How to use this Handbook

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

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

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

Faculty Information.

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

Graduate Study is about higher degrees.

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

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

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

Staff list.

For detailed reference, see the list of Contents.
The University of New South Wales
PO Box 1 Kensington NSW Australia 2033 Phone 6630351

Applied Science

1984 Faculty Handbook
The address of the University of New South Wales is:

PO Box 1, Kensington
New South Wales, Australia 2033

Telephone: (02) 663 0351
Telegraph: UNITECH, SYDNEY
Telex AA26054
Subjects, courses and any arrangements for courses including staff allocated, as stated in the Calendar or any Handbook or any other publication, announcement or advice of the University, are an expression of intent only and are not to be taken as a firm offer or undertaking. The University reserves the right to discontinue or vary such subjects, courses, arrangements or staff allocations at any time without notice.

Information in this Handbook has been brought up to date as at 12 September 1983, but may be amended without notice by the University Council.

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General Information

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

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

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

Some people who can help you

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

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

Note: All phone numbers below are University extension numbers. If you are outside the University, dial 6630351 and ask for the extension. Alternatively you may dial 662 and then the extension number. This prefix should only be used when you are certain of the extension that you require as callers using 662 cannot be transferred to any other number.

The Assistant Registrar (Admissions and Examinations), Mr Jack Hill, is located on the ground floor of the Chancellery. General inquiries should be directed to 3715. For information regarding examinations, including examination timetables and clash of examinations, contact the Senior Administrative Officer, Mr John Grigg, phone 2143.
The Assistant Registrar (Student Records and Scholarships — Undergraduate and Postgraduate), Mr Graham Mayne is located on the ground floor of the Chancellery. For particular enquiries regarding illness and other matters affecting performance in examinations and assessment, academic statements, graduation ceremonies, prizes, release of examination results and variations to enrolment programs, phone 3317.

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

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

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

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

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

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

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

The Chaplaincy Centre is located in Hut E15a at the foot of Basser Steps.

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

Cashier’s Hours The University Cashier’s office is open from 9.30 am to 1.00 pm and from 2.00 pm to 4.30 pm, Monday to Friday. It is open for additional periods at the beginning of Session 1. Consult noticeboards for details.
January
Monday 2
Public Holiday — New Year's Day
Friday 13
Last day for acceptance of applications by office of the Admissions Section for transfer to another undergraduate course within the University
Monday 16
Last day for applications for review of results of assessment
Monday 30
Public Holiday — Australia Day

February
Wednesday 1
Enrolment period begins for new undergraduate students and undergraduate students repeating first year
Monday 20
Enrolment period begins for second and later year undergraduate students and graduate students enrolled in formal courses
Tuesday 28
Last day for undergraduate students who have completed requirements for pass degrees to advise the Registrar they are proceeding to an honours degree or do not wish to take out the degree for which they have applied for any other reason

March
Monday 5
Session 1 begins — all courses except Medicine III, IV and V
Wednesday 7
List of graduands for April/May ceremonies and 1983 prizewinners published in The Sydney Morning Herald
Monday 12
Last day for notification of correction of details published in The Sydney Morning Herald on 7 March concerning April/May graduation ceremonies
Friday 16
Last day for acceptance of enrolment by new undergraduate students (late fee payable thereafter)
Friday 30
Last day for acceptance of enrolment by undergraduate students re-enrolling in second and later years (late fee payable thereafter)

April
Thursday 19
Last day for undergraduate students to discontinue without failure subjects which extend over Session 1 only
Friday 20
Good Friday — Public Holiday
Saturday 21
Easter Saturday — Public Holiday
Monday 23
Easter Monday — Public Holiday
Wednesday 25
Anzac Day — Public Holiday

May
Wednesday 2
Confirmation of Enrolment forms despatched to all students
Friday 11
Last day for acceptance of corrected Confirmation of Enrolment forms
Monday 14
May Recess begins
Wednesday 16
Last day for undergraduate students completing requirements for degrees at the end of Session 1 to submit Application for Admission to Degree forms
Thursday 17
Publication of provisional timetable for June/July examinations
Sunday 20
May Recess ends
Friday 25
Last day for students to advise of examination clashes

June
Tuesday 5
Publication of timetable for June/July examinations
Monday 11
Queen's Birthday — Public Holiday
Sunday 17
Session 1 ends
Monday 18
Midyear Recess begins
Tuesday 19
Examinations begin

July
Wednesday 4
Examinations end
Monday 16
Examination results mailed to students
Tuesday 17
Examination results displayed on University noticeboards
Saturday 20: To Friday 20 July: Students to amend enrolment programs following receipt of June examination results
Sunday 22
Midyear Recess ends
Monday 23
Session 2 begins
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### September

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<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday 2</td>
<td><strong>August Recess ends</strong></td>
</tr>
<tr>
<td>Wednesday 5</td>
<td>List of graduands for October graduation ceremonies published in <em>The Sydney Morning Herald</em></td>
</tr>
<tr>
<td>Monday 10</td>
<td>Last day for notification of correction of details published in <em>The Sydney Morning Herald</em> on 5 September concerning October graduation ceremonies</td>
</tr>
<tr>
<td>Friday 14</td>
<td>Last day for undergraduate students to discontinue without failure subjects which extend over Session 2 only</td>
</tr>
<tr>
<td>Monday 24</td>
<td><em>Confirmation of Enrolment</em> forms despatched to all students</td>
</tr>
<tr>
<td>Friday 28</td>
<td>Last day to apply to UCAC for transfer to another tertiary institution in New South Wales</td>
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### October

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>Monday 1</td>
<td>Eight Hour Day — Public Holiday</td>
</tr>
<tr>
<td>Wednesday 3</td>
<td>Last day for acceptance of corrected <em>Confirmation of Enrolment</em> forms</td>
</tr>
<tr>
<td>Thursday 4</td>
<td>Publication of provisional examination timetable</td>
</tr>
<tr>
<td>Friday 5</td>
<td>Last day for applications from undergraduate students completing requirements for degrees at the end of Session 2 to submit applications for <em>Admission to Degree</em> forms</td>
</tr>
<tr>
<td>Friday 12</td>
<td>Last day for students to advise of examination timetable clashes</td>
</tr>
<tr>
<td>Thursday 25</td>
<td>Publication of examination timetables</td>
</tr>
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</table>

### November

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday 4</td>
<td><strong>Session 2 ends</strong></td>
</tr>
<tr>
<td>Monday 5</td>
<td>Study Recess begins</td>
</tr>
<tr>
<td>Sunday 11</td>
<td><strong>Study Recess ends</strong></td>
</tr>
<tr>
<td>Monday 12</td>
<td>Examinations begin</td>
</tr>
<tr>
<td>Friday 30</td>
<td>Examinations end</td>
</tr>
</tbody>
</table>

### December

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday 17</td>
<td>Examination results mailed to students</td>
</tr>
<tr>
<td></td>
<td>List of graduands in Medicine for February Graduation Ceremony published in <em>The Sydney Morning Herald</em></td>
</tr>
<tr>
<td>Tuesday 18</td>
<td>Examination results displayed on University noticeboards</td>
</tr>
<tr>
<td>Tuesday 25</td>
<td>Christmas Day — Public Holiday</td>
</tr>
<tr>
<td>Wednesday 26</td>
<td>Boxing Day — Public Holiday</td>
</tr>
</tbody>
</table>

### 1985

**Faculties other than Medicine and Military Studies**

**Session 1**
- (14 weeks)
- 4 March to 12 May
- May Recess: 13 May to 19 May
- 20 May to 16 June
- Midyear Recess: 17 June to 21 July
- Examinations: 18 June to 3 July

**Session 2**
- (14 weeks)
- 22 July to 25 August
- August Recess: 26 August to 1 September
- 2 September to 3 November
- Study Recess: 4 November to 10 November
- Examinations: 11 November to 29 November
General Information

Faculty of Medicine

First and Second Years

As for other faculties

Third and Fourth Years

Term 1 (10 weeks) 21 January to 31 March
Term 2 (9 weeks) 9 April to 12 May
May Recess: 13 May to 19 May
20 May to 16 June
Term 3 (9 weeks) 24 June to 25 August
August Recess: 26 August to 1 September
Term 4 (10 weeks) 2 September to 10 November

Fifth Year

Term 1 (8 weeks) 21 January to 17 March
Term 2 (8 weeks) 25 March to 19 May
Term 3 (8 weeks) 27 May to 21 July
Term 4 (8 weeks) 29 July to 22 September
Term 5 (8 weeks) 30 September to 24 November

January

Tuesday 1
Public Holiday (New Year)

Friday 11
Last day for acceptance of applications by office of the Admissions Section for transfer to another undergraduate course within the University

Monday 14
Last day for applications for review of results of annual examinations

Monday 28
Australia Day — Public Holiday

February

Monday 19
Enrolment period begins for second and later year undergraduate students and graduate students enrolled in formal courses

March

Monday 4
Session 1 begins — all courses except Medicine III, IV and V

April

Friday 5 to Monday 8
Easter — Public Holiday

Thursday 25
Anzac Day — Public Holiday

Organization of the University

The University of New South Wales was first incorporated by an Act of Parliament in 1949, under the name of the New South Wales University of Technology.

In 1983 the University had 18,376 students and over 3,600 staff who worked in more than eighty buildings. These figures include staff and students at Broken Hill (W.S. and L.B. Robinson University College), Duntroon (the Faculty of Military Studies) and Jervis Bay.

Arms of the University of New South Wales

The arms of the University are reproduced on the front cover of this handbook. The arms were granted by the College of Heralds in London, on 3 March 1952, and the heraldic description is as follows:

'Argent on a Cross Gules a Lion passant guardant between four Mullets of eight points Or a Chief Sable charged with an open Book proper thereon the word SCIENTIA in letters also Sable.

'The lion and the four stars of the Southern Cross on the Cross of St George have reference to the State of New South Wales which brought the University into being; the open book with SCIENTIA across its page reminds us of its original purpose. Beneath the shield is the motto 'Manu et Mente', which is the motto of the Sydney Technical College, from which the University has developed. The motto is not an integral part of the Grant of Arms and could be changed at will; but it was the opinion of the University Council that the relationship with the parent institution should in some way be recorded.'

The University Colours

The colours of the University are black and gold.

The Council

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

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

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

The Chairman of the Council is the Chancellor, the Hon. Mr Justice Samuels.
The Professorial Board
The Professorial Board is one of the two chief academic bodies within the University and includes all the professors from the various faculties, non-professorial Heads of Schools and Chairmen of Faculty, and several ex-officio and appointed members. 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 matters of major policy are presented to Council for its consideration and adoption.

The Faculties/Boards of Studies
The executive head of a faculty or board of studies is the dean, with the exception of the Australian Graduate School of Management, where the executive head is the director. Members of each faculty or board meet regularly to consider matters pertaining to their own areas of teaching and research, the result of their deliberations being then submitted to the Professorial Board.

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

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

The Schools
Subjects come under the control of the individual schools (eg the School of Chemistry, the School of Accountancy). The head of the school in which you are studying is the person in this academic structure with whom you will be most directly concerned.

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

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

General Administration
The administration of general matters within the University comes mainly within the province of the Registrar, Mr Ian Way, the Bursar, Mr Tom Daly, and the Property Manager Mr Peter Koller.

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 responsible for the building program and the ‘household’ services of the University, including electricity, telephones, cleaning, traffic and parking control and maintenance of buildings and grounds.

Student Representation on Council and Faculties/Boards
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 members for appointment by the Council to their faculty or board of studies. Elections are for a one-year term of office.

Open Faculty/Board Meetings
If you wish you may attend a faculty or board meeting. You should seek advice at the office of the faculty whose meeting you wish to attend, as the faculties have their own rules for the conduct of open meetings.

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

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

Textbook Lists
Textbook lists are issued early in the year and are available from School and Faculty offices for re-enrolling students and from the Unisearch House Enrolment Centre for first year students.
Textbook Costs and Course-Related Costs
Students should allow quite a substantial sum for textbooks. This can vary from $250 to $600 per year depending on the course taken. These figures are based on the cost of new books. The Students’ Union operates a secondhand bookshop. Information about special equipment costs, accommodation charges and cost of subsistence on excursions, field work, etc, and for hospital residence (medical students) are available from individual schools.

Co-operative Bookshop
Membership is open to all students, on initial payment of a fee of $12, refundable after 2 years.

General Studies Program
Almost all undergraduates in faculties other than Arts and Law are required to complete a General Studies program. The Department of General Studies within the Board of Studies in General Education publishes its own Handbook which is available free of charge. All enquiries about General Studies should be made to the General Studies Office, Room G56, Morven Brown Building, phone 3476.

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

New College
New College is an Anglican college and it provides accommodation (with all meals) for 220 graduates and undergraduates, without regard to race, religion, or sex. The College has its own resident tutors, and sponsors a wide range of sporting and social activities. Apply to the Master, New College, Anzac Parade, Kensington 2033 (telephone 6626066).

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

Warrane College
Warrane College provides accommodation for 200 men and is open to students of all ages, backgrounds and beliefs. The College offers a comprehensive tutorial program along with a wide range of activities, professional orientation and opportunities to meet members of the University staff informally. Non-resident membership is available to male students who wish to participate in College activities and to make use of its facilities. The general spiritual care of the College has been entrusted to Opus Dei. Enquiries: The Master, Warrane College, PO Box 123, Kensington 2033. Telephone (02) 6626199.

Creston Residence
Creston Residence offers accommodation to 25 undergraduate and graduate women students. Activities and tutorials are open to non-resident students. The spiritual activities offered at Creston are entrusted to the Women’s Section of Opus Dei. Enquiries: 36 High Street, Randwick 2031. Telephone (02) 3985693.

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

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

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

Australian Armed Services

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

Chaplaincy Centre

The University Chapel

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

Chaplaincy Service

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

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

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

Deputy Registrar (Student Services)

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

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

All enquiries should be made either at room 148E or by telephoning extension 2482 (general enquiries).

Associations, Clubs and Societies

The Sports Association

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

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

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

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

School and Faculty Associations

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

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

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

It makes bookings for use of sporting facilities including tennis courts and playing fields. This section is located on the 3rd Floor, Squarehouse, E4, lower campus. The various services may be contacted by phone on the following extensions: Recreation Program 3271; Grounds Bookings 2235; Tennis Bookings 2617; Sports Association 2673.

Physical Education and Recreation Centre

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

Student Counselling and Research Unit

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

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

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

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

Careers and Employment Section

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

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

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

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

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

Student Health Unit

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

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

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

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

The Family Planning Association of NSW conducts clinics at the Student Health Unit and at the adjacent Prince of Wales Hospital which are available for both staff and students. Appointments may be made for the Student Health Unit clinic by telephoning 5682833 or for the Prince of Wales Hospital clinics by telephoning 3990111.
The Students' Union

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

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

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

The Students' Union is governed by a Council consisting in the main of elected student representatives from the various faculties of the University. There are also representatives of the University Council, Life Members, the Staff Association and the Sports Association. The Council is elected annually.

A full-time President, elected each year by popular ballot, directs the entire administration of the Students' Union and its activities, assisted by a Secretary-Treasurer.

Other officers are the Education Vice-President who works towards the implementation of Students' Union education policy; the Welfare-Research Officer concerned with helping students with problems they may encounter in the University; the Electronic Media Officer; and the Director of Overseas Students who deals with specific problems these students may encounter while in Australia.

The Students' Union has three full-time officers who are elected each year by popular ballot. They are the President, who is mainly the political figure-head of the Union; the Secretary/Treasurer, who organizes the smooth operation of the SU offices, keeps the membership rolls up to date, and oversees the financial operations; and the Women's Officer who represents women on campus and formulates, maintains and co-ordinates the Students' Union policy on women's affairs.

Other officers are the Education Vice-President, who works towards the implementation of Students' Union education policy; the Education Officer concerned with helping students with problems relating to TEAS, Show-Cause and other matters relevant to their courses; the Vice-President who ensures the efficient running of CASOC; and the Director of Overseas Students who deals with specific problems these students may encounter while in Australia.

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

1. Publication of the Student Paper Tharunka.
2. Production of the student video program Campuswide.
3. A free legal service run by a qualified lawyer employed by the Students' Union Council.
4. The Secondhand Bookshop for cheap texts.
5. A child care centre, House at Pooh Corner.
6. CASOC (Clubs and Societies on Campus) which provides money from the SU for affiliated clubs and societies on campus.
7. A video service with access for students to equipment and advice.
8. A noticeboard for casual job vacancies.
9. Organization of orientation for new students.
10. Organization of Foundation Day.

The SU has two offices on campus. One is located at the back of the Library Lawn (between the Chancellery and the Morven Brown Building), the other is on the Second Floor of the Squarehouse (above the bar) at the bottom end of campus.

The University Library

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

For details consult Faculty Information in the relevant Faculty Handbook.

There are also library services at other centres:

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

The library at the Royal Military College, Duntroon, ACT, serving the Faculty of Military Studies.

Each library provides reference and lending services to staff and students and each of the libraries on the Kensington campus is open throughout the year during the day and evening periods. The exact hours of opening vary during the course of the academic year.

