction site.

Preliminary Reading List
Pannell J. P. M. An Illustrated History of Civil Engineering Wiley

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. The analysis, estimating, design, field prediction models, field operation and control of construction operations. State of practice in engineering construction.

Textbook
To be advised.

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.

Textbooks
Standards Association of Australia General Conditions of Contract CA 24.1
O’Neill L. V. Fundamentals of Estimating and Cost Control Tait

8.673 Planning and Management II SS L1T2
Prerequisite: 8.672.
Types of engineering projects, the feasible, risk, financial and economic analysis of projects at the plant engineer, contractor, shire engineer, entrepreneur, government agency and national decision levels.

Textbooks
Investment Analysis, Supplement to the Treasury Information Bulletin (White Paper), Commonwealth Treasury, Canberra, July 1966

8.674 Planning and Management III SS L1T2
Prerequisite: 8.001, 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 relationships and duties between professional agents involved in projects.

8.711 Engineering for Surveyors I SS L1½ T1½

Textbook

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.

Textbooks
Lambe T. W. & Whitman R. V. Soil Mechanics Wiley
Leeper G. W. Introduction to Soil Sciences M.U.P.
8.713 Management for Surveyors SS L2T0

8.708G Finite-Element Methods in Civil Engineering I

8.709G Finite Element Methods in Civil Engineering II

8.710G Advanced Topics in Optimization in Civil Engineering
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
Special studies in system modelling to be offered from time to time by appropriate specialists.

8.702G Network Methods in Civil Engineering
Graphs, flow-in networks, optimal paths, critical path schedule, resource levelling, simulation networks, stochastic networks, project management, further applications.

8.703G Optimization Techniques in Civil Engineering
Search, linear programming, non-linear programming, dynamic linear programming, geometric programming, calculus of variations, maximum principle, applications.

8.704G Stochastic Methods in Civil Engineering
Queueing, Markov processes, theory of storage, reliability, renewal, application, transportation and allocation.

8.705G System Modelling
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 to be limited to selected students.

8.706G Experimental Methods in Engineering Research
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.

8.701G Decision Making in Civil Engineering
Decision theory, game theory, multiple objective planning, micro-economic theory, objectives and criteria, benefit/cost analysis, bidding applications.

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8.724G Decision Making in Civil Engineering
Decision theory, game theory, multiple objective planning, micro-economic theory, objectives and criteria, benefit/cost analysis, bidding applications.

8.725G Decision Making in Civil Engineering
Decision theory, game theory, multiple objective planning, micro-economic theory, objectives and criteria, benefit/cost analysis, bidding applications.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.727G</td>
<td>Construction Planning and Estimating</td>
<td>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.</td>
</tr>
<tr>
<td>8.728G</td>
<td>Design of Construction Operations</td>
<td>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 timelapse methods; field methods at foreman, superintendent, engineer, and project manager levels; field studies of specific construction operations.</td>
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<tr>
<td>8.755G</td>
<td>Materials of Construction I</td>
<td>Concrete: significance of tests and characteristics of constituent materials, target strength, mix design theories, workability, elastic properties, creep and shrinkage.</td>
</tr>
<tr>
<td>8.764G</td>
<td>Composites in Civil Engineering</td>
<td>Physical and mechanical properties of composites.</td>
</tr>
<tr>
<td>8.771G</td>
<td>Foundation Engineering</td>
<td>A specialized study of theoretical and practical aspects of geological 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.</td>
</tr>
<tr>
<td>8.802G</td>
<td>Elastic Stability I</td>
<td>Euler strut; uniform and non-uniform cross sections. Eccentric loading; stressing beyond the elastic limit. Struts continuous over several supports. Stability of frames.</td>
</tr>
</tbody>
</table>
8.805G
Vibration of Structures II

8.806G
Prestressed Concrete I
Historical development. Methods of prestressing. Elastic analysis and design. Flexural capacity and shear capacity of prestressed elements.

8.807G
Prestressed Concrete II

8.808G
Prestressed Concrete III
Analysis and design of various prestressed concrete structures. Estimating and costing.

8.809G
Reinforced Concrete I
Historical development. Methods of analysis and design, including limit state concepts. Analysis and design for bending, compression and combined bending and compression. Serviceability requirements.

8.810G
Reinforced Concrete II

8.811G
Reinforced Concrete III

8.812G
Plastic analysis and design of Steel Structures I
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
Estimation of deflections; factors affecting plastic moment; shake-down; three-dimensional plastic behaviour; minimum weight design.

8.814G
Analysis of Plates and Shells

8.815G
Computer Analysis of Frames I

8.816G
Computer Analysis of Frames II

8.817G
Experimental Structural Analysis I
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

8.819G
Bridge Design II

8.830G
Hydromechanics
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 measurements in pipe lines.

8.832G
Pipe Networks 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.
8.834G  
**River and Estuarine Hydraulics**  
Channel flow in natural and urban channels, tidal and flood flows, loose bed and earthen bank stability, sediment transport, interfaces, diffusion and mixing processes, hydraulic models for river works.

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, atmospheric moisture, precipitation process, precipitation analysis, evaporation and transpiration, storm runoff process, interception, infiltration curves, land use and management, instruments.

8.838G  
**Hydrological Design**  
Steam gauging, hydrography analysis, storm runoff, loss rates, flood estimation, rational method, unitgraphs, flood frequency, storage-yield analysis.

8.839G  
**Advanced Methods of Flood Estimation**  
Flood routing, catchment characteristics, runoff routing, synthetic unitgraphs, urban drainage, regional empirical flood estimation methods.

8.840G  
**Hydrological Models and Data Synthesis**  
Hydrological systems and models, deterministic catchment models, stochastic hydrology, storage-yield, probability of failure, storm models and extreme precipitation, hydrograph models and unitgraph derivation.

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.

8.845G  
**Investigation of Groundwater Resources**  
Evaluation and development of groundwater resources, seismic and resistivity methods, well-logging techniques, drilling methods, management of groundwater resources, conjunctive use studies.

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 Resources 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 transformations 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**  
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**  
Water collection, transmission, and distribution systems—layout design and analysis, reservoirs, pumping. Sewage collection system design and analysis—capacities, corrosion, pumping.

8.853G  
**Public Health Science**  
Science in public health engineering; environmental factors, applications of chemistry, physics, biology, and biochemistry to water and wastewater technology. Control of disease and industrial hygiene, community health and epidemiology. Food technology. Air pollution and solid wastes. Radioactivity and radioactive wastes.
8.855G
Water and Wastewater Analysis and Quality Requirements

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

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

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

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.