Staff and students normally use a machine-readable identification card to borrow from the University libraries.
The University Union

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

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

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

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

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

Financial Assistance to Students

Tertiary Education Assistance Scheme

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

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

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

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

Tertiary students receiving an allowance, and prospective tertiary students, will be sent application forms in January 1984. Forms are also available from the Admissions Section or the Careers and Employment Section, or from the Director, Department of Education, 59 Goulburn Street, Sydney, NSW 2000 (telephone 2188800). Continuing students should submit applications as soon as examination results are available. New students should do so as soon as they are enrolled. All students should apply by 31 March 1984, otherwise benefits will not be paid for the earlier months of the year.

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

Other Financial Assistance

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

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

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

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

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

The University has also been the recipient of generous donations from the Arthur T. George Foundation, started by Sir Arthur George and his family, for the endowment of a student loan fund.
In all cases assistance is limited to students with reasonable academic records and whose financial circumstances warrant assistance.

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

Financial Assistance to Aboriginal Students

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

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

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

Rules and Procedures

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

General Conduct

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

Appeals

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

Admission and Enrolment

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

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

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

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

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

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

First Year Entry

Those seeking entry to first year courses in one or more of eighteen institutions in the State including the University of Wollongong and the three universities in the Sydney Metropolitan area (Macquarie University, the University of New South Wales and the University of Sydney) are required to lodge a single application form with the Universities and Colleges Admissions Centre, Challis House, 10 Martin Place,
Sydney 2000 (GPO Box 7049, Sydney 2001). On the application form provision is made for applicants to indicate preferences for courses available in any one of the three universities and fifteen other tertiary institutions. Students are notified individually of the result of their applications and provided with information regarding the procedures to be followed in order to accept the offer of a place at this university. Enrolment is completed at the Enrolment Bureau, Unisearch House, 221 Anzac Parade, Kensington.

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

Enrolment Procedures and Fees
Schedules 1984

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

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

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

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

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

2. New Undergraduate Enrolments
Persons who are applying for entry in 1984 must lodge an application for selection with the Universities and Colleges Admissions Centre, GPO Box 7049, Sydney 2001, by 1 October 1983.

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

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

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

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

Students who are continuing courses (or returning after approved leave of absence) should enrol through the appropriate school in accordance with the procedures set out in the current Enrolment Procedures booklet, available from the Student Enquiries Counter in the Chancellery and from School offices. Those who have completed part of a course and have been absent without leave need to apply for entry through the Universities and Colleges Admissions Centre, GPO Box 7049, Sydney 2001, by 1 October 1983.

4. Restrictions Upon Re-enrolling
Students who in 1983 have infringed the rules governing re-enrolment should not attempt to re-enrol in 1984 but should follow the written instructions they will receive from the Registrar.

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

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

7. Submission of Project Report
Students registered for formal masters degree programs (course codes 8000-9999) who at the commencement of Session 1 have completed all the work for a degree or diploma except for the submission of the relevant thesis or project report are required to re-enrol by the end of the
second week of Session 1. Completion of enrolment after
then will incur a penalty (see section 16, below).
Information about possible student activities fees exemption
is set out in section 17, (10) below.

8. Enrolments by Miscellaneous Students

Enrolments by Miscellaneous students are governed by the
following rules:

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

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

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

(4) A student who is subsequently admitted to a course of
the University for which any subjects completed as a miscel-
naneous student form a part may receive standing for those
subjects.

9. Final Dates for Completion of Enrolment

No enrolments for courses extending over the whole year or
for Session 1 only will be accepted from new students after
the end of the second week of Session 1 (16 March 1984)
except with the express approval of the Deputy Registrar
(Student Services) and the Heads of the Schools concerned;
no later year enrolments for courses extending over the whole
year or for Session 1 only will be accepted after the end of
the fourth week of Session 1 (30 March 1984) except with the
express approval of the Deputy Registrar (Student Services)
and the Heads of the Schools concerned. No enrolments for
courses in Session 2 only will be accepted after the end of
the second week of Session 2 (3 August 1984) except with
the express approval of the Deputy Registrar (Student Ser-
vices) and the Heads of the Schools concerned.

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

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

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

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

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

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

New students are issued with cards on enrolment if eligible.

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

11. Payment of Fees

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

12. Assisted Students

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

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

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

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

14. Failure to Pay Fees and Other Debts

Students who fail to pay prescribed fees or charges or are otherwise indebted to the University and who fail either to make a satisfactory settlement of indebtedness upon receipt of due notice or to receive a special exemption ceases to be entitled to the use of University facilities. Such students are not permitted to register for a further session, to attend classes or examinations, or to be granted any official credentials. In the case of students enrolled for Session 1 only or for both Sessions 1 and 2 this disbarment applies if any portion of fees is outstanding after the end of the eighth week of Session 1 (27 April 1984). In the case of students enrolled for Session 2 only this disbarment applies if any portion of fees is outstanding after the end of the sixth week of Session 2 (31 August 1984).

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

15. Fees

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

University Union Entrance Fee
Payable on first enrolment $35
Students enrolling for only one session must pay the full University Union entrance fee.

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

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

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

16. Penalties

(1) Failure to lodge enrolment form according to enrolment procedure $20
(2) Payment of fees after end of second week of session $20
(3) Payment of fees after end of fourth week of session $40

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

17. Exemptions — fees

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

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

Students who consider themselves eligible for life membership of the University Union, the Sports Association, or the Students' Union, should make enquiries about the matter at the offices of those bodies, not at the office of the Deputy Registrar (Student Services) or at the Cashier's office.
(2) Students enrolled in courses classified as External are exempt from all Student Activities Fees and the University Union Entrance Fee.

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

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

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

Institutions approved are: Australian Film and Television School, New South Wales Institute of Technology, Sydney College of Advanced Education and Sydney College of Chiropractic.

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

(7) Graduate students not in attendance at the University and who are enrolling in a project only other than for the first time, are exempt from all Student Activities Fees.

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

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

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

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

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

18. Variations in Enrolment (including Withdrawal)

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

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

(3) Enrolment in additional subjects

Applications for enrolment in additional subjects must be submitted by:

- 30 March 1984 for Session 1 only and whole year subjects;
- 17 August 1984 for Session 2 only subjects.

(4) Withdrawal from subjects

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

- (a) for one session subjects, the end of the seventh week of that session (20 April or 7 September)
- (b) for whole year subjects, the end of the second week of Session 2 (3 August).

(5) Withdrawal from Course – Refunds – Student Activities Fees

Whether or not a student's withdrawal entails academic penalties (covered in item (4) above) there are rules governing Student Activities Fees refunds in the case of complete withdrawal from a course as follows:

- (a) If notice of withdrawal from a course is received by the Student Records and Scholarships Office before the first day of Session 1, a refund of all Student Activities Fees paid will be made.
- (b) If notice of withdrawal is received on or after the first day of Session 1, a partial refund of the University Union Entrance Fee will be made on the following basis: any person who has paid the entrance fee in any year and who withdraws from membership of the University Union after the commencement of Session 1 in the same year, or who does not renew membership in the immediately succeeding year may on written application to the Warden receive a refund of half the entrance fee paid.
- (c) If the notice of withdrawal is given before the end of the fourth week of Session 1 (30 March 1984) a full refund of Student Activities Fees paid will be made; if notice is given before the end of the seventh week of Session 1 (20 April 1984) a refund of three-quarters of the Student Activities Fees paid will be made; if notice is given before the beginning of Session 2 (23 July 1984) a refund of one-half of the...
Student Activities Fees paid will be made; if notice is given before the end of the seventh week of Session 2 (7 September 1984) a refund of one-quarter of Student Activities Fees paid will be made; thereafter no refund will be made except that provided for in (d) below.

(d) If a student's enrolment in any year is for one session only and the student gives notice of withdrawal prior to the end of the fourth week of that session (30 March or 17 August 1984) a full refund of Student Activities Fees paid will be made; if notice is given before the end of the seventh week of that session (20 April or 7 September 1984) a refund of one-half of the Student Activities Fees paid will be made; thereafter no refund will be made.

(e) The refunds mentioned in (c) and (d) above may be granted by the Deputy Registrar (Student Services) to a student unable to notify the Student Records and Scholarships Office in writing by the times required provided evidence is supplied that the student has ceased attendance by those times.

(6) Acknowledgements

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

(a) variations lodged before the Friday of the seventh week of each session (20 April or 7 September) will be incorporated in the Confirmation of Enrolment Program notice forwarded to students on 30 April or 20 September as appropriate

(b) variations lodged after those dates will be acknowledged by letter

(c) withdrawals from a course are acknowledged individually whenever they are lodged.

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

19. Exemption – Membership

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

Course Transfers

Students wishing to transfer from one course to another must complete and submit an application form, obtainable from the office of the Admissions Section, the Chancellery, by Friday 13 January 1984.

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

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

Students should also advise the enrolling officer in the school in which they were enrolled in 1983 of their intention to transfer.

Admission with Advanced Standing

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

1. the Board shall not grant such standing under these rules as is inconsistent with the rules governing progression to such degree or award as are operative at the time the application is determined;

2. where students transfer from another university such students shall not in general be granted standing in this Univer-
3. the standing granted by the Board in the case of any application based on any degree/s or other awards already held by the applicants, shall not be such as will permit them to qualify for the degree or award for which they seek to register without completing the courses of instruction and passing the examinations in at least those subjects comprising the later half of the course, save that where such a program of studies would involve them repeating courses of instruction in which the Board deems them to have already qualified, the Board may prescribe an alternative program of studies in lieu thereof;

4. the standing granted by the Board in the case of any application based on partial completion of the requirements for any degree or other award of another institution shall not be such as will permit the applicants to qualify for the degree or award for which they seek to register by satisfactory completion of a program of study deemed by the Board to be less than that required of students in full-time attendance in the final year of the course in which the applicants seek to register;

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

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

Examinations

Examinations are held in June/July and in November/December.

Provisional timetables indicating the dates and times of examinations are posted on the University noticeboards.

Students must advise the Examinations Section (the Chancellery) of any clash in examinations. Final timetables indicating the dates, times, locations, and authorized aids are available for students two weeks before the end of each session.

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

Assessment of Course Progress

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

Examination Results

Grading of Passes

Passes are graded as follows:

- **High Distinction**: an outstanding performance
- **Distinction**: a superior performance
- **Credit**: a good performance
- **Pass**: an acceptable level of performance
- **Satisfactory**: satisfactory completion of a subject for which graded passes are not available

Pass Conceded

A pass conceded may be granted provided that the overall performance is considered to warrant such a concession. A pass conceded in a subject will allow progression to another subject for which the former subject is a prerequisite.

Pass Terminating

A pass terminating may be granted provided that the overall performance is considered to warrant such a concession. A pass terminating does not allow progression to another subject for which the former subject is a prerequisite.

Availability of Results

Final examination results will be posted to a student's term address, or vacation address if requested. Forms requesting that results be posted to a vacation address are included in the examination timetable (November/December only) and change of address forms are obtainable at the Student Enquiry Counter, the Chancellery. Forms can be accepted up to Friday 1 July for Session 1 results and Friday 2 December for Session 2 and whole year results. Results are

Resumption of Courses

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

If students have not obtained leave of absence from their course and have not been enrolled in the course over the past twelve months or more, they should apply for admission to the course through the Universities and Colleges Admissions Centre before 1 October in the year preceding that in which they wish to resume studies.
also posted on School noticeboards and in the University Library. Results on noticeboards are listed by Student Registration Number.

No examination results are given by telephone.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1. Candidates are required to obey any instruction given by an examination supervisor for the proper conduct of the examination.
2. Candidates are required to be in their places in the examination room not less than fifteen minutes before the time for commencement.

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

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

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

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

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

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

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

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

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

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

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

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

First Year Rule
1. Students enrolled in the first year of any undergraduate course of study in the University shall be required to show cause why the should be allowed to continue the course if they do not pass the minimum number of subjects, units or credits prescribed for this purpose by the relevant faculty or board of studies.

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

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

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

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

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

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

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

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

Showing Cause

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

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

Appeal

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

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

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

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

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

The decision of the Committee shall be final.

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

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

Exclusion

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

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

Re-admission after Exclusion

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

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

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

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

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

10. Students who fail a subject at the examinations in any year or session and re-enrol in the same course in the following year or session must include in their programs of studies for that year or session the subject which they failed. This requirement will not be applicable if the subject is not offered the following year or session, is not a compulsory component of a particular course, or if there is some other cause which is acceptable to the Professorial Board for not immediately repeating the failed subject.
Restrictions and Definitions
11. (1) These rules do not apply to students enrolled in programs leading to a higher degree or graduate diploma.

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

Schedule A

(See First Year Rule 1. above)

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

<table>
<thead>
<tr>
<th>Faculty/Board of Studies</th>
<th>Minimum Requirement</th>
<th>Course</th>
<th>Unit Values (UV)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Applied Science</strong></td>
<td>Half the program</td>
<td>3000-3220, 4190-4220</td>
<td>One-session subjects: UV 1, Two-session subjects: UV 2</td>
</tr>
<tr>
<td><strong>Architecture</strong></td>
<td>Half the program</td>
<td>3270, 3330</td>
<td>Elective subjects: UV 0, All other subjects: appropriate UV corresponding to credit points*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3320, 3360, 3380</td>
<td>All subjects: UV equal to the allocated hours*</td>
</tr>
<tr>
<td><strong>Arts</strong></td>
<td>18 first-level credit points</td>
<td>3400, 3420</td>
<td>Science subjects: appropriate UV*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3430</td>
<td>Arts subjects: 6 credit points = UV 1, 12 credit points = UV 2</td>
</tr>
<tr>
<td><strong>Biological Sciences</strong></td>
<td></td>
<td>3490-3595 FT in both sessions</td>
<td>Commerce subjects: UV 1, Two-session subjects: UV 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3490-3595 PT in either session</td>
<td>Engineering subjects: UV 1, Two-session subjects: UV 2</td>
</tr>
<tr>
<td><strong>Engineering</strong></td>
<td>Half the program</td>
<td>3610, 3660, 3690, 3700</td>
<td>Half the program including Physics I or Mathematics I</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3620, 3730</td>
<td>Half the program including Mechanics of Solids or Mathematics I</td>
</tr>
<tr>
<td><strong>Law</strong></td>
<td>Half the program</td>
<td>4710-4790</td>
<td>Half the program including Physics I or Mathematics I</td>
</tr>
<tr>
<td><strong>Medicine</strong></td>
<td>Half the program</td>
<td>3800</td>
<td>Half the program including Physics I or Mathematics I</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3640, 3720, 5.061: UV 0, One-session subjects: UV 1, Two-session subjects: UV 2</td>
<td></td>
</tr>
<tr>
<td><strong>Military Studies</strong></td>
<td>Half the program</td>
<td>BA, BSc</td>
<td>All subjects: UV 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BE</td>
<td>All subjects: appropriate weighted mark*</td>
</tr>
<tr>
<td><strong>Professional Studies</strong></td>
<td>Half the program</td>
<td>4030, 4040</td>
<td>All subjects: UV 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4070-4080</td>
<td>All subjects: appropriate UV*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4030, 4040</td>
<td>One General Studies elective: UV1</td>
</tr>
<tr>
<td><strong>Science</strong></td>
<td>Half the program</td>
<td>3910, 3950</td>
<td>All subjects: appropriate UV*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3970</td>
<td>General Studies: UV 1</td>
</tr>
<tr>
<td><strong>Science and Mathematics</strong></td>
<td>2 units</td>
<td>3970</td>
<td>All subjects: appropriate UV*</td>
</tr>
</tbody>
</table>

*For details see the appropriate Faculty Handbook.
Admission to Degree or Diploma

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

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

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

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

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

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

Students who are potential graduands and who wish to notify the Registrar of a change of address should submit an addition form Final Year Students' Graduation: Change of Address.

Attendance at Classes

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

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

Absence from Classes

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

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

Student Records

Confirmation of Enrolment Program notices are sent to all students on 30 April and 24 September. It is not necessary to return these forms unless any of the information recorded is incorrect. If amendments need to be made, students should contact the appropriate course office.

Release of Information to Third Parties

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

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

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

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

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

Ownership of Students' Work

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

Academic Dress

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

Further Information

Lost Property

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

The Calendar

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

Vice-Chancellor's Official Welcome to New Students

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

Faculties of Architecture, Arts, Biological Sciences, Commerce, Law:
Tuesday 28 February 1984
9 am in the Clancy Auditorium

Faculties of Applied Science, Engineering, Medicine, Professional Studies, Science, and the Board of Studies in Science and Mathematics:
Tuesday 28 February 1984
11 am in the Clancy Auditorium

Meeting for Parents of New Students

Friday 2 March 1984
7.30 pm in the Clancy Auditorium
Foreword

The importance of the Applied Science in this University's development has always been recognized, and is especially referred to in our Act of Incorporation.

Undergraduate courses well established in the Faculty are: Applied Geography (including Applied Economic Geography, Applied Physical Geography and Human and Physical Resources), Applied Geology, Chemical Engineering (including Biological Process Engineering and Fuel Engineering), Industrial Chemistry, Food Technology, Metallurgy (including Ceramic Engineering and Metallurgical Process Engineering), Mining Engineering, Textile Technology (including Textile Chemistry, Textile Physics, Textile Engineering and Textile Manufacture) and Wool and Pastoral Sciences. The Faculty is concerned with a variety of research programs and many of the Faculty's research contributions have achieved international recognition.