8.901G
Civil Engineering Elective I

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

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

8.918G
Research Project

Department of Industrial Engineering

Undergraduate Study

18.011
Industrial Engineering IA  S1 + S2 L1½ T ¾
Prerequisite: 10.022. Co or prerequisite: 5.071, 5.111.


Textbook
Radford J. D. Richardson D. B. Production Engineering Technology Macmillan

18.012
Industrial Engineering IIA  S1 + S2 L2T1
Prerequisites: 5.112, 18.011.


Textbook
Radford J. D. & Richardson D. B. Production Engineering Technology Macmillan

18.021
Industrial Engineering IB  S1 + S2 L1½ T ½
Prerequisite: 10.022. Co or prerequisite: 5.071.


Textbooks
Burtt I. W. Engineering Statistics and Quality Control McGraw-Hill
Smith G. W. Engineering Economy Iowa State UP 1973

18.022
Industrial Engineering IIB  S1 + S2 L2T1
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 learning, motivation to work, conflict and frustration, social aspects of industry, worker participation.
Production Control—The detailed mechanics of control of jobbing production, and its extension to batch and continuous production. Manufacturing organisations, functions, inter-relationships and information flow. Application of data processing and control systems. Introduction to inventory control. Analysis of some engineering planning decisions. Sampling techniques in quality control. Control charts. Further quantitative work.

18.121 Production Management S1 + S2 L3T0
Prerequisites: 10.031, 10.331.

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.

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 organisations, functions, inter-relationships and information flow. Introduction to inventory control. Analysis of some engineering planning decisions.

Introduction to Operations 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, queueing theory, inventory models, simulation.

Textbooks
Buffa E. S. Modern Production Management 4th ed Wiley
Lu F. P. S. Economic Decision-making for Engineers and Managers Whitcomb & Tombs
Moore P. G. Basic Operational Research Pitman

18.431 Design for Production S1 + S2 L2T4
Prerequisite: 5.112

Graduate Study
18.061G Industrial Experimentation I
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
Regression analysis; use of orthogonal polynomials in regression analysis and analysis of variance; confounding in factorial design; response surfaces and determination of optimum conditions.

18.073G Ergonomics
18.081G  
**Industrial Engineering I**


18.082G  
**Industrial Engineering II**


18.171G  
**Inspection and Quality Control**

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 tool acceptance testing; alignment procedures.

18.271G  
**Theory of Machining and Forming Processes**


18.272G  
**Technology of Machining and Forming Processes**

Selected topics from: Machine tool vibration; design of machine tool elements; economics of machining and forming; numerical and adaptive control of machine tools; design of dies and cutting tools for strength and wear resistance; automation.

18.371G  
**Factory Design and Layout**


18.461G  
**Design for Production**

Influence of manufacturing processes on design; design simplification and standardization; value engineering; economics of process selection; case studies.

18.462G  
**Industrial Design**

Economic considerations; fundamentals of design; influence of processes; case studies.

18.463G  
**Tool Design**

Advanced theories and techniques for design and specification of cutting tools; jig and fixture design; press tool design, gauge design; design of selected machine tool components; computer aided tool design.

18.471G  
**Design Communication**

Communication system in design; aids to design communication; engineering drawing practice; standardization; interpretation of design information.

18.472G  
**Engineering Design Analysis**

Error analysis in design; economic tolerance selection; probabilistic tolerancing; case studies using industrial design.

18.571G  
**Operations Research I**

The formulation 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 and simulation. These techniques will be applied to situations drawn from industrial fields, for example, production planning and control. Practical problems of data collection, problem formulation and analysis will be included.

18.574G  
**Operations Research II**

18.671G Decision Theory
Theories of choice, value, risk and uncertainty for the individual and for multi-person situations. Statistical decision theory, Bayes and minimax rules.

18.681G Engineering Economic Analysis
Price-output decision 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, e.g. replacement, capital rationing. Measures of profitability.

18.761G Simulation in Operations Research

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

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 (e.g. 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 and Forecasting

18.778G Scheduling and Sequencing

18.779G Game Theory

18.871G Mathematics for Operations Research

18.872G Mathematical Programming A

18.873G Mathematical Programming B

18.874G Dynamic Programming
Engineering

18.875G
Geometric Programming
The geometric programming theory is developed for convex and non-convex mathematic programs. The theory is applied to polynomial and posynomial programming. As projects actual polynomial and posynomial programs will be solved.

18.876G
Advanced Mathematics for Operations Research
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.

18.877G
Large-scale Optimization

18.909G
Project

18.918G
Research Project

18.936G
Research Project

18.960G
Seminar (Production Engineering)

18.967G
Advanced Topic in Production Engineering*

18.968G
Advanced Topic in Production Engineering*

18.969G
Advanced Topic in Production Engineering*

18.970G
Seminar (Operations Research)

18.977G
Advanced Topic in Operations Research*

18.978G
Advanced Topic in Operations Research*

18.979G
Advanced Topic in Operations Research*

18.981G
Industrial Computations

Industrial Applications of Probability: Tutorial problems from the fields of sampling inspection, quality control, control charts. Simple economic models—for example, the newsboy problem, length of steel bars.

Digital Computer Programming: The basic elements of computer programming. A number of programming assignments will be included.

School of Transportation and Traffic

Graduate Study

19.101G
Applications and Practice of Traffic Engineering
1. Vehicle and driver characteristics; 2. measurement of traffic; 3. the design and execution of traffic surveys; 4. kinematic design of highways: capacity, lanes, medians, shoulders; 5. intersection design and control; 6. traffic control devices and regulations: unbalanced flow, speed limits and zoning, pedestrian control; 7. street lighting: methods of discernment, characteristics of lighting systems, location and spacing; 8. organization of traffic engineering functions; and 9. traffic law and enforcement.

19.111G
Theory of Traffic Behaviour

19.121G
Theory and Practice of Statistics for Traffic Engineers

19.131G
Land Use and Transport Planning
The development of the basic laws of land used and transport system interaction. Covers models for traffic generation, desire line distribution and inter- and intramodal assignment. The systems and programming philosophies of transport planning. Mathematical programming.