It is hoped that students who enter the Faculty will share the enthusiasm and the dedication of those who have taken part in its development. It is of the greatest importance that students should acquire, from the very beginning, the right approach to their studies, and that they should achieve a proper balance between their work and their extra-curricular activities.

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 Calendar, for further information.

It is hoped that this handbook will be of value to present and prospective students in the Faculty and to employers.

M. Chaikin
Dean
Faculty of Applied Science
Faculty Information

Who to Contact

If you require advice and information of a general nature contact:

Mr. R. Starr, Senior Administrative Officer, Faculty of Applied Science. Room 123, Sir Robert Webster Building. Tel. (02) 662 3401.

All students re-enrolling in 1984 should obtain a copy of the free booklet *Enrolment Procedures 1984* available from School Offices and the Admissions Office. This booklet provides detailed information on enrolment procedures and fees, enrolment timetables by Faculty and course, enrolment in miscellaneous subjects, locations and hours of Cashiers and late enrolments.

For information and advice of a specific nature, contact the appropriate school representative below:

**Applied Geology** Mr. G. Baldwin, Senior Administrative Officer. Room 810, Applied Science Building. Tel. 662 2336

**Chemical Engineering and Industrial Chemistry** Mr. J. Gatenby, Senior Administrative Officer. Room 319, Applied Science Building. Tel. 662 2404.

**Food Technology** Mr. R. Greenwood, Administrative Officer. Room 411, Applied Science Building. Tel. 662 3816.

**Geography** Mr. P. Dunkley, Administrative Assistant. Room G10, Geography and Surveying. Tel. 662 2084.

**Metallurgy** Administrative Officer. Room 110B, Metallurgy Building. Tel. 662 2351.

**Mining Engineering** Mr. R. Rolls, Administrative Assistant. Room 51B, Main Building. Tel. 662 2912.

**Textile Technology** Mr. R. Starr, Senior Administrative Officer. Room 123, Sir Robert Webster Building. Tel. 662 3401.

**Wool and Pastoral Sciences** Mr. J. Lawrence, Administrative Officer. Room 102, Wool and Pastoral Sciences Building. Tel. 662 2288.

Student Clubs and Societies

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

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

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

The Biomedical Library
This library serves the information needs of the staff and students of the Schools of Food Technology and Wool and Pastoral Sciences for life sciences aspects of their study and research.

Biomedical Librarian George Franki

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

Physical Sciences Librarian Marian Bate

The Bachelor of Social Science Degree Course (3420)

The Bachelor of Social Science (BSocSc) is a degree of special interest to students wishing to pursue careers in research, teaching, social planning and social administration. It enables students to gain a broad view of social issues, and introduces them to a diversity of social data. The program combines depth and breadth by requiring students to undertake a range of studies and to complete compulsory courses in the theories and methods of the various social sciences.

Although administered by the Faculty of Arts, the BSocSc degree course allows for in-depth study in two major disciplines drawn from various faculties. These disciplines are economic History, Economics, Industrial Relations, Geography, History, History and Philosophy of Science, Mathematics, Philosophy, Political Science, Psychology, Sociology and Statistics.

It may be possible for a limited number of students who have completed a year of study in a faculty other than Arts to transfer into the second year state of the course if their performance in at least two of the above disciplines is of a sufficiently high standard (Credit grade or better).

For further enquiries, contact the Arts Faculty Office, Room G1, Morven Brown Building. Tel. 662 2248.

Conditions for the Award of the Degree of Bachelor of Science or Bachelor of Engineering

The courses leading to the award of the degree of Bachelor of Science or Bachelor of Engineering in the Faculty of Applied Science are programmed over four years of full-time study. The normal programs may be varied by the Head of the School in which the student is enrolled. The regulations governing the award of these degrees are as follows:

1. A candidate for the award of the degree of Bachelor of Science or Bachelor of Engineering shall:
   (1) comply with the requirements for admission;
   (2) follow the prescribed course of study in the appropriate School, and satisfy the examiners in the necessary subjects;
   (3) complete an approved program of industrial or similar training for such periods as are prescribed.

2. A student may be granted advanced standing by the Professorial Board on the recommendation of Faculty, but in each case must complete the appropriate period of approved industrial training before being eligible for the award of the degree.
3. The degree shall be awarded at Pass or Honours levels. Honours may be awarded in the following categories: Honours Class I; Honours Class II, Division I; Honours Class II, Division II.

4. Students shall be required to conform with the general rules relating to University courses.

**Conditions for the Award of the Degree of Bachelor of Science (Technology) or Bachelor of Science (Engineering)**

The courses leading to the award of the degree of Bachelor of Science (Technology) or Bachelor of Science (Engineering) in the Faculty of Applied Science are normally programmed over six years of part-time study in the University whilst the student is employed in industry. The normal programs may be varied by the Head of the School in which the student is enrolled. The regulations governing the award of these degrees are as follows:

1. A candidate for the award of the degree of BSc(Tech) or BSc(Eng) shall:
   (1) comply with the requirements for admission;
   (2) follow the prescribed course of study in the appropriate school and pass the necessary examinations;
   (3) complete an approved program of industrial or similar training for such periods as are prescribed.

2. A student may be granted advanced standing by the Professorial Board on the recommendation of Faculty.

3. The degrees of BSc(Tech) and BSc(Eng) shall be awarded at Pass level only but in the case of superior performance throughout the course the degree shall be conferred 'with merit'.

4. Students shall be required to conform with the general rules relating to University courses.

**General Studies Program**

Almost all undergraduates in faculties other than Arts and Law are required to complete a General Studies program. The only course in the Faculty of Applied Science which does not have this requirement is the Bachelor of Science course in Economic Geography.

For further details, consult General Information earlier in this handbook.
Undergraduate Study: Course Outlines

Undergraduate Study

The Faculty of Applied Science consists of the Schools of Applied Geology, Chemical Engineering and Industrial Chemistry, Food Technology, Geology, Metallurgy, Mining Engineering, Textile Technology and Wool and Pastoral Sciences. These Schools offer full-time undergraduate courses leading to the degree of Bachelor of Science or Bachelor of Engineering, and some of the Schools also offer part-time courses leading to the award of the degree of Bachelor of Science (Technology) or Bachelor of Science (Engineering).

Full-time Courses

Full-time courses of four years' duration leading to the award of the degree of Bachelor of Science are offered in Applied Geography, Applied Geology, Food Technology, Industrial Chemistry, Metallurgy, Textile Technology and Wool and Pastoral Sciences. Four-year courses leading to the award of the degree of Bachelor of Engineering are offered in Ceramic Engineering, Chemical Engineering, Metallurgical Process Engineering and Mining Engineering.

Honours: Candidates for a degree at Honours level are required to undertake special reading and other assignments as directed by the Head of the School concerned. In considering the award of Honours special attention is paid to the performance of a candidate in the final research project, for which a thesis describing a theoretical or experimental study is required. Honours are awarded in Class I; Class II Division I; and Class II Division II.

Industrial Training Requirements: In the scientific and technological courses close association with industry is maintained on the practical aspects of the professions. This is achieved in most of the courses of the Faculty by expecting students to complete an approved industrial training program prior to graduation. This is normally carried out during the Summer Recess. In the case of Wool and Pastoral Sciences, students are required to complete twenty-four weeks' approved practical work. In Mining Engineering students will undertake a program of practical training of at least 100 days.

Part-time Courses

Six-year part-time courses leading to the award of the degree of Bachelor of Science (Technology) are offered by the School of Food Technology; in Industrial Chemistry by the School of Chemical Engineering and Industrial Chemistry; and in Metallurgy and Ceramic Engineering by the School of Metallurgy.

The BSc(Tech) degree courses are intended for students who are employed in relevant industries and who wish to prepare for a degree mainly by part-time attendance. As part of the requirements for the award of the BSc(Tech) degree, students are required to complete an approved program of industrial training of not less than one year prior to the award of the degree. Industrial training should normally be completed concurrently with attendance in the course, but with the approval of the Head of School, may be completed after completion of the prescribed course of study.

Students who qualify for the award of the BSc(Tech) degree in the Faculty of Applied Science and who wish to proceed to the award of a BSc or BE degree will normally be required to complete further work which will involve at least one year of full-time attendance.

Holders of the degree of BSc(Tech) or BSc(Eng) will be eligible to proceed to the award of the degree of Master of Science, Master of Engineering or Master of Applied Science, subject to the regulations relating to these degrees.

Transfer is also possible from full-time courses to the part-time BSc(Tech) and BSc(Eng) degree courses, but in both
cases a period of approved industrial experience must be gained before graduation. This requirement will apply to students transferring from BSc and BE degree courses within the Faculty.

**BSc(Eng) Degree Courses With Partial Full-time Attendance**

BSc(Eng) degree courses may be completed by a combination of full-time and part-time study. The first two stages are to be completed part-time; in the following two years students complete Years 2 and 3 of the corresponding full-time course; and in the fifth stage a special program is prepared. Full details are set out below under the Schools which provide the courses.

**General Studies Electives**

The following summary of the changes in General Studies requirements which took effect in the 1983 academic year is provided for the benefit of continuing students.

<table>
<thead>
<tr>
<th>Previous Requirement</th>
<th>New Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-42 hour electives or equivalent</td>
<td>3-56 hour electives or equivalent</td>
</tr>
<tr>
<td>3-42 hour electives or equivalent</td>
<td>2-56 hour electives or equivalent</td>
</tr>
<tr>
<td>2-42 hour electives or equivalent</td>
<td>1½-56 hour electives or equivalent</td>
</tr>
<tr>
<td>1½-42 hour electives or equivalent</td>
<td>1-56 hour electives or equivalent</td>
</tr>
</tbody>
</table>

**School of Applied Geology**

**Head of School**
Professor G. J. S. Govett

**Senior Administrative Officer**
Mr G. J. Baldwin

Geology is 'the science of the earth' and is concerned with the nature and evolution of our planet. Resource geology is concerned with the exploration for and exploitation of minerals and energy, and other aspects of the science that form a foundation on which much of mankind's well-being is based. Thus geology has both an applied, professional function as well as being a scientific discipline. The structure and syllabus of the BSc degree courses in Applied Geology and Mining Geology are designed to prepare graduates for employment in some field of resource geology.

Training to meet this objective demands a thorough understanding of basic geological principles. Accordingly, in the early part of the course in Applied Geology students receive instruction in standard fundamental geological subjects. As the course progresses, increasing emphasis is placed on practical applications in the geology of minerals and energy, on engineering and environmental geology and on exploration techniques including geochemical and geophysical methods. In Session 1 of Year 4 students choose between tuition strands of mineral resources, sedimentary basin resources, engineering and environmental geology, or geophysics. Session 2 of Year 4 is devoted to field and laboratory work on a specialized research project.

Year 1 of the course in Mining Geology is common to that in Applied Geology. Years 2 to 4 allow for greater emphasis on the engineering aspects of both underground and open-cut mining techniques while still providing a good basis of geological principles. Session 2 of Year 4 is devoted to a research project in mining geology either within the School of Applied Geology or the School of Mining Engineering.

A three-year full-time course in Geology, and courses that combine a single major in Geology with Physics, Chemistry, Mathematics, or Botany and Zoology, and courses that combine Geology with Geophysics and Geography are available to students in the Faculty of Science. Provision is also made for part-time study in the first year of Geology within that Faculty. Selected students in the Faculty of Science may read for an Honours degree in Geology.

Master of Applied Science degree courses in Engineering Geology, Hydrogeology, Environmental Geology, Mineral Exploration, Exploration Geochemistry and Exploration Geophysics are offered on a part-time or a full-time basis. The courses are designed to provide specialized training in practical applications of these fields.

**General Studies Electives**

For details of changes in the General Studies requirements refer to the table earlier in this section.

---

### 3000

**Applied Geology — Full-time**

**Bachelor of Science**

**BSc**

<table>
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<tr>
<td>25.120</td>
<td>Earth Environments and Dynamics*</td>
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*Up to 2 days of field tutorials in 25.110 Earth Materials and Processes and up to 4 days in 25.120 Earth Environments and Dynamics are essential parts of these subjects. Attendance is compulsory.*
### Undergraduate Study: Course Outlines

#### Year 2

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*Field work of up to 1 day is a compulsory part of the subject.

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*Field work of up to 6 days is a compulsory part of the subject.

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*Field work of up to 7 days is a compulsory part of this subject.

---

### Subject Strands

**A. Mineral Resources strand**, consisting of

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<td>Principles of Mining</td>
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*Field work of up to 7 days is a compulsory part of this subject.

---

**B. Sedimentary Basin Resources strand**, consisting of

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<td>Seismic Stratigraphy and Log Analysis</td>
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<td>B</td>
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<td>25.4123</td>
<td>Geology of Selected Oil and Gas or Coal Fields</td>
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<td>25.4124</td>
<td>Palynology or Foraminiferal Micropalaeontology</td>
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**Field work of up to 5 days is a compulsory part of this subject.

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**C. Engineering and Environmental Geology strand**, consisting of

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<td>Engineering Geology</td>
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<td>B</td>
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**Field work of up to 3 days is a compulsory part of this subject.

---

**D. Geophysics strand**, consisting of

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<td>25.9311</td>
<td>Gravity and Magnetic Methods</td>
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**Field work of up to 4 days is a compulsory part of this subject.

---

Students take Ancillary Subjects equivalent to 2 units from Table 1 of the Combined Sciences Handbook.
3145
Minning Geology — Full-time (New Course)
Bachelor of Science
BSc

Year 1

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*Up to 2 days of compulsory field tutorials are part of this subject.
**Up to 4 days of compulsory field tutorials are part of this subject.

Year 2

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*Field work of up to 1 day is a compulsory part of this subject.
**Field work of up to 8 days is a compulsory part of this subject.
***Field work of up to 5 days is a compulsory part of this subject.

Year 3

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*Field work of up to 4 days is a compulsory part of this subject.
**Field work of up to 1 day is a compulsory part of this subject.
***Field work of up to 5 days is a compulsory part of this subject.
****Field work of up to 3 days is a compulsory part of this subject.
*****10 hours total during Session 1 only.

School of Chemical Engineering and Industrial Chemistry

Head of School
Professor D. L. Trimm

Senior Administrative Officer
Mr J. R. Gatenby

The former Schools of Chemical Engineering and Chemical Technology were amalgamated in January 1980 to form the combined School of Chemical Engineering and Industrial Chemistry. The new school offers the courses previously taught by the former two schools, ie a course in Chemical Engineering and a course in Industrial Chemistry. The combined school contains the Departments of Chemical Engineering and Industrial Chemistry which serve the two degree courses, and the Departments of Biological Process Engineering, Fuel Technology and Polymer Science which offer professional electives in these degree courses.

Chemical engineering is the application of the principles of the physical sciences, together with the 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.
Biological process engineering is the extension of chemical engineering principles to systems involving biological materials. Typical areas of interest are: the manufacture of antibiotics; the fermentation industries; bacterial mineral extraction; and the production of industrially useful materials by the growth and utilization of micro-organisms.

Fuel engineering is primarily concerned with the practical and economic applications of scientific knowledge and engineering experience to the production, processing and utilization of fuels and energy.

Industrial Chemistry is the discipline in which the scientific work of the research chemist is translated into the activities of the chemical industry. The thermodynamic feasibility of a reaction in inorganic or organic chemistry, the conditions under which the reaction might proceed, the kinetics of the reaction and the means whereby the reaction might be controlled to produce the desired product are the fundamentals of the course.

For the award of Honours in both the Chemical Engineering and Industrial Chemistry degree courses, students need to have distinguished themselves in the formal work, in other assignments as directed by the Head of the School, and in the final year project, for which a thesis is required.

It is compulsory that before completion of the course students in the full-time course in Chemical Engineering must obtain a minimum of twelve weeks' professionally oriented, or industrial experience. Students in the part-time courses in Chemical Engineering should complete three years of industrial training concurrently with their University work.

It is recommended that before graduation students in the full-time courses in Industrial Chemistry obtain a minimum of eight weeks' professionally oriented or industrial experience. Students in the part-time courses in Industrial Chemistry must complete an approved program of industrial experience of not less than twelve months prior to the award of the degree.

General Studies Electives
For details of changes in the General Studies requirements refer to the table earlier in this chapter.

3040
Chemical Engineering — Full-time Course
Bachelor of Engineering
BE

This course extends over four years and students study full-time during the day for twenty-eight weeks of each year (excluding examination and recess periods).

Successful completion of the BE degree course is accepted by the Institution of Chemical Engineers, the Institution of Engineers, Australia, and Royal Australian Chemical Institute as sufficient academic qualification for corporate membership.

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*In certain cases this subject may be replaced by another elective with approval of the Head of School.

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**Students should note the special proviso for enrolment in this subject as indicated in the Subject Descriptions later in this handbook.