*Subjects which allow the presentation of special topics, particularly by visiting academics.
19.141G
Transport Systems Analysis
Historical introduction to sea and land transport systems. The impact of the internal combustion engine and subsequent rise of automobile and air transport. Description and methods of measurement of performance characteristics of different transport modes: rail, road, sea, air, pipeline, e.g. capacity, speed range, unit operating costs. Operating characteristics of terminal and transfer facilities. Frequency and speed of service, timetables, peak hour problems. Cargo and passenger systems, description of cargo characteristics. Inventory, insurance and packaging costs. Development of criteria for distribution and assignment of cargo and passenger traffic.

19.151G
Economics of Transport

19.161G
Characteristics of Transport Systems
Historical introduction to sea and land transport systems. Description and methods of measurement of performance characteristics of different transport modes: rail, road, sea, air, pipeline, e.g. capacity, speed range, unit operating costs. Operating characteristics of terminal and transfer facilities. Cargo and passenger systems, description of cargo characteristics. Inventory, insurance and packaging costs. Criteria for distribution and assignment of cargo and passenger traffic.

19.171G
Fundamentals of Transport Economics

19.181G
Introduction to Statistics

19.191G
Introduction to Traffic Theory

19.211G
Fundamentals of Transport Planning
The main topics covered are: Generation of traffic, estimation of traffic growth and assignment of traffic to competing travel modes. Land use and transport interaction.

19.221G
Traffic Operation and Control
Traffic measurements and data handling. Studies of capacity of roads and intersections, levels of service, delay. Accident analysis and treatments. Traffic service—street lighting and guidance. Principles of traffic design, improvements.

19.909G
Project
19.918G
Research Project
19.936G
Research Project

School of Highway Engineering

Graduate Study

20.002G
Soil Mechanics Applied to Road Engineering


20.003G
Road Engineering Practice
Highway Law: Highway law, the law of contracts, definition of a contract, five necessary elements for a valid contract. Operation and interpretation, fundamental principles and established practice, time for performance, discharge or dissolution, remedies for breach of contract, variations. Powers and duties of the engineer, agency, commercial arbitration, approvals, scope of obligations and authority, both legal and ethical, related contracts, carriage of goods by land, insurance, master and servant (contracts of employment), sale of goods, arbitration act.

Contract Documents: Engineering contracts, types of contract, contract documents, general conditions of contract, drawings, specification, schedule or Bill of Quantities, tenders, letter of acceptance, the agreement, mechanics of execution of a contract, contract law in other countries. Specifications, purpose and relationship to other contract documents, principles of specification writing, basic layout, method of approach and composition, bills of quantities, purpose and relationship to other contract documents, methods of presentation, principles of preparation and standard procedures, units.


Aggregates: Types of aggregates, properties of aggregates, review of available tests, difficulties of testing, relationship between results of arbitrary and fundamental tests, effect of various factors on the result obtained with Los Angeles and aggregate crushing tests, importance and determination of surface texture of aggregate, crushing and preparation of aggregate and factors affecting particle shape, importance of free silica content in crushing, presence of secondary minerals and other factors affecting durability, alkali aggregate reaction, proportioning (blending) aggregates.


20.041G Road Location and Design—Part I
Preliminary and final survey, geometric designs of roads for rural and urban conditions, sight distances, stopping distances, passing distances, road gradients, super-elevation horizontal curves, vertical curves, appreciation of visual effects of combinations of horizontal and vertical curves, design models, types of cross section, speed change lanes, median lanes, median openings, design of at grade road junctions, expressways and parkways, types of and design of grade separation crossings. Road planning, design traffic load estimation, urban highway network planning and design road capacity and levels of service. Drawing office examples in design for rural and urban conditions.

20.042G Road Location and Design—Part II
Traffic Engineering: Traffic measurements, relationship between flow and concentration, speed, sampling, headway distributions and gap acceptance, delays to conflicting streams, car following behaviour, traffic signals (isolated and linked), street lighting, accident studies and traffic control warrants.

Photogrammetry: Drawing office methods of photo measurement and interpretation, radial line plotting, parallax bar measurements, controlled mosaic assembly.

Town Planning and Landscape Architecture: Analysis of the 20th century town, principles of land use zoning, planning for traffic and transport, public open spaces, the planning of residential areas, planning for industry, visual quality of urban and rural environment, the city centre, vegetation and environment, plant materials, principles of landscape design, examples of landscape design, street and roadside planting, urban sociology.

Hydrology: Urban drainage design, hydraulic design of highway structures, introduction to run off process and estimates, review of and discussion of the theoretical basis for the most important existing methods of calculating culvert and gully sizes.

20.052G Road Location and Design—Part II (Surveyors)
As for 20.042G, omitting section on Photogrammetry and adding: Use of computers in Highway Engineering: capabilities and limitation of integrated design systems used in highway design.

20.061G Road Location and Design—Part I
As for 20.041G.

20.062G Road Location and Design—Part II
As for 20.042G.

20.121G Soil Analysis, Pavement and Bridge Foundation Design—Part I
Strength and deformation properties of saturated and unsaturated soils, application of theories of plasticity in stability analysis, treatment of weak grounds marshes, etc., sand drains, investigation design and field observations of stability of natural slopes cuttings and embankments, earth pressures relative to abutments and wing walls, design and construction of shallow and deep bridge foundations, factors of safety, use of piles and caissons, grouting techniques, settlement prediction and measurement, subsoil exploration, engineering geology, ground water lowering, subsoil drainage.

20.122G Soil Analysis, Pavement and Bridge Foundation Design—Part II
Soil classification, function and material specifications of pavement base (base course), moisture under steady and non-steady conditions and under temperature gradients, moisture equilibrium, soil suction, frost heave, laboratory and field methods of soil compaction, soil structure, field control of compaction, performance of compaction plant, stage compaction, area compaction proof rolling, cement, lime, bituminous and mechanical stabilization, environmental factors, stress distribution in layered systems, dynamic behaviour of soil and flexible pavement structures, design criteria for flexible pavements, critical review of some current design methods, modern trends, airfield runways pavement design, review of pavement evaluation by surface deflection AASHO road test and other methods, design of overlays, evaluation of subgrade reaction, analysis of temperature stress in concrete slabs, design of rigid pavement analytical and empirical methods.