**Plus one of the following electives:**

| 44.101** Introductory Microbiology | 6   |
| 48.039 Chemical Engineering IIA    | 3   |
| 48.321 Fuel Engineering             | 3   |
| Any other elective approved by     | 3   |
| Head of School                      | 3   |
Chemical Engineering — Subjects and Units

<table>
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<tr>
<th>Hours per week</th>
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<th>S2</th>
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Chemical Engineering — Subjects and Units

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</table>
### Chemical Engineering - Principles II

(Applicable to Mathematics programs)

Consists of:

- Units 1, 2 and 5 of 48.031
- Unit 4 of 48.033

### Chemical Engineering IIJ

### Chemical Engineering IIIA

- Unit 1 Convective Mass Transfer
- 2 Simultaneous Heat and Mass Transfer
- 3 Multicomponent Separation
- 4 Transport Phenomena

### Chemical Engineering IIIB

- Unit 1 Process Dynamics and Control I
- 2 Optimization

### Chemical Engineering IIIC

- Unit 1 Design Workshop
- 2 Industrial Pollution Control

### Chemical Engineering Laboratory II

### Chemical Engineering Project

### Chemical Engineering IIIID

- Unit 1 Management
- 2 Process Engineering II
- 3 Process Dynamics and Control II

### Advanced Chemical Engineering

- Unit 1 Petroleum and Reservoir Engineering
- 2 Mineral Chemistry

### Thermodynamics

### Reactor Design I

- Unit 1 Kinetics of Rate Processes
- 2 Reaction Engineering

### Instrumentation and Process Control

### Biological Process Engineering

### Biological Process Engineering Project

### Fuel Engineering I *

- Unit 1 Fuels and Energy
  - Sources and Properties
  - 2 Energy Conversion
  - 3 Fuel Processing
  - 4 Fuel Plant Technology

### Fuel Engineering II *

- Unit 1 Combustion — Fundamentals and Science
- 2 Principles of Gasification
- 3 Radiation Heat Transfer and Application
- 4 Measurements in Flames and Furnaces
- 5 Laboratory — Fuel Testing

### Fuel Engineering III

- Unit 1 Combustion Engineering
- 2 Furnace Design
- 3 Fuel Plant Design
- 4 Fuel Conservation and Efficiency
- 5 Liquid Fuels
- 6 Coal and Its Evaluation
- 7 Laboratory

### Fuel Engineering Project

### 3040 Chemical Engineering — Full-time/Part-time Course

**Bachelor of Engineering BE**

The BSc(Tech) degree course in Chemical Engineering was replaced in 1975 by a part-time/full-time course leading to the award of a BE degree normally to be completed in seven years. The preferred course pattern is as follows:

- Stages 1 and 2 or Year I
- Stages 3 and 4 or Year II
- Stages 5 and 6 or Year III
- Stage 7 or Year IV

Various course patterns involving full-time/part-time study may be approved by the Head of the School.

Candidates presently enrolled in the BSc(Tech) degree course are allowed to complete their degrees as outlined in the 1974 Calendar.
Preferred course pattern for BSc(Tech) and BE degree courses — Full-time/Part-time

For variations to this course pattern students should contact the School.

### Stage 1

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<th>Hours per week</th>
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**Total:** 12 12

### Stage 2

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<td>6</td>
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<tr>
<td>5.010 Engineering A</td>
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**Total:** 12 12

### Stage 3

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**Total:** 12 12

### Stage 4

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**Total:** 12 14

*In certain cases this subject may be replaced by another elective with approval of Head of School.*

### Stage 5

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<td>48.135 Thermodynamics</td>
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**Total:** 13 13

### Stage 6

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**Total:** 7 13

Plus one of the following electives:

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<td>44.101 Introductory Microbiology**</td>
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<td>48.321 Fuel Engineering II</td>
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*Any other elective approved by Head of School*

**Students should note the special proviso for enrolment in this subject as indicated in the Subject Descriptions later in this handbook.*

### Stage 7

As per Year 4 of full-time course.

### 3100 Industrial Chemistry — Full-time Course

Bachelor of Science BSc

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<tr>
<td>or</td>
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</tr>
<tr>
<td>2.121 Chemistry IA and</td>
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<tr>
<td>or</td>
<td></td>
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<tr>
<td>2.131 Chemistry IB</td>
<td>6</td>
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<td>or</td>
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<td>2.141 Chemistry IM</td>
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<td>or</td>
<td></td>
</tr>
<tr>
<td>10.001 Mathematics I</td>
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<tr>
<td>or</td>
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<tr>
<td>10.011 Higher Mathematics</td>
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<td><strong>Plus:</strong></td>
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<tr>
<td>5.010 Engineering A*</td>
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<td>5.030 Engineering C*</td>
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<td>or</td>
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<tr>
<td>17.031 Biology A* or</td>
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<td>25.110 Earth Materials* and Processes</td>
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**and**

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*One session only*
Undergraduate Study: Course Outlines

### Year 2

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### Year 3

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<td>48.124 Applied Kinetics</td>
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<td>48.134 Applied Thermodynamics</td>
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*Plus two of the following:*  
48.115 Industrial Electrochemistry  
48.116 Water Chemistry  
48.166 Microprocessors in Analytical Instrumentation  
48.303 Fuel Science for Industrial Chemists  
48.404 Advanced Polymer Science

---

**Industrial Chemistry — Part-time Course**

**Bachelor of Science (Technology)**

**BSc(Tech)**

### Stages 1 and 2*

<table>
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<th>Hours per week</th>
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<td>2.131 Chemistry IB or</td>
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<td>5.010 Engineering A†</td>
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<td>17.031 Biology A†</td>
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<td>25.110 Earth Materials and Processes†</td>
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<td>and</td>
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<td>5.030 Engineering C†</td>
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*Physics and Mathematics are usually taken in Stage 1 and the other subjects in Stage 2.

†One session only.

### Stage 3

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</tr>
<tr>
<td>10.031 Mathematics</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>10.301 Statistics SA</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>48.122 Instrumental Analysis</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>2</td>
<td>2</td>
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<tr>
<td></td>
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</tbody>
</table>

### Stage 4

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>1.9222 Electronics</td>
<td>3</td>
</tr>
<tr>
<td>2.002B Organic Chemistry</td>
<td>6</td>
</tr>
<tr>
<td>2.042C Inorganic Chemistry</td>
<td>0</td>
</tr>
<tr>
<td>48.125 Industrial Chemistry IA</td>
<td>4</td>
</tr>
<tr>
<td>48.126 Industrial Chemistry IB</td>
<td>1</td>
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### Stage 5

<table>
<thead>
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<th>Course</th>
<th>Hpw</th>
</tr>
</thead>
<tbody>
<tr>
<td>48.121 Corrosion in the Chemical Industry</td>
<td>0</td>
</tr>
<tr>
<td>48.135 Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>48.136 Reactor Design I</td>
<td>1</td>
</tr>
<tr>
<td>48.137 Industrial Chemistry IIA</td>
<td>3</td>
</tr>
<tr>
<td>48.138 Industrial Chemistry IIB</td>
<td>0</td>
</tr>
<tr>
<td>48.139 Experimental Design</td>
<td>0</td>
</tr>
<tr>
<td>48.171 Chemistry of High Temperature Materials</td>
<td>0</td>
</tr>
<tr>
<td>48.172 Instrumental Analysis II</td>
<td>3</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

*Only two of these are offered in any one year as selected by student preferences.*
### Professional Electives in Course 3040

#### Chemical Engineering

**Biological Process Engineering**

The Department of Biological Process Engineering offers a coherent professional elective in Biological Process Engineering designed for students wishing to pursue a career in the biologically based processing industries. Students electing for this professional elective should take 44.101 Introductory Microbiology in Year 3, and 48.211 Biological Process Engineering and 48.240 Biological Process Engineering Project in Year 4.

**Chemical Engineering**

Students wishing to pursue a career in the chemical, petroleum, petrochemical, minerals utilization or metallurgical industries are advised to take 48.039 Chemical Engineering II in Year 3 and 48.211 Biological Process Engineering and 48.240 Biological Process Engineering Project in Year 4. Part-time students should take these subjects at equivalent stages of the part-time degree.

**Fuel Engineering**

The Department of Fuel Technology offers a coherent professional elective in Fuel Engineering designed for those students wishing to pursue a career concerned with fuel and energy conversion and the application of fossil fuels to the process industries. The Department is the only one of its kind in Australia and has a long history of teaching and research in the fossil fuels area. The elective covers the broad areas of properties, constitution, processing and conversion, and utilization of fossil fuels. Topics include combustion science and engineering; radiation and flames; design and performance evaluation of fuel using plant such as furnaces, boilers and head recovery appliances; coal and oil conversion processes; energy conservation; and progress in fuel science and fuel processing. Students choosing this professional elective should take 48.321 Fuel Engineering II in Year 3 and 48.331 Fuel Engineering III and 48.340 Fuel Engineering Project in Year 4. Part-time students should take these subjects at equivalent stages of the part-time degree.

This elective may qualify graduates for membership of the Australian Institute of Energy or the Institute of Energy (U.K.).

### School of Food Technology

**Head of School**

Professor R. A. Edwards

**Administrative Officer**

Mr R. J. Greenwood

Food Technology is the application of basic science to the management of foods from the time of production until their use by the consumer. It is concerned with optimum food quality and quantity, with nutritional status and safety, and with means of production, processing, preservation, distribution and utilization.

A study of food science and technology demands an interdisciplinary and integrated approach, one that brings many scientific disciplines into focus. Its basis is in areas of chemistry, biochemistry and microbiology, and its borders merge with those of agriculture, engineering, nutrition and commerce.

The food technologist acquires new knowledge by laboratory and process research, and applies it to the development of acceptable foods by optimum processes and equipment. Foods are studied in terms of their basic constituents and the changes they undergo when subjected to modern processing and distribution. The technologist is equally concerned with the development and selection of raw materials from agricultural, horticultural, animal and marine sources.

There is a demand, both national and international, for professionally trained people who are prepared to accept responsibility for the quality and safety of man’s food supply, who can contribute to the solution of one of the greatest problems of our age, how to make food supplies grow faster than population.

The School of Food Technology offers a four-year full-time course leading to the award of the degree of Bachelor of Science and six-year part-time course leading to the award of the degree of Bachelor of Science (Technology). Graduates of both courses qualify for membership of the Royal Australian Chemical Institute, the Australian Institute of Food Science and Technology, and the US Institute of Food Technologists.

A Graduate Diploma course in Food Technology of one year full-time or two years part-time is designed for graduates in science or agriculture wishing to familiarize themselves with the principles of food technology.

### General Studies Electives

For details of changes in the General Studies requirements refer to the table earlier in this chapter.
3060
Food Technology — Full-time Course

Bachelor of Science
BSc

This course is designed to provide depth and breadth in the relevant physical and biological sciences on which food technology is based. Students completing the Year 1 requirements are eligible for selection for admission to Year 2 of the course.

Year 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hpw</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.001</td>
<td>Physics I or Introductory Physics I</td>
<td>S1</td>
</tr>
<tr>
<td>2.121</td>
<td>Chemistry IA</td>
<td>S2</td>
</tr>
<tr>
<td>2.131</td>
<td>Chemistry IB</td>
<td></td>
</tr>
<tr>
<td>10.011</td>
<td>Mathematics I or Higher Mathematics I</td>
<td></td>
</tr>
<tr>
<td>10.021B</td>
<td>General Mathematics IB and IC</td>
<td></td>
</tr>
<tr>
<td>17.031</td>
<td>Biology A</td>
<td></td>
</tr>
<tr>
<td>17.041</td>
<td>Biology B</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

Total: 24 hours per week

Year 2

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<td>2.002A</td>
<td>Physical Chemistry</td>
<td>S1</td>
</tr>
<tr>
<td>2.002B</td>
<td>Organic Chemistry</td>
<td>S2</td>
</tr>
<tr>
<td>2.002D</td>
<td>Analytical Chemistry</td>
<td></td>
</tr>
<tr>
<td>38.122</td>
<td>Man and Food</td>
<td></td>
</tr>
<tr>
<td>38.421</td>
<td>Food Engineering I</td>
<td></td>
</tr>
<tr>
<td>38.521</td>
<td>Introductory Nutrition</td>
<td></td>
</tr>
<tr>
<td>41.101</td>
<td>Introductory Biochemistry</td>
<td></td>
</tr>
<tr>
<td>44.143</td>
<td>Microbiology AS, General Studies Elective</td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
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</tbody>
</table>

Total: 26 hours per week

Year 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</tr>
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<tbody>
<tr>
<td>2.043L</td>
<td>Chemistry and Enzymology of Foods</td>
<td>S1</td>
</tr>
<tr>
<td>10.301</td>
<td>Statistics SA</td>
<td>S2</td>
</tr>
<tr>
<td>38.131</td>
<td>Principles of Food Preservation</td>
<td></td>
</tr>
<tr>
<td>38.132</td>
<td>Plant Food Science</td>
<td></td>
</tr>
<tr>
<td>38.133</td>
<td>Animal Food Science</td>
<td></td>
</tr>
<tr>
<td>38.134</td>
<td>Food Science Laboratory</td>
<td></td>
</tr>
<tr>
<td>38.135</td>
<td>Food Quality Assessment</td>
<td></td>
</tr>
<tr>
<td>38.331</td>
<td>Food Microbiology I</td>
<td></td>
</tr>
<tr>
<td>38.431</td>
<td>Food Engineering II</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
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<td></td>
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</tr>
</tbody>
</table>

Total: 27 hours per week

3070
Food Technology — Part-time Course

Bachelor of Science (Technology)
BSc(Tech)

This course is designed for students who are employed in the food processing industries. It extends over six part-time years of study, and leads to the award of the degree of Bachelor of Science (Technology). Students are required to complete an approved program of industrial training of not less than twelve months prior to the award of the degree. Industrial training should normally be completed concur-
rently with attendance in the course, but with the approval of the Head of School may be completed after completion of the prescribed course of study.

The course covers the same subject matter as the first three years of the full-time course. For the first two years students follow a common course in which general biology is taken, and thereafter specialize in the biological sciences, which are fundamental to the study of food science and technology. The subjects of Stages 4, 5 and 6 may be available only in day-time classes, and substantial day-time release from industry may be required.

Students who have completed the requirements of this course and have qualified for the award of the degree of Bachelor of Science (Technology) may proceed to the award of the degree of Bachelor of Science by attending for one full-time year and completing the subjects listed in Year 4 of the full-time course. Students desiring to proceed to the award of a BSc degree must apply to the Head of the School not later than 31 December of the year in which the sixth stage is completed.

### Stages 1 and 2*

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
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<td>1.001</td>
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<td>1.021</td>
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<td>10.001</td>
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<td>6</td>
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<td>10.011</td>
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<td>10.021B</td>
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<td>10.021C</td>
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<td>6</td>
</tr>
<tr>
<td>17.031</td>
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</tr>
<tr>
<td>17.041</td>
<td>0</td>
<td>6</td>
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</tbody>
</table>

*Physics and Mathematics are usually taken as Stage 1, the other subjects as Stage 2.

†There are no evening lectures in this subject.

### Stage 3

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.002B</td>
<td>0</td>
<td>6</td>
</tr>
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<td>2.002D</td>
<td>0</td>
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<td><strong>Total</strong></td>
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### Stage 4

<table>
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<th>Hours per week</th>
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<th>S2</th>
</tr>
</thead>
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<tr>
<td>2.002A</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>38.122</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>38.421</td>
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<td>3</td>
</tr>
<tr>
<td>38.521</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>44.143</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>General Studies Elective</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
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### School of Geography

**Head of School**
Professor B. J. Garner

**Administrative Assistant**
Mr P. Dunkley

Geographers study the spatial relationships of the phenomena which make up man's physical and social environment, and aim to establish principles which govern those relationships. The geographer may concentrate on selected variables, as in systematic geography, or may deal with variables operative in a specific area, as in regional geography.

The cultural significance of geography lies in its contribution to an understanding of the total environment, but the geographer's skills also find practical application in the conservation and planned development of resources. Increasing numbers of geographers are finding such professional employment. For instance, geomorphologists and biogeographers are undertaking resource-inventory surveys and environmental assessment, and economic geographers are engaged as urban and regional planners and spatial analysts.

**General Studies Electives**
For details of changes in the General Studies requirements refer to the table earlier in this chapter.
Applied Geography — Full-time Courses
Bachelor of Science

The School offers three four-year full-time courses leading to the award of the degree of Bachelor of Science, which aim to train professional geographers for entry into applied fields.

There are elective specializations in physical geography (with special emphasis on either the biologic or geomorphic aspects), economic geography (with emphasis on urban geography), and in human and physical resources (with emphasis on the integration of physical and human geography). First year subjects involve systematic studies of the physical or economic bases of geography. There is progressive specialization in the following years, with heavy emphasis on field observation and data handling. For the award of the degree at Honours level students will be required to have distinguished themselves in formal work, in additional assignments as directed by the Head of the School, and in the final year project for which a thesis will be required.

All students are expected to spend a period of four to six weeks with organizations concerned with the investigation and planned use of resources etcetera.

Several units in Geography include laboratory and project work involving the use of computer and quantitative techniques. Students need a battery-operated calculator. It is also required that students provide their own drawing materials such as tracing and graph paper. Details of exact requirements are given at the beginning of the relevant subjects.

3010
Applied Geography — Full-time Course
Bachelor of Science
BSc

Applied Physical Geography

<table>
<thead>
<tr>
<th>Year</th>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
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<td>10.021C</td>
<td>General Mathematics IC or 10.011</td>
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<tr>
<td></td>
<td>17.031</td>
<td>Biology A</td>
<td>6</td>
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<tr>
<td></td>
<td>17.041</td>
<td>Biology B</td>
<td>0</td>
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<tr>
<td></td>
<td>25.110</td>
<td>Earth Materials and Processes§</td>
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<tr>
<td></td>
<td>25.120</td>
<td>Earth Environments and Dynamics‡</td>
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<td>27.111</td>
<td>Applied Physical Geography I*</td>
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<tr>
<td></td>
<td>27.641</td>
<td>Data Processing Systems</td>
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<td>24</td>
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</table>

*Up to 1½ days of field tutorials in 25 110 and up to 3½ days in 25 120 are essential parts of these subjects. Attendance is compulsory.

3010
Undergraduate Study: Course Outlines

Bachelor of Science

The award of the degree of Bachelor of Science, which is of a final year project for which a thesis will be required.

The School offers three four-year full-time courses leading to the award of the degree of Bachelor of Science, which aim to train professional geographers for entry into applied fields.

There are elective specializations in physical geography (with special emphasis on either the biologic or geomorphic aspects), economic geography (with emphasis on urban geography), and in human and physical resources (with emphasis on the integration of physical and human geography). First year subjects involve systematic studies of the physical or economic bases of geography. There is progressive specialization in the following years, with heavy emphasis on field observation and data handling. For the award of the degree at Honours level students will be required to have distinguished themselves in formal work, in additional assignments as directed by the Head of the School, and in the final year project for which a thesis will be required.

All students are expected to spend a period of four to six weeks with organizations concerned with the investigation and planned use of resources etcetera.

Several units in Geography include laboratory and project work involving the use of computer and quantitative techniques. Students need a battery-operated calculator. It is also required that students provide their own drawing materials such as tracing and graph paper. Details of exact requirements are given at the beginning of the relevant subjects.

3010
Applied Geography — Full-time Course
Bachelor of Science
BSc

Applied Physical Geography

<table>
<thead>
<tr>
<th>Year</th>
<th>Course Code</th>
<th>Subject</th>
<th>Hours per week</th>
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</thead>
<tbody>
<tr>
<td>Year 2</td>
<td>2.121</td>
<td>Chemistry IA or</td>
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<td>Introductory Chemistry</td>
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</tr>
<tr>
<td></td>
<td>2.131</td>
<td>Chemistry IB</td>
<td>2</td>
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<td></td>
<td>27.162</td>
<td>Geographical Statistics and Computing</td>
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<td>27.172</td>
<td>Environmental Measurements* and either</td>
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<tr>
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<td>25.211</td>
<td>Earth Materials I and II</td>
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<td>Earth Materials I and II</td>
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<td>43.111</td>
<td>Flowering Plants</td>
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<td>43.101</td>
<td>Introductory Genetics</td>
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<td>43.122</td>
<td>Plant Physiology</td>
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<td>45.152</td>
<td>Population and Community Ecology†</td>
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<td>45.201</td>
<td>Vertebrate Zoology</td>
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<td>45.301</td>
<td>Vertebrate Zoogeography</td>
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<td></td>
<td>24</td>
<td>22</td>
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<tr>
<td>Year 3</td>
<td>27.133</td>
<td>Pedology*</td>
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<td>Biogeography*</td>
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<td>27.153</td>
<td>Climatology</td>
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<td>27.163</td>
<td>Methods in Physical Geography</td>
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<td></td>
<td>27.1711</td>
<td>Introduction to Remote Sensing</td>
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<tr>
<td></td>
<td>27.183</td>
<td>Geomorphology*</td>
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<td>27.193</td>
<td>Environmental Impact Assessment</td>
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<td>General Studies Elective and either</td>
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<td></td>
<td>25.510</td>
<td>Geology for Geomorphologists and Sedimentologists</td>
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<tr>
<td></td>
<td>25.622</td>
<td>Hydrological and Coastal Surveying</td>
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<tr>
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<td>or any two of the following (one session)</td>
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<tr>
<td></td>
<td>27.1712</td>
<td>Remote Sensing Applications‡</td>
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<td>43.142</td>
<td>Environmental Botany</td>
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<td></td>
<td>43.112</td>
<td>Taxonomy and Systematics§</td>
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<td></td>
<td>43.152</td>
<td>Plant Community Ecology</td>
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<td>43.162</td>
<td>The Plant Kingdom§</td>
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<td>45.121</td>
<td>Evolutionary Theory</td>
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<td></td>
<td>45.152</td>
<td>Population and Community Ecology†</td>
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<td>45.302</td>
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<tr>
<td></td>
<td>20½</td>
<td>21</td>
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</tr>
<tr>
<td></td>
<td>or</td>
<td>23½</td>
<td>19</td>
</tr>
</tbody>
</table>

*Up to 5 days field work, equivalent to 40 tutorial hours, is an essential part of this subject.
†Field work of up to 3 days, equivalent to 7 tutorial hours, is an essential part of this subject.
‡May be taken in either Year 2 or Year 3. 10.001 or 10.011 is a prerequisite.
Subject to availability of staff.

Enrolment in this subject is dependent on approval by the Head of School.

Three days field work, equivalent to 24 tutorial hours, is an essential part of the subject.

*Up to 5 days field work, equivalent to 40 tutorial hours, is an essential part of the subject.

†Includes scheduled tutorials of one hour per week in Session 1 and two hours per week in Session 2.

---

### Applied Economic Geography

#### Year 1

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<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
<th>S1</th>
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<tbody>
<tr>
<td>10.021B General Mathematics IB and IC</td>
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<tr>
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<tr>
<td>10.001 Mathematics I</td>
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<td>10.011 Higher Mathematics I</td>
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<tr>
<td>27.641 Data Processing Systems</td>
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<tr>
<td>54.1002 Power and Democracy in Australia</td>
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*Three days field work, equivalent to 24 tutorial hours, is an essential part of the subject.

#### Year 2

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<td>15.072 Applied Microeconomics†</td>
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<td>27.622 Applied Economic Geography IIB</td>
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<td>27.632 Geographic Data Analysis II</td>
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<td>27.642 Mathematical Methods for Spatial Analysis§</td>
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<td>27.662 Urban Systems or Urban Planning</td>
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<td>27.1711 Introduction to Remote Sensing**</td>
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<td>54.2008 Public Policy Making</td>
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*Three days field work, equivalent to 24 tutorial hours, is an essential part of the subject.
†Subject to the availability of staff.
‡By arrangement with Heads of Schools.
§Subject to availability of staff.

---

### Year 3

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<td>8.403G Theory of Land Use/Transport Interaction†</td>
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<td>8.413G Transport Economics†</td>
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<td>27.753 Social Welfare and Urban Development§</td>
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<td>27.773 Spatial Aspects of the Housing Market†</td>
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<td>27.783 Spatial Impacts and Opportunities†</td>
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<td>28.052 Marketing Research†</td>
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*Up to two subjects may be substituted for those listed with permission of Head of School.
‡27.1711 is a prerequisite for this subject in the Applied Economic Geography program.

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### Year 4

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<td>27.504 Project*</td>
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<td>27.514 Practical Applications in Geography</td>
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<td>27.624 Geographic Thought and Perspectives</td>
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<td>27.644 Seminars in Applied Geography</td>
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*Includes scheduled tutorials of one hour per week in Session 1 and two hours per week in Session 2.
# Human and Physical Resources

### Year 1

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<td>10.021C General Mathematics IC</td>
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and either

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<tbody>
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<td>15.001 Microeconomics I</td>
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<td>15.011 Macroeconomics I</td>
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or

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<td>17.041 Biology B</td>
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or

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<tbody>
<tr>
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and either

<table>
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<td>27.162 Geographical Statistics and Computing</td>
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<td>27.172 Environmental Measurements*</td>
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<td>27.432 Computer Mapping and Data Display</td>
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<td>27.622 Applied Economic Geography IIB</td>
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<td>27.662 Urban Systems</td>
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and either

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
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<td>15.062 Applied Macroeconomics†</td>
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<tr>
<td>27.171 Introduction to Remote Sensing</td>
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<td>27.423 Environmental Impact Evaluation</td>
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plus four of the following subjects†§

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<tbody>
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<td>27.133 Pedology*</td>
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<td>27.143 Biogeography*</td>
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<td>27.153 Climatology</td>
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<td>27.183 Geomorphology*</td>
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<td>27.713 Marketing Geography</td>
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<td>27.723 Transport Geography</td>
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<td>27.743 Regional Population Analysis</td>
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<td>Courses in Geography are available on a full-time basis in the Faculties of Arts, Commerce and Science.</td>
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</table>
The BSc and BE degree courses are almost identical up to Year 3 and students enrolled in either of these courses may transfer from one to the other up to this point without loss of standing.

These courses meet the formal educational requirements for admission to the professional metallurgical institutes, such as the Australasian Institute of Mining and Metallurgy and the Institution of Metallurgists (London). Further details about membership of these institutes, the Australasian Institute of Metals and the undergraduate Metallurgical Society of the University, all of which students are encouraged to join, may be obtained from the Head of the School. It is expected that submissions to the Institution of Engineers for recognition of the Bachelor of Engineering degree course will meet with success.

General Studies Electives
For details of changes in the General Studies requirements refer to the table earlier in this section.

3120 Metallurgy — Full-time Course
Bachelor of Science
BSc
Students in this course attend the University for twenty-eight weeks over two sessions from March to November (excluding examinations and recesses).

Students are required, before graduation, to have gained at least sixteen weeks approved industrial experience, and to have submitted satisfactory reports on the work done to comply with this requirement. Industrial experience is normally obtained during the long vacations at the end of Years 2 and 3. During Years 2, 3 and 4 of the course, visits are made to various metallurgical works, and students are required to submit reports on some of these.

<table>
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<tr>
<th>Year 1</th>
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<td>2.131</td>
<td>Chemistry IB</td>
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Plus either:

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<td>5.030 Engineering C† or</td>
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<td>25.120 Earth Environments and Dynamics</td>
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*This subject includes 4 001 Introduction to Materials Science.
†This subject includes 4 002 Introduction to Metallurgical Engineering.
Undergraduate Study: Course Outlines

### Year 2

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<td>4.402 Physical Metallurgy I</td>
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<td>4.502 Mechanical Metallurgy</td>
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<tr>
<td>5.030 Engineering C† or</td>
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### Year 3

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### Year 4

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### Year 5

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*Project includes three weeks laboratory work during Midyear Recess

**3180 Metallurgical Process Engineering — Full-time Course**

**Bachelor of Engineering BE**

Attendance and Industrial Training requirements are as listed in the Bachelor of Science degree course.

### Year 1

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### Year 3

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### Year 4

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*Part only.

‡Includes 4.001 Introduction to Material Sciences.

†Students in Metallurgical Process Engineering include 4.002 Introduction to Metallurgical Engineering in 5.030.
3130 Metallurgy — Part-time Course

Bachelor of Science (Technology) BSc(Tech)

This course is designed for students who are employed in the metallurgical industries. It extends over six part-time years of study, and leads to the award of the degree of Bachelor of Science (Technology). Students are required to complete an approved program of industrial training of not less than twelve months prior to the award of the degree. Industrial training should normally be completed concurrently with attendance in the course, but with the approval of the Head of School may be completed after completion of the prescribed course of study.

### Stage 1

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<tr>
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### Ceramic Engineering

The ceramic industry produces an enormous volume and variety of products used in engineering applications, building construction and in our everyday life. As well as the traditional bricks, roof tiles, sheet and container glass and tableware, ceramics have been found essential as abrasives, refractories, enamels and in electrical and electronic appli-
cations and nuclear fuels. In many of these cases, ceramic articles make possible the manufacture of other products either by being a key component, such as an electronic or magnetic part, or by forming the material of construction of, for example, a blast furnace or an abrasive wheel.

Modern ceramics comprise such a varied and complex group of materials that a high level of training is required to control their manufacture with the required precision and to supervise their proper use. Ceramic engineers are needed in increasing numbers both in Australia and overseas countries and the Department offers the only degree course in Ceramic Engineering in Australasia. The Ceramic Engineering course trains students in the relation between the structure and the properties of ceramic materials, the engineering and process chemistry of their manufacture and the design principles of their use. Careers open to graduates fall into two broad categories. Some go initially into activities associated directly with production, i.e., the design and layout of plants, supervision of their construction, and control of their operations. Others move into research and development in industrial laboratories or research institutions. In either case, graduates with organizing ability frequently move into management if they have an interest in this side of the industry.

In Australia, a number of government research organizations are active in ceramic research, e.g., the Australian Atomic Energy Commission Research Establishment, and the Divisions of Materials Science and Building Research of CSIRO. Investigations with more immediate applications are carried out in industrial laboratories. Even when the basic principles of a process have been worked out in the laboratory, its successful transfer to an industrial scale requires a great deal of effort and expertise. This is an area which offers great scope for further development in Australia.

Graduates in Ceramic Engineering are eligible for membership of the Institution of Engineers, Australia, the Institute of Ceramics (Great Britain) and the Royal Australian Chemical Institute.

### 3025

**Ceramic Engineering — Full-time Course**

**Bachelor of Engineering**

**BE**

**Year 1**

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*Additional 14 hours bridging course for students not having done 48.001.*

**Year 4**

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*7 weeks only.*

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47
3030
Ceramics — Part-time Course
Bachelor of Science (Technology)
BSc(Tech)

Stages 1 and 2*

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*Physics and Mathematics are usually taken in Stage 1 and the other subjects in Stage 2.

Stage 6

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12½ 10½

School of Mining Engineering

Head of School
Professor F. F. Roxborough

Administrative Assistant
Mr R. Rolls

Australia is one of the world's largest producers of minerals and, with vast reserves of metallic ores, coal and diverse other minerals, the mining industry of this country is assured of a long and prosperous future. Mining, whether underground, at the surface or on the ocean floor has become a technically advanced activity and education for mining engineers has progressed rapidly to cater for present day and future requirements of the industry. Mining engineers are now frontline executives: they plan, co-ordinate and control the many activities which comprise the operations of a mine. They are in control of all phases of mining projects from the initial planning and development to mineral extraction and processing and final restoration of the land.

To prepare graduates for these tasks, the School of Mining Engineering provides an education in a wide range of engineering topics and associated scientific subjects, at the same time providing a comprehensive insight into the techniques and practices of modern mining, material processing and mine management.

The School offers a 4-year full-time course in Mining Engineering leading to the award of the degree of Bachelor of Engineering at Pass or Honours level and a graduate course requiring one year of full-time or two years of part-time study leading to the award of the Graduate Diploma (GradDip) in Mining and Mineral Engineering.

Formal graduate programs also comprise Master of Applied Science (MAppSc) degree courses in Minerals Engineering and Mining Geomechanics. The latter is available by external correspondence only and is chiefly designed for professionals working in geographically remote areas in the mining industry.

*Additional 14 hours bridging course for students not having done 48.001.
After graduation, mining engineers are equipped to enter any sector of the mining industry such as coal mining, metalliferous mining, petroleum production, sea-floor mining, quarrying or mineral processing. If they choose to develop careers in production management, they will be required to gain further practical experience before obtaining a Mine Managers Certificate of Competency, in either Coal or Metalliferous Mining. These statutory certificates of competency are issued by the State Government of Mines, which in the case of New South Wales coal mining comes under the Coal Mines Regulation Act No. 37, 1912, and for metalliferous mining under the Mines Inspection Act No. 75, 1901.

Graduate mining engineers are not, however, restricted to primary production for employment. Many find posts in civil sub-surface construction; research and development; with consultants, governments or universities; or with their broad engineering training, in a wide range of manufacturing industries.

Arrangements have been made with the Universities of Newcastle and Tasmania for students who have completed a specified program at these institutions to be admitted with advanced standing to Year 3 of the Mining Engineering degree course at the University of New South Wales.

**General Studies Electives**

For details of changes in the General Studies requirements refer to the table earlier in this section.

### 3140 Mining Engineering — Full-time Course

#### Bachelor of Engineering

**BE**

Year 1 of the course is essentially the same as that for several other Engineering courses and Year 2 includes those subjects of common relevance to the Engineering disciplines. Year 3 is largely devoted to basic mining subjects and Year 4 provides advanced instruction in subjects essential to all mining engineers. In addition, the fourth year offers a wide range of elective subjects, allowing students, if they so wish, to concentrate their studies on a particular sector of the industry, such as coal mining or metalliferous mining. An important fourth year requirement is for students to undertake a personal research or study project in mining or minerals engineering on which they are required to submit a thesis for examination.

For the award of Honours at the conclusion of the full-time course, students will need to have distinguished themselves in the formal work, in other assignments as directed by the Head of School, and in the final year project.

In the undergraduate course it is compulsory for students to gain practical experience in the mining industry during successive long vacations. The minimum requirement is 100 days which must be completed before graduation. The School assists students in securing suitable vacation employment.

Students are required to submit for assessment an industrial training report on the vacation and other relevant experience acquired.

#### Year 1

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| Total | 24 24 |

†Incorporates 7.111, Introduction to Mining Engineering. Visits to mines and related undertakings are a requirement of this subject.

#### Year 2

<table>
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<td>4.972 Materials for Mining Engineers</td>
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<tr>
<td>29.441 Surveying for Engineers</td>
<td>0 6</td>
</tr>
<tr>
<td>29.491 Survey Camp</td>
<td>0 0</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>2 2</td>
</tr>
</tbody>
</table>

| Total | 23 26 |

†Visits to mines and related undertakings are a requirement of this subject.

‡Includes two compulsory field tutorials.