20.131G Road Construction—Part II (Surveyors)
Soil Engineering for Highways: The origin and formation of soils, soil as an engineering material, classification of soils, site investigation, sampling and in situ testing, stress-strain and consolidation characteristics of soils, failure hypotheses, laboratory test methods, moisture movement in saturated and unsaturated soils, soil suction, compaction characteristics of soils, field and laboratory compaction, specifications for compaction, the role of soil structure, the effects of temperature and other environmental factors, the improvement of soil properties by mechanical stabilization or by the use of binders or additives.
Pavement design methods for flexible and rigid pavements, stability analysis and field observation of natural slopes, cuttings and embankments, earth pressure relative to abutments and wing walls, reinforced earth, sand drains, ground water lowering, applications of computers in soil engineering.

20.211G
Road Construction—Part I
Materials Science: Rheology, study of linear and non-linear materials, mechanistic and phenomenological approaches, time and temperature dependent processes, state process theory, viscoelasticity and elasticity, multiphase materials, mathematical models for material behaviour, three dimensional analyses of stress and strain, failure mechanisms in continuous and particulate materials, choice of testing methods and their influence on results, blending materials, wave propagation methods and their interpretation, factors affecting road surface friction at high and low speeds, measurement of road surface friction.

Bituminous Materials: Forms and origins of binders, emulsions selection criteria, laboratory tests, physical and chemical properties of binders, design of dense and open graded bituminous mixes, stability tests, engineering properties of mixes, continuous and batch manufacture of mixes, construction of bituminous concrete surface courses and full depth pavements, overlays, special forms of bituminous construction, heavy duty surfacings, seal coats, primes and primers, durability of bituminous materials, stripping, climatic factors, maintenance procedures, comparisons of Australian and overseas practice.

Aggregates: Types of aggregates, properties of aggregates, review of available tests, difficulties of testing, relationship between results of arbitrary and fundamental tests, effect of various factors on the result obtained with Los Angeles and aggregate crushing tests, importance and determination of surface texture of aggregate, crushing and preparation of aggregate and factors affecting particle shape, importance of free silica content in crushing, presence of secondary minerals and other factors affecting durability, alkali aggregate reaction, proportioning (blending) aggregates.

Geology: Geophysical methods of investigating foundations conditions of proposed bridge sites, roads or other engineering constructions. The seismic refraction methods and specialized techniques for the detailed investigation of the depth and quality of subsurface rock and overburden. Electrical resistivity methods and their use in foundation investigation, finding overburden thickness, or related problems, petrological interpretation for highway engineers, petrology, rock weathering, the clay minerals and their importance in engineering geology.

Quarrying and the Use of Explosives: Acquisition and administration of plant, estimating plant productivity and cost. Quarrying, crushing and screening. Types and application of explosives.

Seminar: One day seminar on maintenance requirements and methods.

20.212G
Road Construction—Part II
Highway Law: Highway law, the law of contracts, definition of a contract, five necessary elements for a valid contract. Operation and interpretation, fundamental principles and established practice, time for performance, discharge or dissolution, remedies for breach of contract, variations. Powers and duties of the engineer, agency, commercial arbitration, approvals, scope of obligations and authority, both legal and ethical, related contracts, carriage of goods by land, insurance, master and servant (contracts of employment), sale of goods, arbitration act.

Contract Documents: Engineering contracts types of contract, contract documents, general conditions of contract, drawings, specification, schedule or Bill of Quantities, tenders, letter of acceptance, the agreement, mechanisms of execution of a contract, contract law in other countries. Specification, purpose and relationship to other contract documents, principles of specification writing, basic layout, method of approach and composition, bills of quantities, purpose and relationship to other contract documents, methods of presentation, principles of preparation and standard procedures, units.

Construction Surveying and Setting Out: Lectures on and field exercises in difficult construction and setting out problems.

Linear Programming and Critical Path Analysis: Introduction to operations research, critical path methods for planning and control, PERT techniques, available computer systems, administration of roadworks.

Use of Computers in Highway Engineering: Introduction to computers and programming, discussion of capabilities and limitations of integrated design systems used in highway design.

Statistics in Highway Engineering: Quality control, laboratory techniques, design of experiments.

Seminar: One day seminar on engineering management.

20.213G
Road Construction—Part III
Plant Operation and Earthworks: Construction plant, planning and supervision of earthmoving operations.

Construction Setting Out: Lectures on and field exercises in difficult construction and setting out problems.


20.221G
Road Construction—Part I (Surveyors)
Bituminous Materials: As for 20.211G.

Concrete: Kinds of cement and their principal properties, additives, mix design, placing and control of quality, compaction, curing testing of fresh and set concrete properties of concrete.

Aggregates: As for 20.211G.

Geology: As for 20.211G.

Quarrying and the Use of Explosives: As for 20.211G.

Seminar: One day seminar on maintenance requirements and methods.
20.231G
Road Construction
Specifications, bills of quantities, engineering drawings for roadworks, feasibility and cost-benefit analyses, supervision of construction, progress payments, cost estimation, construction and personnel management, report writing.

Construction planning, use of critical path methods, setting out roadworks, selection and use of roadmaking plant including fixed and mobile units, quality control.

20.232G
Highway Materials
Selection, evaluation and specification of materials for flexible and rigid pavements and for road embankments. Forms and origins of bituminous materials and road tars, laboratory tests, seal-coats, primes and primseals, design of bituminous mixes, wearing courses, full depth asphalt pavements, manufacture of bituminous concrete, maintenance procedures.

Types of aggregates and their application, laboratory tests, relevance of tests to pavement performance, crushing, screening, grading of aggregates, durability of aggregates, blending procedures, quarrying and use of explosives, selection and testing of gravels.

Types of cement, additives, design of concrete mixes, transport and placing of concrete, compaction and curing, laboratory and in-situ tests, quality control.

20.311G
Highway Structures—Part I
Systems analysis in the choice of location and structure type of bridges, site investigation, foundation, waterways, aesthetics of design, design and planning constraints, optimum criteria, bridge structure analysis, orthotropic plate theory, articulated plate theory, theories of load distribution, matrix methods of analysis.

20.312G
Highway Structures—Part II
Bridge design—concrete, steel, prestressed concrete, culvert design and construction under high fills, foundation, sub-structure and retaining wall design, computer programs for design and optimization.

20.421G
Law and Administration
The law relating to the planning and construction of roads and highways and associated works, contractual law, industrial law, company law, Commonwealth and State laws relating to roadworks. Relevant sections and ordinances of Local Government and Main Roads Acts. Supervision and administration of contracts, interpretation of documents, organization of construction and maintenance works. Types of contract and their application, general conditions of contracts and responsibilities of engineer thereunder, sureties, guarantees, arbitration, drawings, specifications, bills of quantities, their function and inter-relationship, employment and discharge of labour, cost accounting, industrial awards.