#### Year 3

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.113 Mining Methods†</td>
<td>2 2</td>
</tr>
<tr>
<td>7.123 Geomechanics</td>
<td>4 4</td>
</tr>
<tr>
<td>7.133 Mine Transport</td>
<td>0 2½</td>
</tr>
<tr>
<td>7.143 Mine Environment and Safety Engineering†</td>
<td>3½ 3½ 0 2 2</td>
</tr>
<tr>
<td>7.153 Power Supply in Mines</td>
<td>2½ 0</td>
</tr>
<tr>
<td>7.163 Excavation Engineering</td>
<td>2 2</td>
</tr>
<tr>
<td>7.173 Computer Applications in Mining</td>
<td>2 2</td>
</tr>
<tr>
<td>7.213 Mine Surveying</td>
<td>2 0</td>
</tr>
<tr>
<td>7.313 Minerals Engineering</td>
<td>3 3</td>
</tr>
<tr>
<td>Processes</td>
<td></td>
</tr>
<tr>
<td>25.530 Geology for Mining Engineers II</td>
<td>4 4</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>2 2</td>
</tr>
</tbody>
</table>

| Total | 27 25 |

†Visits to mines and related undertakings are a requirement of this subject.

‡Includes field training in mine-rescue and recovery.

§A geology field excursion is held at the end of Session 1.
present and future technological requirements of the textile and allied industries. Since present-day textile technology is based on engineering and the fundamental sciences, excellent opportunities also await university-trained scientists and technologists in research and development organizations. Such scientists and technologists will play a decisive part in bridging the gap which exists between fundamental research and its industrial application.

Students are given the opportunity of choosing from four courses, viz. Textile Chemistry, Textile Physics, Textile Engineering and Textile Manufacture. The course in Textile Manufacture, which includes subjects in Commerce, is especially designed to meet the need for executives in industry who have been given a comprehensive technological training. Each course extends over four years. All students take a common first year, and they need not choose the option they desire to follow until the end of that year. The aim of all four courses is to produce graduates who have acquired a comprehensive knowledge of all the textile sciences and technologies, the courses themselves differing only in the subjects offered outside the School in Years 2 and 3. Students are normally required to undertake twelve weeks' industrial training during the long recesses between Years 2 and 3, and 3 and 4.

General Studies Electives

For details of changes in the General Studies requirements refer to the table earlier in this section.

---

**School of Textile Technology**

**Head of School**
Professor M. Chaikin

**Senior Administrative Officer (Faculty)**
Mr R. F. Starr

The conversion of textile raw materials into their finished products is simply a succession of and an interaction between, a number of chemical, physical and engineering processes. Graduates with a good background in physics, chemistry or engineering, and with a broad training in the range of textile sciences and technologies, as provided in the courses in Textile Technology, will substantially meet the

---

### 3170 Textile Technology — Full-time Course

**Bachelor of Science BSc**

<table>
<thead>
<tr>
<th>Year 1 (All courses)</th>
<th>Hours per week</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
</tr>
<tr>
<td>1.001 Physics I† or</td>
<td>6</td>
</tr>
<tr>
<td>1.011 Higher Physics I</td>
<td>6</td>
</tr>
<tr>
<td>2.121 Chemistry IA</td>
<td>6</td>
</tr>
<tr>
<td>2.131 Chemistry IB</td>
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<tr>
<td>5.010 Engineering A</td>
<td>6</td>
</tr>
<tr>
<td>6.611 Computing I</td>
<td>6</td>
</tr>
<tr>
<td>10.001 Mathematics I or</td>
<td>6</td>
</tr>
<tr>
<td>10.011 Higher Mathematics I</td>
<td>6</td>
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</table>

†Students who do not qualify for entry into 1.001 Physics I, may be allowed, at the discretion of the Head of the School, to substitute 1.021 Introductory Physics I. Such students will be ineligible to proceed to the Textile Physics course.
### Undergraduate Study: Course Outlines

#### Textile Chemistry

**Year 2**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<th>S2</th>
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<tbody>
<tr>
<td>2.002A</td>
<td>Physical Chemistry</td>
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<tr>
<td>2.002B</td>
<td>Organic Chemistry</td>
<td>2</td>
<td>4</td>
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<tr>
<td>2.002D</td>
<td>Analytical Chemistry</td>
<td>6</td>
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<tr>
<td>10.031</td>
<td>Mathematics</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>10.301</td>
<td>Statistics SA</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>13.111</td>
<td>Textile Technology I</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>13.211</td>
<td>Textile Science I</td>
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**General Studies Elective**

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<tr>
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#### Textile Engineering

**Year 2**

<table>
<thead>
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<tr>
<td>5.0201</td>
<td>Engineering Dynamics IA</td>
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<td>0</td>
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<tr>
<td>5.0301</td>
<td>Engineering Drawing</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5.300</td>
<td>Engineering Dynamics IB</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>7.132</td>
<td>Fluid Mechanics and Machines</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.112</td>
<td>Structures</td>
<td>3</td>
<td>0</td>
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<tr>
<td>10.022</td>
<td>Engineering Mathematics II</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>10.301</td>
<td>Statistics SA</td>
<td>2</td>
<td>2</td>
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<tr>
<td>13.111</td>
<td>Textile Technology I</td>
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<tr>
<td>13.211</td>
<td>Textile Science I</td>
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**General Studies Elective**

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<tbody>
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#### Textile Physics

**Year 2**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>1.002</td>
<td>Mechanics, Waves and Optics</td>
<td>4</td>
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<tr>
<td>1.012</td>
<td>Electromagnetism and Thermal Physics</td>
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<td>1.022</td>
<td>Modern Physics</td>
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<tr>
<td>10.1113</td>
<td>Multivariable Calculus</td>
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<td>Vector Calculus</td>
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<tr>
<td>10.2112</td>
<td>Mathematical Methods for Differential Equations</td>
<td>0</td>
<td>2½</td>
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<td>10.301</td>
<td>Statistics SA</td>
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<td>2</td>
</tr>
<tr>
<td>13.111</td>
<td>Textile Technology I</td>
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<tr>
<td>13.211</td>
<td>Textile Science I</td>
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**General Studies Elective**

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<tbody>
<tr>
<td><strong>Total</strong></td>
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<td>23½</td>
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#### Textile Manufacture

**Year 2**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<th>S2</th>
</tr>
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<tbody>
<tr>
<td>10.301</td>
<td>Statistics SA</td>
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<td>2</td>
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<tr>
<td>13.111</td>
<td>Textile Technology I</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>13.211</td>
<td>Textile Science I</td>
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<tr>
<td>14.501</td>
<td>Accounting and Financial Management IA</td>
<td>4½</td>
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<tr>
<td>14.511</td>
<td>Accounting and Financial Management IB</td>
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<td>15.001</td>
<td>Microeconomics I</td>
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<tr>
<td>15.011</td>
<td>Macroeconomics I</td>
<td>0</td>
<td>3½</td>
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</table>

**General Studies Elective**

<table>
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<tr>
<th></th>
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<th>2</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>23</td>
<td>23</td>
</tr>
</tbody>
</table>
Farming has advanced technologically in recent years, however innovations are continually being sought to increase productivity, raise quality and improve marketing of rural products within the framework of local and international economics. There is a continual need for the feeding and clothing of mankind on a planet with finite mineral and fuel resources. This challenge must be balanced with the need for conservation and careful manipulation of a pool of renewable resources. Wool and pastoral scientists are required to research, communicate and administer the changes which are occurring.

The School of Wool and Pastoral Sciences offers a full-time course of four years duration leading to the award of a Bachelor of Science degree at either Honours or Pass level. The course is the only one in Australia in which special emphasis is given to wool science. In addition, studies concentrate on the most important animal industries (sheep and cattle).

Students receive a thorough grounding in the appropriate basic scientific disciplines as well as the theory and application of principles which are relevant to all aspects of pastoral production, including production and utilization of pastures: reproduction, nutrition, health, genetic improvement, ecology and management of grazing animals and the production, preparation for sale and specification of wool and meat. The course also includes study of the design and interpretation of experimental investigations, economics and business management as well as elective options on crop production, rangeland management and rural communications. Relevant subjects offered by other schools may also be included. An important component is the final year project whereby students engage in an area of personal research on a theoretical or experimental topic on which they are required to submit a thesis.

The course provides students with a broad overview of the pastoral industries. It aims to produce generalists rather than specialists and, although there is some scope for studying topics of special interest, the course is designed so that certain core subjects must be undertaken. Because of the broad education received, graduates are equipped for a wide variety of careers in and associated with agricultural production including research, advisory work, education, marketing, management and administration. Graduates are eligible for corporate membership of the Australian Institute of Agricultural Science.

The School also offers a course requiring one year of full-time or two years of part-time study leading to the award of the Graduate Diploma in Wool and Pastoral Sciences. Research may also be undertaken for the award of the degrees of Master of Science and Doctor of Philosophy.

**Industrial Training Requirements**

1. Students are required to obtain twenty-four weeks practical experience on commercial properties. At least twenty weeks of experience must be obtained concurrently with the course, while up to four weeks may be allowed for practical experience obtained immediately prior to the commencement of the course.

2. Students are encouraged to obtain experience in a diversity of pastoral enterprises, ie cattle, sheep and cropping, in different climatic zones.

3. A maximum of eight weeks shall be allowed for practical experience on any one property, including home properties. Up to eight weeks employment at research or teaching institutions is allowed towards the industrial training requirement.
In order to obtain recognition for practical work carried out, students shall, within six weeks of the commencement of the session immediately following the period of employment:

(1) Submit written evidence from the owner/manager of the property or the director of the institution as to the length of employment.

(2) Submit a written report along the guidelines which are available from the School.

General Studies Electives

For details of changes in the General Studies requirements refer to the table earlier in this section.

<table>
<thead>
<tr>
<th>Year 3</th>
<th>Hpw</th>
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<tbody>
<tr>
<td>9.131</td>
<td>Animal Health I</td>
</tr>
<tr>
<td>9.202</td>
<td>Pastoral Agronomy</td>
</tr>
<tr>
<td>9.301</td>
<td>Agricultural Economics and Management I</td>
</tr>
<tr>
<td>9.421</td>
<td>Animal Nutrition</td>
</tr>
<tr>
<td>9.801</td>
<td>Genetics I</td>
</tr>
<tr>
<td>41.101</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>2 4</td>
</tr>
</tbody>
</table>

Plus at least one subject chosen from the list of optional subjects in each session. The choice is to be approved by the Head of School.

Year 4

| 9.001  | Project | 6 6 |
| 9.002  | Seminar | 1 1 |
| General Studies Elective | 2 0 |

Plus subjects providing at least 15 hours per week of lectures, tutorials and laboratory classes per session, chosen from the list of optional subjects. A minimum of 2 subjects in each session must be chosen from subjects in Group A. The choice of subjects is to be approved by the Head of School who may vary the requirements in special circumstances.

Optional subjects

<table>
<thead>
<tr>
<th>Group A</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.113</td>
<td>Livestock Production III</td>
</tr>
<tr>
<td>9.132</td>
<td>Animal Health II</td>
</tr>
<tr>
<td>9.204</td>
<td>Range Management†</td>
</tr>
<tr>
<td>9.503</td>
<td>Wool Science III</td>
</tr>
<tr>
<td>9.802</td>
<td>Genetics II</td>
</tr>
<tr>
<td>9.811</td>
<td>Biostatistics I</td>
</tr>
<tr>
<td>9.812</td>
<td>Biostatistics II</td>
</tr>
</tbody>
</table>

*One week of instruction at Fowlers Gap Research Station is an essential part of this course.

<table>
<thead>
<tr>
<th>Group B</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.112</td>
<td>Livestock Production II</td>
</tr>
<tr>
<td>9.203</td>
<td>Crop Agronomy†</td>
</tr>
<tr>
<td>9.302</td>
<td>Agricultural Economics and Management II</td>
</tr>
<tr>
<td>9.412</td>
<td>Agricultural Chemistry II</td>
</tr>
<tr>
<td>9.502</td>
<td>Wool Science II</td>
</tr>
<tr>
<td>9.602</td>
<td>Animal Physiology II</td>
</tr>
<tr>
<td>9.901</td>
<td>Rural Extension</td>
</tr>
<tr>
<td>28.012</td>
<td>Marketing Systems</td>
</tr>
<tr>
<td>28.052</td>
<td>Marketing Research</td>
</tr>
<tr>
<td>41.111</td>
<td>Biochemical Control</td>
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<tr>
<td>43.121</td>
<td>Plant Physiology</td>
</tr>
<tr>
<td>43.142</td>
<td>Environmental Botany</td>
</tr>
<tr>
<td>44.101</td>
<td>Introductory Microbiology*</td>
</tr>
</tbody>
</table>

†Range Management and Crop Agronomy are offered in alternate years.

*A 4 day field excursion is an essential part of the subject.

*Students should note the special proviso for enrolment in this subject as indicated in the Subject Descriptions later in this handbook.
Graduate Study

Graduate Enrolment Procedures

All students enrolling in graduate courses should obtain a copy of the free booklet *Enrolment Procedures 1984* available from School Offices and the Admissions Office. This booklet provides detailed information on enrolment procedures and fees, enrolment timetables by faculty and course, enrolment in miscellaneous subjects, locations and hours of Cashiers and late enrolments.

Graduate Study

The Faculty provides facilities for students to proceed to the award of the higher degrees of Doctor of Philosophy, Master of Engineering, Master of Science, Master of Applied Science, and Master of Environmental Studies. Courses leading to the award of a Graduate Diploma are also offered. The degree of Doctor of Science is awarded for a contribution of distinguished merit in the fields of science, engineering or applied science.

The degrees of Doctor of Philosophy, Master of Engineering and Master of Science are all awarded for research and require the preparation and submission of a thesis embodying the results of an original investigation or design. Candidates for the Doctorate of Philosophy may read for the degree in this Faculty and are normally involved in three years work. The work for the award of a Master’s degree may be completed in a minimum of one year, but normally requires two years of study.

The Faculty offers courses leading to the award of the degree of Master of Applied Science. The institution of this degree springs from the recognition of the considerable advance of knowledge in the fields of applied science and engineering which has marked recent years and the consequent increased scope for advanced formal instruction in these fields. Students are usually in attendance at the University for one year on a full-time basis, or for two years part-time.

The Faculty offers a course leading to the award of the degree of Master of Environmental Studies. This is an interdisciplinary course designed to study the nature of environmental problems and the evaluation methodology. Students are usually in attendance at the University for one year on a full-time basis or for two years part-time.

Courses are also offered at the graduate level leading to the award of a Graduate Diploma. Students are required to attend courses of study for one year full-time or two years part-time. The courses available for the Graduate Diploma are Arid Lands Management, Corrosion Technology, Food Technology, Mining and Mineral Engineering and Wool Technology.

Courses leading to the award of the degree of Master of Applied Science and of Graduate Diplomas are available at Kensington only. Candidates may register for all the research degrees at Kensington subject to adequate research facilities and satisfactory supervision being available in the candidate's particular field of study. Where these special conditions can be met the Professorial Board may grant permission to a candidate to register for the degree of Doctor of Philosophy in these centres.
The conditions governing the award of the various higher degrees and graduate diplomas are set out later in this handbook in Conditions for the Award of Higher Degrees.

Short, intensive graduate and special courses are provided throughout each year designed to keep practising scientists and technologists in touch with the latest developments in their various fields.

Faculty of Applied Science

Graduate Programs in Arid Lands Management

General

The University has considerable experience of research and teaching relating to the management of arid environments, gained over many years by several of its schools. This experience is being mobilized in the provision of graduate programs based at the University campus in Kensington, Sydney, but includes significant field studies using the resources at Fowlers Gap Arid Zone Research Station in western New South Wales.

The programs include the following areas of study:

- Hydrogeology
- Land Evaluation
- Terrain Management
- Soil Conservation
- Range Management
- Management of Pastoral Enterprises

For most of the above study areas, programs are available leading to the award of:

Master of Applied Science in Arid Land Management by Course Work Course 8025
Graduate Diploma in Arid Lands Management Course 5025

Hydrogeology

These programs involve training in groundwater investigations, including geophysical investigations, and the assessment, development and utilization of groundwater resources. They are suited to geologists, engineers, agricultural scientists, planners and resource managers.

Land Evaluation and Terrain Management

These programs are designed to provide graduate training in the evaluation of land management and in the prediction of the environmental impact of land use. They include the two sectors of land evaluation and terrain management, with a close relationship reflected in overlapping core programs. Terrain management also embraces geopollution management, with reference to groundwater and hydrological processes. Terrain evaluation is envisaged as serving a wide range of land management, including agricultural and biological management.

Soil Conservation

These programs are designed to provide graduate training in soil conservation for land management in arid zones. They are appropriate for personnel engaged in or preparing for positions in conservation or reclamation projects, agricultural advisory services, land-use planning, administration of pastoral lands, or research into problems of arid land management.

Range Management

These programs are designed to provide graduate training in the assessment and management of rangelands, and are also relevant to animal production and soil conservation, national parks and wildlife management, and land evaluation. They are appropriate for personnel engaged in or preparing for positions in project management, pastoral advisory services, and rangeland research or administration.

Management of Pastoral Enterprises

These programs are designed to provide graduate training in the production and management of grazing sheep and beef cattle, the production of pasture, range management, and in the economic management of pastoral enterprises.

8025
Arid Lands Management Graduate Course

Master of Applied Science MAppSc

Hydrogeology

Prerequisite: Four-year degree of appropriate standard in geology or in a relevant science.

Compulsory Subject
25.915G Project in Hydrogeology or 25.916G Research Project in Hydrogeology

Recommended Core Subjects
8.842G Groundwater Hydrology
8.860G Investigation of Groundwater Resources I
8.861G Investigation of Groundwater Resources II
25.325 Engineering and Environmental Geology
25.411G Arid Zone Engineering Geology
25.413 Engineering and Environmental Resources
Candidates must also include additional subjects selected from core subjects in other programs in Water Resources, or from the listed optional subjects, or from other relevant subjects offered within the University, as approved by the Head of the School of Applied Geology and the Heads of the other Schools concerned, to complete a program equivalent to an average of 20 hours per week for two sessions of full-time study.

Optional Subjects

- 8.701G Economic Decision Making in Civil Engineering
- 8.703G Optimization Techniques in Civil Engineering
- 8.833G Free Surface Flow
- 8.839G Advanced Flood Estimation
- 8.843G Groundwater Hydraulics
- 8.847G Water Resources Policy
- 8.848G Water Resources System Design
- 8.849G Irrigation
- 8.850G Drainage of Agricultural Land
- 27.043G Remote Sensing Applications
- 27.171G Directed Problems in Remote Sensing
- 27.174G Remote Sensing Instrumentation and Satellite Programs
- 27.914G Terrain Evaluation
- 27.913G Soil Studies for Arid Lands Management
- 27.911G Soil Erosion and Conservation
- 27.918G Research Project in Soil Conservation
- 27.917G Project in Soil Conservation or
- 29.601G Remote Sensing Principles and Procedures
- 29.604G Land Information Systems

*Includes a field exercise of at least three days duration at Fowlers Gap Research Station.

Land Evaluation

Prerequisite: Four-year degree of appropriate standard in physical geography, or in a relevant environmental, biological or agricultural science.

Compulsory Subjects†

- 27.910G Geomorphology of Arid Lands
- 27.913G Soil Studies for Arid Lands Management
- 27.914G Terrain Evaluation
- 27.915G Project in Land Evaluation or
- 27.916G Research Project in Land Evaluation

Candidates must also include additional subjects selected from the following listed optional subjects, or from other relevant subjects offered within the University, as approved by the Head of the School of Geography and Heads of the other Schools concerned, to complete a program equivalent to an average of 20 hours per week for two sessions of full-time study.

Optional Subjects

- 9.205G Range Management†
- 25.411G Arid Zone Engineering Geology*
- 27.043G Remote Sensing Applications
- 27.171G Directed Problems in Remote Sensing
- 27.174G Remote Sensing Instrumentation and Satellite Programs
- 27.911G Soil Erosion and Conservation
- 27.912G Arid Zone Climatology
- 29.601G Remote Sensing Principles and Procedures
- 29.604G Land Information Systems

45.900G Ecological Studies in Arid Lands Management

†Compulsory subjects jointly include one week of fieldwork, probably at Fowlers Gap Research Station.

Terrain Management

Prerequisite: Four-year degree of appropriate standard in geology or physical geography, or in a relevant environmental, biological or agricultural science.

Compulsory Subjectst

- 25.402G Hydrogeology
- 25.407G Geopolllution Management
- 25.411G Arid Zone Engineering Geology*
- 25.412G Project in Terrain Management or
- 25.413G Research Project in Terrain Management
- 27.910G Geomorphology of Arid Lands
- 27.914G Terrain Evaluation

Candidates must also include additional subjects selected from the following listed optional subjects, or from other relevant subjects offered within the University, as approved by the Head of the School of Applied Geology and Heads of the other Schools concerned, to complete a program equivalent to an average of 20 hours per week for two sessions of full-time study.

Optional Subjects

- 8.837G Hydrological Processes
- 27.043G Remote Sensing Applications
- 27.171G Directed Problems in Remote Sensing
- 27.174G Remote Sensing Instrumentation and Satellite Programs
- 27.911G Soil Erosion and Conservation
- 27.913G Soil Studies for Arid Lands Management
- 29.601G Remote Sensing Principles and Procedures
- 29.604G Land Information Systems

*Includes a field exercise of at least three days duration at Fowlers Gap Research Station.

Soil Conservation

Prerequisite: Four-year degree of appropriate standard in physical geography or agricultural science, or in a relevant earth science or biological science.

Compulsory Subjectst

- 27.910G Geomorphology of Arid Lands
- 27.911G Soil Erosion and Conservation
- 27.913G Soil Studies for Arid Lands Management
- 27.917G Project in Soil Conservation or
- 27.918G Research Project in Soil Conservation

Candidates must also include additional subjects selected from the following listed optional subjects, or from other relevant subjects offered within the University, as approved by the Head of the School of Geography and Heads of the other Schools concerned, to complete a program equivalent to an average of 20 hours per week for two sessions of full-time study.
Optional Subjects
8.864G Arid Zone Surface Water Hydrology§
8.865G Arid Zone Water Resources Management
9.205G Range Management‡
25.411G Arid Zone Engineering Geology*
27.043G Remote Sensing Applications
27.171G Directed Problems in Remote Sensing
27.174G Remote Sensing Instrumentation and Satellite Programs
27.912G Arid Zone Climatology
27.914G Terrain Evaluation
29.601G Remote Sensing Principles and Procedures
29.604G Land Information Systems
45.900G Ecological Studies in Arid Lands Management
§Co-requisites 8.837G Hydrological Processes

5025
Arid Lands Management
Graduate Diploma Course
Graduate Diploma
GradDip

Hydrogeology
Prerequisite: Degree in engineering or geology or in a relevant science.

Recommended Core Subjects
As for 8025 MAppSc degree Hydrogeology strand (see earlier this section).

Candidates must also include additional subjects selected from core subjects in other programs in Water Resources, or from the listed optional subjects, or from other relevant subjects offered within the University, as approved by the Head of the School of Applied Geology and Heads of the other Schools concerned, to complete a program equivalent to an average of 18 hours per week for two sessions of full-time study.

Optional Subjects
As for 8025 MAppSc degree Hydrogeology strand (see earlier this section).

Land Evaluation
Prerequisite: Degree in physical geography or geology, or in a relevant environmental, biological or agricultural science.

Compulsory Subjects‡
27.910G Geomorphology of Arid Lands
27.913G Soil Studies for Arid Lands Management
27.914G Terrain Evaluation
27.915G Project in Land Evaluation

Candidates must also include additional subjects selected from the following listed optional subjects, or from other relevant subjects offered within the University, as approved by the Head of the School of Geography and Heads of the other Schools concerned, to complete a program equivalent to an average of 18 hours per week for two sessions of full-time study.

Optional Subjects
9.205G Range Management‡
25.411G Arid Zone Engineering Geology*
27.043G Remote Sensing Applications
27.171G Directed Problems in Remote Sensing
27.174G Remote Sensing Instrumentation and Satellite Programs
27.911G Soil Erosion and Conservation
27.912G Arid Zone Climatology
29.601G Remote Sensing Principles and Procedures
29.604G Land Information Systems
45.900G Ecological Studies in Arid Lands Management

‡Compulsory subjects jointly include one week of fieldwork, probably at Fowlers Gap Research Station.
*Includes a field exercise of at least three days duration at Fowlers Gap Research Station.

Terrain Management
Prerequisite: Degree in geology or physical geography, or in a relevant environmental, biological or agricultural science.

Compulsory Subjects‡
25.411G Arid Zone Engineering Geology*
25.412G Project in Terrain Management
27.910G Geomorphology of Arid Lands
27.914G Terrain Evaluation

Candidates must also include additional subjects selected from the following listed optional subjects, or from other relevant subjects offered within the University, as approved by the Head of the School of Applied Geology and Heads of the other Schools concerned, to complete a program equivalent to an average of 18 hours per week for two sessions of full-time study.

Optional Subjects
8.837G Hydrological Processes
25.402G Hydrogeology
25.407G Geopollution Management
27.043G Remote Sensing Applications
27.171G Directed Problems in Remote Sensing
27.174G Remote Sensing Instrumentation and Satellite Programs
27.911G Soil Erosion and Conservation
27.913G Soil Studies for Arid Lands Management
29.601G Remote Sensing Principles and Procedures
29.604G Land Information Systems

‡Compulsory subjects jointly include one week of fieldwork, probably at Fowlers Gap Research Station.
*Includes a field exercise of at least three days duration at Fowlers Gap Research Station.
Soil Conservation

Prerequisite: Degree in physical geography or agricultural science, or in a relevant earth science or biological science.

Compulsory Subjects†
27.910G Geomorphology of Arid Lands
27.911G Soil Erosion and Conservation
27.913G Soil Studies for Arid Lands Management
27.917G Project in Soil Conservation.

Candidates must also include additional subjects selected from the following listed optional subjects, or from other relevant subjects offered within the University, as approved by the Head of the School of Geography and Heads of the other Schools concerned, to complete a program equivalent to an average of 18 hours per week for two sessions of full-time study.

Optional Subjects
8.865G Arid Zone Water Resources Management
9.205G Range Management‡
25.411G Arid Zone Engineering Geology*
27.043G Remote Sensing Applications
27.171G Directed Problems in Remote Sensing
27.174G Remote Sensing Instrumentation and Satellite Programs
27.912G Arid Zone Climatology
27.914G Terrain Evaluation
29.601G Remote Sensing Principles and Procedures
29.604G Land Information System
45.900G Ecological Studies in Arid Lands Management

†Compulsory subjects jointly include one week of fieldwork, probably at Fowlers Gap Research Station.
‡Includes up to one week of fieldwork at Fowlers Gap Research Station.
*Includes a field exercise of at least three days duration at Fowlers Gap Research Station.

Management of Pastoral Enterprises

Prerequisite: Degree in veterinary or agricultural science, or in a relevant biological science.

Recommended Subjects
9.105G Livestock Production
9.205G Range Management‡

Candidates must also include additional subjects selected from the following listed optional subjects, or from other relevant subjects offered within the University, as approved by the Head of the School of Wool and Pastoral Sciences and Heads of the other Schools concerned, to complete a program equivalent to an average of 18 hours per week for two sessions of full-time study.

Optional Subjects
9.001 Project in Management of Pastoral Enterprises
9.113 Livestock Production III
9.131 Animal Health I
9.132 Animal Health II
9.202 Pastoral Agronomy
9.301 Agricultural Economics and Management I
9.302 Agricultural Economics and Management II
9.421 Animal Nutrition
9.503 Wool Science III
9.504G Wool Science
9.602 Physiology II
9.802 Genetics II
9.803G Animal Breeding
9.811 Biostatistics I
9.812 Biostatistics II
9.813G Quantitative Methods
9.901 Rural Extension
45.122 Animal Behaviour
45.900G Ecological Studies in Arid Lands Management

‡Includes up to one week of fieldwork at Fowlers Gap Research Station.

Graduate Programs in Remote Sensing

Programs are available leading to the award of:

Master of Applied Science in Remote Sensing Course 8026
Graduate Diploma in Remote Sensing Course 5026
Graduate Study

Remote Sensing Graduate Course

Master of Applied Science
MAppSc

The masters degree program in Remote Sensing is offered in both the Faculty of Applied Science and the Faculty of Engineering. Entry into either Faculty depends on the background of the applicant and the orientation of the proposed program.

Entry qualifications: Four-year degree of appropriate standard in engineering, physical geography, geology, surveying, or in a relevant environmental biological or agricultural science.

Course requirements: Candidates are required to complete a course totalling at least 36 credits, made up of compulsory subjects, elective subjects and a project or research project. Compulsory subjects not offered in a particular year may be substituted by an equivalent subject, approved by the appropriate Head of School. The degree will normally comprise one year of full-time study (two sessions of 18 credits) or two years of part-time study (four sessions of 9 credits each).

Candidates who are not exempted from any of the compulsory subjects and who opt for the Research Project (18 credits), will achieve the required 36 credits without any elective subjects.

Compulsory Subjects

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.580G Image Analysis in Remote Sensing</td>
<td>3</td>
</tr>
<tr>
<td>6.587G Computer Techniques in Remote Sensing</td>
<td>3</td>
</tr>
<tr>
<td>27.043G Remote Sensing Applications</td>
<td>3</td>
</tr>
<tr>
<td>29.601G Remote Sensing Principles and Procedures*</td>
<td>6</td>
</tr>
<tr>
<td>29.605G Ground Investigations for Remote Sensing</td>
<td>3</td>
</tr>
</tbody>
</table>

*Includes Group Practical Exercises in Remote Sensing, C3.

Project

<table>
<thead>
<tr>
<th>Project</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>46.101G Project in Remote Sensing</td>
<td>9</td>
</tr>
<tr>
<td>46.102G Research Project in Remote Sensing</td>
<td>18</td>
</tr>
</tbody>
</table>

Elective Subjects

Candidates are required to include additional subjects selected from the following listed elective subjects, or from other relevant subjects offered within the University, as approved by the appropriate Head of School, to complete a program totalling 36 credits.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.458G Decision and Syntactic Systems for Digital Pattern Recognition</td>
<td>3</td>
</tr>
<tr>
<td>6.468G Computer Display Systems and Interactive Instrumentation</td>
<td>3</td>
</tr>
<tr>
<td>6.611 Computing I</td>
<td>4</td>
</tr>
<tr>
<td>6.621 Computing IIA</td>
<td>3</td>
</tr>
<tr>
<td>25.816G Remote Sensing</td>
<td>2</td>
</tr>
<tr>
<td>27.642 Mathematical Methods for Spatial Analysis</td>
<td>2</td>
</tr>
<tr>
<td>27.643G Geographic Data Analysis</td>
<td>2</td>
</tr>
<tr>
<td>27.672G Geographic Information Systems</td>
<td>2</td>
</tr>
<tr>
<td>27.911G Soil Erosion and Conservation</td>
<td>6</td>
</tr>
<tr>
<td>29.520G Photogrammetric Production Processes</td>
<td>3</td>
</tr>
<tr>
<td>29.604G Land Information Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

Graduate Diploma GradDip

The graduate diploma program in Remote Sensing is offered in both the Faculty of Applied Science and the Faculty of Engineering. Entry into either Faculty depends on the background of the applicant and the orientation of the proposed program.

Entry qualifications: Three-year degree from an approved university and/or qualifications deemed appropriate by the relevant faculty.

Course requirements: Candidates are required to complete a program totalling a minimum of 30 credits or equivalent to 15 hours per week for two sessions of full-time study, made up of compulsory subjects (15 credits) and elective subjects (15 credits). Compulsory subjects not offered in a particular year may be substituted by an approved equivalent subject.

The course will normally comprise one year of full-time study or two years part-time study. One-third of the credits for elective subjects may be from approved undergraduate subjects.

Compulsory Subjects

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.580G Image Analysis in Remote Sensing</td>
<td>3</td>
</tr>
<tr>
<td>29.600G Principles of Remote Sensing</td>
<td>3</td>
</tr>
<tr>
<td>29.605G Ground Investigations for Remote Sensing</td>
<td>3</td>
</tr>
<tr>
<td>27.174G Remote Sensing Instrumentation and Satellite Programs</td>
<td>3</td>
</tr>
<tr>
<td>27.043G Remote Sensing Applications</td>
<td>3</td>
</tr>
</tbody>
</table>

Elective Subjects

From the following (or as approved by the relevant Faculty):

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.458G Decision and Syntactic Systems for Digital Pattern Recognition</td>
<td>3</td>
</tr>
<tr>
<td>6.468G Computer Display Systems and Interactive Instrumentation</td>
<td>3</td>
</tr>
<tr>
<td>6.587G Computing Techniques in Remote Sensing Image Analysis</td>
<td>3</td>
</tr>
<tr>
<td>8.837G Hydrological Processes</td>
<td>3</td>
</tr>
<tr>
<td>8.849G Irrigation</td>
<td>3</td>
</tr>
<tr>
<td>8.861G Investigation of Ground Water Resources II</td>
<td>3</td>
</tr>
<tr>
<td>8.864G Arid Zone Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>8.865G Arid Zone Water Resources Management</td>
<td>3</td>
</tr>
<tr>
<td>25.404G Environmental Geology</td>
<td>3</td>
</tr>
</tbody>
</table>
Applied Science

25.801G Geology in Exploration I
25.816G Remote Sensing (in Applied Geology)
25.821G Geology in Exploration II
27.171G Directed Problems in Remote Sensing
27.672G Geographic Information Systems
27.914G Terrain Evaluation
29.205G Satellite Geodesy
29.207G Doppler Positioning
29.520G Photogrammetric Production Processes
29.604G Land Information Systems

Graduate Program in Environmental Studies

8045
Master of Environmental Studies
MEnvStudies

This is an interdisciplinary course designed to study the nature of environmental problems and the methodology of evaluation. Emphasis is placed on the development of relevant skills in environmental analysis, management and planning.

The subject matter covers a set of themes: resource use and conservation, pollution abatement, hazard perception and adjustment. Strong attention will be given to environmental impact assessment and conflict resolution.