20.430G
Highway Engineering Elective I
An occasional elective on a Highway Engineering topic selected according to current demand and availability of local and visiting specialists.

20.431G
Highway Engineering Elective II
An occasional elective on a Highway Engineering topic selected according to current demand and availability of local and visiting specialists.

20.501G
Management for Highway Engineers

Behavioural Science and Personnel Management: The psychological and sociological factors affecting organizational behaviour and affecting the individual. Perception, learning, motivation, conflict and frustration. Personality development and learning theory. Group dynamics, systems and subsystems, individual and group motivation, communications within the organization, leadership theory, the nature of authority, human engineering principles, techniques of personnel control. Recruitment, selection, promotion, job evaluation and salary administration, education, training, placement policies, incentive schemes. Staff reporting and counselling, appraisal and control of personnel. Public relations.


Decision Making: Dynamic programming, decision trees, Bayesian and other decision making techniques. Operations Research techniques: Problems of allocation, the transport techniques, mathematical programming, the simplex method, inventory and queueing problems.

School of Nuclear Engineering

Undergraduate Study

23.051
Nuclear Power Technology
L2½T1½
Nuclear processes, reaction rates, fission and energy release. Neutron multiplication, slowing down and diffusion. Nuclear reactor criticality and burnup, neutron kinetics and reactor control.

Thermal and fast reactor types, operation, environmental and safety aspects. Nuclear fuel enrichment and utilization, nuclear power costing and economics.

Heat generation and removal, fluid dynamics and heat transfer aspects of gas and liquid coolants, boiling, two phase flow and burnout. Structural mechanics in reactor technology, thermomechanical performance of fuel pins and pressure vessels.

Textbooks
No set texts.
Graduate Study

23.013G Neutron Transport and Diffusion
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
The derivation and use of fewgroup reactor models for the macroscopic analysis of finite reactor criticality, burnup and control.

23.015G Multigroup Reactor Theories
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
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.

23.023G Reactor Thermal Performance
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.

23.024G Boiling and Two-phase Flow
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
A study of the 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
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.

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
A course in 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 utilisation.
23.909G  
Project

23.918G  
Research Project

23.936G  
Research Project

School of Surveying

Undergraduate Study

29.001  
Surveying IA  SS L3T2½

Textbooks
Seven Figure Mathematical Tables Full ed Chambers
Whyte W. S. Revision Notes on Plane Surveying Newnes-Butterworth

29.002  
Surveying IB  SS L1T5½
Tacheometric surveys: calculation, plotting and contouring. Minor instruments. Surveying project embodying the selection of instruments and the design and application of field procedures. Introduction to plotting and plan drawing.

Textbooks
As for 29.001 Surveying IA.

29.103  
Surveying III  SS L4T3

Textbooks
No set texts.

29.151  
Survey Computations I  SS L3½T2½

Textbooks
Maughan M. Survey Computations School of Surveying Monograph No 5
Seven Figure Mathematical Tables Chambers
Tables of Natural Sines Tangents etc to every Ten Seconds DMR

29.152  
Survey Computations II  SS L2T1

Textbook
Maughan M. Adjustment of Observations by least squares School of Surveying Monograph No 6

29.161  
Hydrographic Surveying I  SS L1T1
Principles, objectives, equipment and methods of hydrographic surveying.

29.162  
Hydrographic Surveying II  SS L2T1
Not offered in 1976.

29.182  
Cartography Elective  SS L1T1

Textbook
Keates J. S. Cartographic Design and Production Longman

29.183  
Cartography Advanced Elective  SS L2T1
Not offered in 1976.
29.192
Survey Camp
A two-week field camp, including the preparation of a report and plans.

Textbooks
As for 29.102 Surveying II and 29.151 Survey Computations I.

29.193
Professional Training
A five-month period of practical experience including the submission of a report.

29.194
Survey Camp
A two-week field camp followed by two weeks on campus for completion of computations.

Textbooks
As for 29.152 Survey Computations II, 29.211 Geodesy I, 29.311 Astronomy I and 29.511 Photogrammetry I.

Textbooks
Mackie J. B. *The Elements of Astronomy for Surveyors* 6th ed
Griffin
or
*Textbook of Field Astronomy* HMSO
*Star Almanac for Land Surveyors for Current Year* HMSO

29.312
Astronomy II
Azimuth by circum-elongation, circum-polar and sun observations. Optimum position of observation, balancing of observations. Position line methods.

Textbook
*Star Almanac for Land Surveyors for Current Year* HMSO

29.313
Astronomy III
A study of topics selected from the following: Corrections to observations and calculations; star coordinates; meridian methods; equal altitude methods; precise timing.

Textbook
As for 29.312 Astronomy II

29.411
Surveying for Architects

Textbooks
Bannister A. & Raymond S. *Surveying* Pitman Paperback
*Seven Figure Mathematical Tables* Chambers
Engineering

29.511 Photogrammetry I SS L3T3

Textbook
Moffit F. H. Photogrammetry 2nd ed International Textbook Co

29.512 Photogrammetry II L1 1/2 T1 1/2

Textbook
As for 29.511 Photogrammetry I.

29.513 Photogrammetry III SS L1 1/2 T1 1/2

Textbook
As for 29.511 Photogrammetry I.

29.612 Land Studies II SS L4T1

2. Land Utilization: A broad study of biological, political, social and economic factors establishing a concept of ecological relationships and the place of man therein. Primary industries and urbanization. Conservation of resources.

3. Introducing Property Law: The legal system, forms and sources of law; land tenure and property law.

Textbooks
Collins H. G. Rural Land Utilization Commonwealth Institute of Valuers
Murray J. F. N. Principles and Practice of Valuation C’wealth Inst of Valuers
or
Rost R. O. & Collins H. G. Land Valuation and Compensation in Australia C’wealth Inst of Valuers

29.613 Land Studies III SS L2To
Land Titles and Survey Law: General study of land title systems; land tenure and title; the law of boundaries and of easements and other estates. The N.S.W. Real Property Act and other acts regulating the conduct of surveys and recording; field records, plans, title searches; surveyor’s powers and duties. Cadastral Survey Systems. The N.S.W. Integrated Survey System.

Textbooks
Hallman F. M. Legal Aspects of Boundary Surveyings as apply in NSW Institution of Surveyors Sydney
Willis R. W. Survey Investigation Registrar-General’s Dept

29.614 Land Studies Project SS L1T2
A project involving the preliminary survey, analysis and all aspects of design for a development.

29.615 Land Studies SS L2T1
Advanced studies in residential and industrial subdivisional design and presentation. Conflict of demand for land use; environmental control. Integrated survey applications. Data banks.

Graduate Study

29.154G Adjustment of Observations

29.163G Mathematical Methods I—Numerical Analysis

29.164G Mathematical Methods II—Statistics of Observations
Advanced applications to survey observations and least square adjustments of frequency distributions, variance, minimum variance, unbiased estimation, central limit theorem, multivariate distributions and statistical testing.

29.165G Mathematical Methods III—Ellipsoidal Harmonics
Vector theorems. Theory of spherical and ellipsoidal harmonics.

29.215G Geometrical Geodesy
29.216G
Geodetic Surveying

29.223G
Dynamic Geodesy
Orbital motion of near earth satellites; the analysis of satellite orbits for low degree harmonics of the earth's gravitational field; the application of results at the surface of the earth.

29.224G
Physical Geodesy
Fundamental equations for the solution of the boundary value problem; telluroid; solutions to the order of the flattening. The gravitational field of the rotating spheroid. The analysis of gravity; extension techniques. Astro-geodetic levelling; comparison of gravimetric and astro-geodetic solutions. The determination of the earth's gravitational field from satellite orbital analysis. The combination of satellite and surface gravity data. Computational data.

29.314G
Geodetic Astronomy

29.517G
Theory of Optical Mechanical Photogrammetric Orientation

29.518G
Theory of Analytical Photogrammetric Orientation

29.519G
Photogrammetric Instrumentation
Theory of instruments; stereocomparators, restitution instruments, approximate instruments, ancillary equipment. Testing and calibration of instruments.

29.520G
Photogrammetric Production Processes

29.521G
Aerial Triangulation
Prerequisite: 29.518G
Aerial triangulation; optical-mechanical methods; analytical methods, sequential and simultaneous; strip adjustment, computer programs.

29.522G
Block Adjustment
Prerequisite: 29.521G

Division of Postgraduate Extension Studies

Graduate Study

97.001G
Linguistics and the Art and Practice of Written and Spoken Communication
The broad purpose of the lectures on linguistics is to analyse the structure of English on the phonetic, phonemic, morphological and syntactical levels but in making this analysis, consideration is given to:

The different general approaches to linguistics: eg traditionalist, structionalist, generative and transformationalist; specific matters in theoretical dispute; eg the statistics of the phoneme; experimental and instrumental research; eg spectrographic examinations of English sounds and their combination; correlations between acoustic phenomena and the perceived sounds of English; the statistics of written and spoken English. Types of communication problems; establishing identity of purpose or common ground; essential differences between written and spoken English; limitation of words; visual aids to comprehension; preparation of factual or technical reports; preparation of a technical lecture.
97.002G  
**Basic Information Theory**


97.004G  
**The Psychology of Communication**

The basic communication process analyzed 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. Elementary statistics and statistical analyses in the experimental study of communication.

97.005G  
**Audio and Video Equipment—Capabilities and Applications**

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, NTSC and SECAM colour television systems; switching, mixing and processing of television signals; lighting equipment; studio floor equipment.

Printing processes; letterpress, gravure and lithography. Photography.

97.007G  
**Audio and Video Signals in Communication**


97.008G  
**The Body in Communication**


97.009G  
**Presentation of Information**


97.010G  
**Basic Fortran**

Introduction to computer programming in FORTRAN IV 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 scientific applications. Input and Output FORMAT statements; Nested DO loops; Arithmetic statement functions; Matrix arrays; Implied DO loops; Magnetic tape and disc READ and WRITE statements; Function subprograms and subroutine programs; Sorting and merging techniques; Common Storage; Program planning and debugging.

97.031G  
**Linguistics, and Written and Spoken Communication**

As for 97.001G (lectures only).

97.032G  
**Basic Information Theory**

As for 97.002G (lectures only).

97.034G  
**Psychology of Communication**

As for 97.004G (lectures only).

97.035G  
**Audio Video Equipment**

As for 97.005G (lectures only).

97.037G  
**Audio Video Signals In Communication**

As for 9.007G (lectures only).

97.038G  
**The Body in Communication**

As for 97.008G (lectures only).

97.039G  
**Presentation of Information**

As for 97.009G (lectures only).

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**Non-Engineering Subjects**

**Physics**

**Physics Level I units**

1.001  
**Physics I**  
S1 + S2 L3T3

Aims and nature of physics and the study of motion of particles under the influence of mechanical, electrical, magnetic and gravitational forces. Concepts of force, inertia, mass, energy, momentum, charge, potential, fields. Application of the conservation principles to solution of problems involving charge, energy and momentum. Electrical circuit theory, application of Kirchoff’s Laws to AC and DC circuits. Uniform circular motion, Kepler’s Laws and Rotational mechanics.

The application of wave and particle theories in physics. A review of the atomic theory of matter and the structure and properties of atomic nuclei. A molecular approach to energy transfer, kinetic theory, gas laws and calorimetry. The wave theories of physics, transfer of energy by waves, properties of waves. Application of
wave theories to optical and acoustical phenomena such as interference, diffraction and polarization. Interaction of radiation with matter, photoelectric effect, Compton effect, spectroscopy. Resolution of the wave—particle paradox by means of wave mechanics and the uncertainty of principle.

Textbook
Weidner R. T. & Sells R. L. Elementary Physics, Classical and Modern Allyn & Bacon

1.101 Physics I (Part 1) S1 L3T3
For Surveying students doing the sandwich course.

The syllabus is identical with 1.001, Session 1.

1.202 Physics I (Part 1) S2 L3T3
For Surveying students doing the sandwich course.

The syllabus is identical with 1.001, Session 2.

1.011 Higher Physics I S1 + S2 L3T3
For students of all Faculties except Medicine and Architecture who have a good secondary school record and who wish to do a more challenging course.

As for 1.001 with additional topics: space physics, mechanical properties of real materials, rotational dynamics, physics of biological systems, AC and charged particle dynamics, physics of energy resources and conversion.

Textbooks
Russell G. J. & Mann K. Alternating Current Circuit Theory NSW Univ Press
Weidner R. T. & Sells R. L. Elementary Physics, Classical and Modern Allyn & Bacon

Physics Level II units
The units are at two levels, an ordinary level, prefix 1.112, and a higher level, prefix 1.122:

1.112A Electromagnetism S2 L2½ T3½
Electrostatics in vacuum and in dielectrics. Magnetostatics in vacuum and in magnetic materials. Maxwell's equations and simple applications.

Textbook

1.112B Modern Physics S1 L2½ T3½
Special theory of relativity, Lorentz transformation, relativistic mass momentum and energy. Schrodinger wave equation expectation values, operators, eigenfunctions, eigenvalues, free-particle, bound-particle and applications to physical systems, spectra, electron spin, spin-orbit coupling, exclusion principle, origins and spectra of X-rays, electron energy levels in solids.

Textbook
Arya A. P. Elementary Modern Physics Addison-Wesley

1.112C Thermodynamics and Mechanics S1 + S2 L1½ T½


Textbooks
French A. P. Vibrations and Waves Nelson
Mandl F. Statistical Physics Wiley

1.122A Electromagnetism S2 L2½ T3½

Textbook
Lorrain P. & Corson D. Electromagnetic Fields and Waves 2nd ed Freeman

1.122B Quantum Physics S1 L2½ T3½

Textbook
Eisberg R. M. Fundamentals of Modern Physics Wiley
1.122C Thermodynamics and Mechanics


Textbooks
Mandi F. Statistical Physics Wiley
Symon K. R. Mechanics 2nd ed Addison-Wesley

Chemistry

2.001 Chemistry I

Classification of matter and theories of the structure of matter. Atomic structure, the periodic table and chemical behaviour. Chemical bonding, molecular structure and stereochemistry. Chemical kinetics and equilibrium; enthalpy, free energy and entropy changes in chemical systems. The structure, nomenclature and properties of organic and inorganic compounds. Reactions of organic and inorganic compounds.

Textbooks
Aylward G. H. & Findlay T. J. V. SI Chemical Data Wiley Sydney
Chemistry I—Laboratory Manual Univ of NSW
Mahan B. H. University Chemistry 3rd ed Addison-Wesley

2.021 Chemistry IE

A terminating subject for students in the Aeronautical, Civil, Electrical, Industrial, Mechanical and Mining Engineering, and Naval Architecture courses.

Classification of matter and theories of the structure of matter. Atomic and molecular structure, the periodic table and chemical behaviour. Chemical bonding and the nature and properties of chemical systems. Equilibrium and energy changes in chemical systems. Introduction to colloidal systems.

Textbooks
Aylward G. H. & Findlay T. J. V. SI Chemical Data Wiley
Barrow G. M. Kenney M. E. Lassila J. D. Little R. L. & Thompson W. E. Understanding Chemistry Benjamin
Chemistry IE Laboratory Manual Univ of NSW

Metallurgy

4.913 Materials Science


Polymer materials. The structure and properties of polymers. Mechanisms for the modification of properties.

Ceramic materials. The structure and properties of ceramics. Similarities and differences with other crystalline solids. Ceramic-metal composites.

Textbook
Clark D. S. & Varney W. R. Physical Metallurgy for Engineers Van Nostrand

4.921 Materials Science


Textbook

4.931 Metallurgy

For students of Civil Engineering. Part of 8.272 Civil Engineering Materials I.


Textbooks
As for 4.921 Materials Science.

4.941 Metallurgy for Engineers

For students of Civil Engineering. Part of 8.259 Properties of Materials.

Solidification of metals, defects in cast metals, casting methods. Phase equilibrium in alloys. Strengthening mechanisms in metals. Elastic and plastic deformation of crystalline materials; mechanism of slip dislocations. Fracture mechanisms, brittle fracture, fatigue and
Subject Descriptions and Textbooks


Textbooks
As for 4.921 Materials Science.

Mathematics

10.001 Mathematics I S1 + S2 L4T2
Calculus, analysis, analytic geometry, linear algebra, an introduction to abstract algebra, an introduction to computer programming.

Textbooks
Blatt J. M. Basic Fortran IV Programming Miditran Version Computer Systems (Aust)
Shields P. C. Elementary Linear Algebra 2nd ed Worth
Thomas G. B. Calculus and Analytic Geometry 4th ed Addison-Wesley

Preliminary Reading List
Bell E. T. Men of Mathematics 2 Vols Pelican
Courant R. & Robbins H. What is Mathematics? OUP
Polya G. How to Solve It Doubleday Anchor
Sawyer W. W. A Concrete Approach to Abstract Algebra Freeman
Sawyer W. W. Prelude to Mathematics Pelican

10.011 Higher Mathematics I S1 + S2 L4T2
Calculus, analytic geometry, linear algebra, an introduction to abstract algebra, elementary computing.

Textbooks
Blatt J. M. Basic Fortran IV Programming Miditran Version Computer Systems (Aust)
Spivak M. Calculus Benjamin

Preliminary reading List
As for 10.001 Mathematics I plus:
David F. N. Games Gods and Gambling Griffin
Felix L. The Modern Aspect of Mathematics Science Editions
Huff D. How to Lie with Statistics Gollancz
Reid C. From Zero to Infinity Routledge & Kegan Paul

10.022 Engineering Mathematics II S1 + S2 L2T2
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.

Textbook
(Alternatively:
Giles E. Pretorius W. J. & Prokhovnik S. J. Supplement to Mathematical Methods Science Press

10.033 Electrical Engineering Mathematics III

Textbook
Groden C. M. McKeegan D. J. & Kirkpatrick C. B. Mathematics for Electrical Engineers Notes issued by the School of Mathematics

10.111A Pure Mathematics II—Linear Algebra S1 + S2 L1½ T½
Vector Spaces: inner products, linear operators, spectral theory, quadratic forms. Linear Programming: convex sets and polyhedra, feasible solutions, optimality, duality.

Textbook
Tropper A. M. Linear Algebra Nelson Paperback

10.111B Pure Mathematics II—Analysis S1 + S2 L1½ T½
Real analysis: partial differentiation, multiple integrals. Analysis of real valued functions of one and several variables. Complex analysis: analytic functions, Taylor and Laurent series, integrals, Cauchy's theorem, residues, evaluation of certain real integrals, maximum modulus principles.

Textbooks
Session 1
Kolman B. & Trench W. F. Elementary Multivariable Calculus Academic

Session 2
Churchill R. V. Complex Variables and Applications ISE McGraw-Hill

10.211A Applied Mathematics II—Mathematical Methods S1 + S2 L1½ T½
Review of functions of two and three variables, divergence, gradient, curl; line, surface, and volume integrals; Green's and Stokes' theorems. Special functions, including gamma and Bessel functions. Differential equations and boundary value problems, including vibrating string and vibrating circular membrane; Fourier series.
Engineering

Textbooks
Blatt J. M. Basic Fortran IV Programming Miditran Version Computer Systems (Aust)
Sneddon I. N. Fourier Series Routledge
Spiegel M. R. Advanced Mathematics for Scientists and Engineers Schaum
Spiegel M. R. Theory and Problems of Vector Analysis Schaum

10.341 Statistics SU S1 + S2 L1T½
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. Least squares adjustment of data.

Textbooks
Freund J. E. Mathematical Statistics Prentice-Hall
Kreitzig E. Introductory Mathematical Statistics Wiley

Accountancy

14.001 Introduction to Accounting A SS L2T0

Textbook
Thacker R. J. Introduction to Modern Accounting (with student guide) 2nd ed Prentice-Hall

14.002 Introduction to Accounting B $½S L2T0
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.

Textbook
Horngren C. T. Accounting for Management Control: An Introduction 3rd ed Prentice-Hall

Industrial Relations

15.501 Introduction to Industrial Relations
For students enrolled in Faculties other than Commerce and Arts. It is designed to provide a practical introduction to important industrial relations concepts, issues and procedures. Topics covered include: the origins, evolution and operation of the Australian system of industrial relations; the structure and role of trade unions and employer bodies; the function of industrial tribunals such as the Australian Conciliation and Arbitration Commission and the N.S.W. Industrial Commission; wages structure and determination; employment, unemployment and retraining; the nature and causes of strikes and other forms of industrial conflict; the processes and procedures for conflict resolution.

Where appropriate to class composition, particular attention is paid to individual industries.

Preliminary Reading
Hyman R. Strikes Fontana
Martin R. Trade Unions in Australia Penguin
Portus J. H. Australian Compulsory Arbitration 1900-1970 Hicks Smith

Textbooks
Isaac J. E. & Ford G. W. eds Australian Labour Relations Readings 2nd ed Sun Books
Niland J. R. & Isaac J. E. eds Australian Labour Economics Readings Sun Books
Rosow J. M. ed The Worker and the Job: Coping with Change Prentice Hall

*Paperback.
Geography

27.295 Physical Geography for Surveyors S2 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.

Textbook
Strahier A. N. An Introduction to Physical Geography Wiley

Optometry

31.212 Geometrical Optics L1½ T1½

Textbook
Fincham, W. H. A. & Freeman M. H. Optics 8th ed Butterworths

Town Planning

36.411 Town Planning SS L2T0
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The University of New South Wales
Kensington Campus 1979

Theatres
Biomedical Lecture Theatres E27
Central Lecture Block E19
Classroom Block (Western Grounds) H3
Electrical Engineering Theatre F17
Keith Burrows Lecture Theatre J14
Mathews Theatres D23
Old Main Theatre K15
Parade Theatre E3
Science Theatre F13
Sir John Clancy Auditorium C24

Buildings
Affiliated Residential Colleges
New (Anglican)  L6
Shalom (Jewish)  N9
Warrane (Roman Catholic)  M7
Applied Science F10
Architecture H14
Arts (Morven Brown)  C20
Banks F22
Barker Street Gatehouse N11
Basser College C18
Biological Sciences D26
Central Store B13
Chancellery C22
Chemistry
Dalton F12
Robert Heffron E14
Civil Engineering H20
Commerce (John Goodsell)  F20
Dalton (Chemistry)  F12
Electrical Engineering G17
Geography and Surveying K17
Goldstein College D16
Golf House A27
Gymnasium B5
House at Pooh Corner  N8
International House C6
John Goodsell (Commerce)  F20
Kensington Colleges C17
Basser C18
Goldstein D16

General
Accountancy C20
Admissions Office C22
Anatomy C27
Applied Geology F10
Applied Science (Faculty Office) F10
Appointments Office C22
Architecture
(Including Faculty Office) H14
Arts (Faculty Office) C20
Australian Graduate
School of Management F23
Biochemistry D28

Biological Sciences (Faculty Office) D26
Biological Technology D26
Biomedical Library F23
Bookshop G17
Botany D26
Building H14
Centre for Design C22
Centre for Medical Education Research and Development C27
Chaplains E15
Chemical Engineering F10
Chemical Technology F10
Chemistry E12
Child Care Centre N8
Civil Engineering H20
Closed Circuit Television Centre F20
Commeres (Faculty Office) F20
Community Medicine D26
Computing Services Unit E21
Drama D9
Economics F20
Education G2
Electrical Engineering G17
Engineering (Faculty Office) K17
English C20
Examinations and Student Records C22
Fees Office C22
Food Technology F10
French C20
General Studies C20
Geography K17
German C20
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 B8
Kindergarten (House at Pooh Corner/Child Care Centre) N8
Landscape Architecture H14
Law (Faculty Office) E21
Library E21
Librarianship B10
Lodges and Pastoral Sciences B8
Marketing F20
Mathematics F23
Mechanical Engineering J17
Medicine (Faculty Office) B27
Metallurgy E8
Microbiology D26
Mining Engineering K15
Music B11
National Institute of Dramatic Art C15
Nuclear Engineering G17
Optometry J12
Pathology C27
Patrol and Cleaning Services F20
Philosophy C20
Physics K15
Physical Education and Recreation Centre (PERC) B5
Physiology and Pharmacology C27
Political Science C20
Postgraduate Committee
in Medical Education B27
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 E1
Sociology C20
Spanish and Latin American Studies C20
Student Amenities and Recreation E15
Student Counselling and Research E15
Student Employment C22
Student Health E15
Students' Union E4
Surveying K17
Teachers' College Liaison Office F16
Tertiary Education Research Centre E15
Textile Technology G14
Town Planning K15
University Union (Blockhouse) G6
Wool and Pastoral Sciences B8
Zoology D26
# Student’s Timetable

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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, conditions for the award of degrees, scholarships, prizes, and so on, you should consult the Calendar.

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 General Education.

The Calendar and Handbooks are available from the Cashier's Office. The Calendar costs $3 (hard cover) and $2.50 (soft cover) (plus postage and packing, 90 cents). The Handbooks vary in cost. Applied Science, Arts, Commerce and Science are $1.50: Architecture, Engineering, Law, Medicine and Professional Studies are $1.00. Postage is 40c in each case. The exception is General Studies, which is free.