The course is designed around three broad components for a minimum of 40 credits (1 credit = 1 hour per week per one session):

• Core subjects (10 credits)
• Project (20 credits)
• Electives (10 credits)

The core subjects and electives will consist of subjects specially designed together with appropriate subjects taken from those offered by a number of Faculties and Boards of Studies within the University of New South Wales. Prerequisites shall be determined by the relevant Subject Authority.

Core Subjects

27.202G Environmental Planning and Evaluation 3
36.945G The Organization of Town Planning 2
46.201G Themes in Environmental Studies 3
46.203G Medical Aspects 1
46.204G Legislative Aspects 1

Project

46.200G Project 20

Elective Subjects

Earth Science — Engineering

8.021G Environmental Aspects of Civil Engineering 3
8.847G Water Resources Policy 3
25.704G Environmental Geology 3
25.707G Geopolllination Management 3
25.710G Coastal Environmental Geology 3
27.043G Remote Sensing Applications 3
27.133G Pedology 5
27.171G Directed Problems in Remote Sensing 3
27.174G Remote Sensing Instrumentation and Satellite Programs 3
27.183G Geomorphology 5
27.902G Meteorological and Hydrological Principles 3

Chemistry — Biology

2.043A Environmental Chemistry 6
2.251G Toxicology, Occupational and Public Health 6
9.424G Minerals and Their Effects on Grazing Animals 2
27.143G Biogeography 5
27.153G Climatology 5
42.212G Principles of Biochemistry 3
43.142G Ecology and Environmental Botany 6
48.063G Industrial Water and Wastewater Engineering 3
48.386G Unit Operations in Waste Management 3
48.391G Atmospheric Pollution Control 3
48.392G Practical Aspects of Air Pollution Measurement and Control 3

Social-Economic-Planning

8.402G Transport, Environment, Community 6
8.403G Theory of Land Use/Transport Interaction 3
30.935G Organization Behaviour A 3
30.958G Organizational Communications 3
30.960G Technology and Organizations 3
36.311G Environmental Psychology 4
37.301G Environmental Impact Assessment I 2
37.3016 Environmental Impact Assessment II 2
37.581G Land Systems 3
37.5817 Land Management 2
37.7116 Landscape Planning 3
37.7145 Landscape Planning I 3
37.7146 Landscape Planning II 2
39.908G Community Noise Control 2
85.716G Public Policy 3
85.721G Economics of Natural Resources 2

School of Applied Geology

8020
Engineering Geology-Hydrogeology-Environmental Geology Course

Master of Applied Science
MAppSc

The course consists of a Project (Group A) and six subjects chosen from Group B, at least one of which must be 25.702G Hydrogeology, 25.704G Environmental Geology, or 25.708G Engineering Geology. In special cases, eg where students have achieved a satisfactory standard in Geomechanics, those students taking 25.708G Engineering Geology and/or 25.714G Geology of Foundations, may select in place of 25.706G either another subject from Group B, or one subject from another Faculty, provided such a subject is relevant to the course.
The Project normally consists of field and laboratory work, and is related to the student's major interest. Students must consult the Professor of Engineering Geology for approval of the Project.

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.703G Project (Engineering Geology Graduate Course)</td>
<td>0</td>
<td>18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group B</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>25.702G Hydrogeology</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>25.704G Environmental Geology</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>25.705G Engineering Geophysics</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>25.706G Geological Basis of Geomechanics</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>25.707G Geopollution Management</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>25.708G Engineering Geology</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>25.710G Coastal Environmental Geology</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>25.714G Geology of Foundations</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>27.904G Geomorphology for Engineering Geologists</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

**Unit A (Weeks 1-7 Session 1)**

- 25.800G Seminar
- 25.801G Geology in Exploration I
- 25.802G General Introduction to Exploration Geophysics
- 25.803G Introduction to Exploration Geochemistry
- 25.804G Introduction to Data Processing and Interpretation
- 25.805G Resource Economics I
- 25.807G Exploration Geophysics
- 25.808G Exploration Project
- 7.013* Principles of Mining
- 7.044* Mining Economics

Seven days of field tutorials are an integral part of Unit A.

*These are one session subjects, ie weeks 1-14.

**Unit B (Weeks 8-14 Session 1)**

- 25.811G Advanced Geology in Exploration
- 25.815G Resource Economics II
- 25.816G Remote Sensing
- 25.817G Mining Law and Exploration Management
- 25.840G Seminar
- 7.001G Exploration Drilling
- 7.013* Principles of Mining
- 7.044* Mining Economics

*These are one session subjects, ie weeks 1-14.

**Unit C (Session 2)**

- 25.819G Field — Laboratory Project

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**8091**

**Mineral Exploration Graduate Course**

**Master of Applied Science MAppSc**

The course is designed to give broad training in techniques of modern mineral exploration to geologists and mining engineers. Practical aspects are emphasized and the field-laboratory project is oriented to current problems of mineral exploration.

The duration of the course is one academic year of full-time study; the course is, however, divided into three units to facilitate part-time study. All students must complete Units A, B and C. Formal course work (Units A and B) accounts for 20-22 hours per week during Session 1. Some students (depending on their qualifications) may be required to take a Special Project, 25.000G, either as a pre- or co-requisite. The courses within the three units may be varied at the discretion of the Head of the School to suit the requirements of individual students.

**8092**

**Exploration Geophysics Graduate Course**

**Master of Applied Science MAppSc**

This is a specialized course in the techniques of exploration geophysics relevant to the current needs of the exploration industry. Practical applications are emphasized, and the field-laboratory project is designed to investigate aspects of specific exploration problems.

The duration of the course is one academic year full-time study; the course is, however, divided into three units to facilitate part-time study. All students must complete Units A, B and C. Formal course work (Units A and B) accounts for 20-22 hours per week during Session 1. Some students (depending on their qualifications) may be required to...
take a Special Project 25.000G. either as a pre- or co-
requisite. The courses within the three units may be varied at
the discretion of the Head of the School to suit the require-
ments of individual students.

Unit A (Weeks 1-7 Session 1)
25.800G Seminar
25.801G Geology in Exploration I
25.802G General Introduction to Exploration Geophysics
25.803G Introduction to Exploration Geochemistry
25.804G Introduction to Data Processing and
Interpretation
25.805G Resource Economics I

and either
7.013* Principles of Mining

or
7.044* Mining Economics

25.807G Exploration Geophysics

Seven days field tutorials are an integral part of Unit A.

Unit B (Weeks 8-14 Session 1)
25.821G Geology in Exploration II
25.823G Advanced Exploration Geochemistry
25.824G Advanced Data Processing and Interpretation
25.827G Laboratory methods
25.840G Seminar

and either
7.013* Principles of Mining

or
7.044* Mining Economics

25.828G Exploration Project

*These are one session subjects, ie weeks 1-14.

Unit C (Session 2)
25.839G Field — Laboratory Project

8093
Exploration Geochemistry Graduate Course

Master of Applied Science
MApSc

This is a specialist course in the techniques of exploration
geochemistry covering general principles, specific field
applications, laboratory techniques, and data display and
interpretation. Practical applications are emphasized and
the field-laboratory project is designed to investigate aspects
of mineral exploration problems.

The duration of the course is one academic year of full-time
study; the course is, however, divided into three units to
facilitate part-time study. All students must complete units A,
B and C. Formal course work (Units A and B) accounts for
20-22 hours per week during Session 1. Some students
(depending upon their qualifications) may be required to
take a Special Project, 25.000G, either as a pre- or co-
requisite. The courses within the three units may be varied at
the discretion of the Head of the School to suit the require-
ments of individual students.

School of Chemical Engineering
and Industrial Chemistry

Formal courses in the School of Chemical Engineering
and Industrial Chemistry lead to the award of the Master of
Applied Science or the Graduate Diploma.

Master of Applied Science Degree Courses

The MApSc degree courses involve a project which must
integrate and apply the principles treated in the course. It
may take the form of a design feasibility study or an experi-
mental investigation. Evidence of initiative and of a high level
of ability and understanding is required in the student's
approach, and the results must be embodied in a report and
submitted in accordance with the University's requirements.
The following graduate courses are available to Master of Applied Science degree course candidates. Candidates may specialize in the following areas:

Bioprocess Engineering  
Chemical Engineering and Industrial Chemistry  
Fuel Technology

The MAppSc degree courses provide for a comprehensive study of theoretical and practical aspects of many advanced topics. The courses are formal and elective in nature and provide an opportunity for graduates to apply their basic skills in fields in which the School has developed special expertise.

The courses specializing in Chemical Engineering and Industrial Chemistry and Fuel Technology are primarily intended for graduates in Applied Science, Engineering, or Science with principal interests in Chemistry, Mathematics and/or Physics. The course specializing in Bioprocess Engineering is primarily intended for graduates in Agriculture, Applied Science, and Science with principal interests in Biochemistry, Chemistry and/or Microbiology. They are designed to allow the maximum flexibility consistent with the standing of the award.

Intending candidates are invited to submit proposed study programs to the Head of the School for advice and recommendation. Each individual course must be approved by the Higher Degree Committee of the Faculty of Applied Science. An acceptable course would be a program of formal study aggregating approximately 20 hours weekly for two sessions full-time or ten hours weekly for four sessions part-time, and which could comprise:

1. A major strand of course material making up 75% of the total program. This includes a project constituting not less than 15% and not more than 30% of the program;
2. A minor strand of broader-based supporting material making up to 25% of the total program; and
3. Undergraduate material (generally designated as subjects without a suffixed G number), which may be included in one or both strands but may not exceed 25% of the total program.

Approximately 60% of the program (including the project) must be undertaken in the School of Chemical Engineering and Industrial Chemistry. The remainder, subject to approval and availability, may be undertaken in other Schools within the University. Full details of all subjects are listed under Disciplines of the University in the Calendar.

8000 Bioprocess Engineering Graduate Courses*

Master of Applied Science
MAppSc

The graduate subjects offered have been utilized to provide maximum flexibility. Any combination of units may be selected, subject to prerequisites or co-requisites as specified. Further, some of these units are designed as bridging material and would not be offered to graduates with previous qualifications in these particular areas.

The units offered are summarized below.

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>48.281G Design of Microbial Reactors</td>
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<tr>
<td>Unit 1 Rate Processes</td>
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<td></td>
</tr>
<tr>
<td>Unit 2 Fundamentals of Microbial Stoichiometry</td>
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</tr>
<tr>
<td>Unit 3 Design of Microbial Reactors</td>
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</tr>
<tr>
<td>48.282G Microbial Kinetics and Energetics</td>
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<td>1</td>
</tr>
<tr>
<td>Unit 1 Microbial Kinetics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit 2 Microbial Energetics</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>48.283G Bioprocess Unit Operations and Equipment Design</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>48.284G Heat, Mass and Momentum Transport</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>48.285G Bioprocess Laboratory</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

This course is designed to provide professional training in the application of chemical engineering principles in the bioprocess industries. It extends over one full-time year or two part-time years and leads to the award of the degree of Master of Applied Science as outlined above.

As the material in this course will be of interest to graduates from a wide range of disciplines, the suggested course outlines consist of a central core selected from the subjects above and a range of background material. This background material can be designed to suit graduates from either of the two groups consisting of firstly Applied Science, Engineering or Science with principal interests in Chemistry, Mathematics, or Physics, or, secondly, Agriculture or Science graduates with principal interests in Biochemistry, Chemistry and/or Microbiology. Graduates with an inadequate background in Mathematics and/or rate processes are required to do a bridging course consisting of a specified reading list with associated assignments up to a maximum of 1 hour per week.

Suggested course outlines for graduates from the two primary areas are given below, however these outlines may be modified to suit individual interests within the general requirements for the MAppSc degree course described above.

**Applied Science Graduate or equivalent**

**Core Subjects**

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>48.281G Unit 3 Design of Microbial Reactors</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>48.282G Microbial Kinetics and Energetics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>48.283G Bioprocess Unit Operations and Equipment Design</td>
<td>2½</td>
<td></td>
</tr>
<tr>
<td>48.285G Bioprocess Laboratory</td>
<td>1½</td>
<td></td>
</tr>
<tr>
<td>48.900G Project</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>
1. Students wishing a more complete coverage of the life sciences may select

- 42.211G Principles of Biology
- 42.212G Principles of Biochemistry
- 44.101 Introductory Microbiology*

(S1 only)

*Students should note the special proviso in this subject as indicated in the Subject Descriptions later in this handbook.

2. Students wishing to reinforce other areas in chemical engineering may select

- 44.101 Introductory Microbiology* 6
- 48.281G Unit 2 — Fundamentals of Microbial Stoichiometry ½
- plus other elective material 3

*Students should note the special proviso in this subject as indicated in the Subject Descriptions later in this handbook.

Science Graduate with a principal interest in the Life Sciences or equivalent

Core Subjects

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>48.281G Unit 1 Rate Processes</td>
<td>½</td>
</tr>
<tr>
<td>48.282G Microbial Kinetics and Energetics</td>
<td>1</td>
</tr>
<tr>
<td>48.283G Bioprocess Unit Operations and Equipment Design</td>
<td>3</td>
</tr>
<tr>
<td>48.284G Heat, Mass and Momentum Transport</td>
<td>2½</td>
</tr>
<tr>
<td>48.900G Project</td>
<td>6</td>
</tr>
</tbody>
</table>

Plus 6 hours of other material, for example:

- 48.063G Industrial Water and Wastewater Engineering 2
- 38.159G Food Process Wastes ½
- 48.396G Unit Operations in Waste Management 1½
- Reading List (Mathematics) 1

8005 Chemical Technology Graduate Course*

Master of Applied Science
MAppSc

8010 Chemical Engineering Graduate Course*

Master of Applied Science
MAppSc

8040 Environmental Pollution Control Graduate Course*

Master of Applied Science
MAppSc

These courses have been discontinued. Continuing students should refer to the 1982 Applied Science Handbook for details.

8060 Fuel Technology Graduate Course*

Master of Applied Science
MAppSc

This is a formal course leading to the award of the degree of Master of Applied Science. It is a two-year part-time course designed to provide professional training and specialization in fuel science or fuel engineering for graduates in science, applied science or engineering who have not had substantial previous formal education in these subjects.

The course is based on the general formula for a MAppSc degree program, whereby the subjects 48.311 and 48.321 can comprise the 25% undergraduate component, the project (15 or 30% of the program) is 48.900G, and the remainder of the hours can be taken from the units offered in the 48.38-G and 48.39-G series of subjects. There are also compulsory seminar and laboratory practice subjects.

*For additional information on the MAppSc degree course see earlier this section.
The course allows reasonable flexibility with a choice of 
subjects, and units within subjects, subject to the availability 
of staff.

Provision is made for subjects outside those offered by the Department to be incorporated in the program at either graduate or undergraduate level.

8080
Industrial Pollution Control Graduate Course*

Master of Applied Science MAppSc

This course has been discontinued. Continuing students should refer to the 1982 Applied Science Handbook for details.

5010
Corrosion Technology Graduate Diploma Course

Graduate Diploma GradDip

The Graduate Diploma course in Corrosion Technology is open to graduates in Engineering, Applied Science or Science who wish to undertake formal studies to promote their careers in industry. At present it may only be taken as a two-year part-time course.

The course is designed for those professionals in industry who are faced with the problem of combating corrosion. Its aim is to develop an appreciation of the fundamentals, principles of corrosion and of the available methods of overcoming it.

For graduates from Engineering (non-chemical) or Science (in a particular major) a bridging course is a necessary introduction to the graduate level of certain subjects. For this purpose the subject, 48.070G Process Principles, is specified.

Year 1 of the course introduces elementary aspects of corrosion technology and suitably orientates students depending on their initial qualifications. Year 2 of the course contains more detailed instruction at a graduate level in corrosion theory and prevention, together with suitable laboratory assignments.

*For additional information on the MAppSc degree course see earlier this section.

Year 1
48.070G Process Principles or Corrosion Laboratory
48.071G Corrosion Technology I

Hours per week 2 3 5

Chemical Engineering graduates will undertake:
48.072G Corrosion Laboratory

Science Graduates who have passed the equivalent of second year Chemistry will undertake parts of:
48.070G Process Principles (1 hr/wk)
48.072G Corrosion Laboratory (1 hr/wk)

Graduates who have passed only the equivalent of first year Chemistry will undertake 48.070G Process Principles.

Year 2
48.073G Corrosion Materials
48.074G Corrosion Technology II
48.075G Seminar
48.076G Corrosion Literature Review
48.077G Testing Laboratory (by roster)

10

School of Food Technology

The School of Food Technology conducts formal courses leading to the award of the Master of Applied Science degrees and of the Graduate Diploma in food technology.

In addition, the School welcomes enquiries from graduates in Chemistry, Biochemistry, Microbiology, Applied Science, Chemical Engineering, Physiology, Nutrition and Agriculture who are interested in pursuing research in food science and technology for the award of the degrees of Master of Science and Doctor of Philosophy.

The Head of School provides information on research scholarships, fellowships, grants-in-aid and School research activities. Graduates are advised to consult the Head of School before making a formal application for registration.
8030
Food Technology Graduate Course
Master of Applied Science
MAppSc

This course provides for a comprehensive study of theoretical and applied aspects of the science and technology of foods. The course is formal and elective in nature, providing an opportunity for graduates to apply their basic skills in areas relevant to this field of applied science, and is particularly relevant to graduates in agriculture, applied science and science with principal interests in chemistry, biochemistry, microbiology, physiology, nutrition and chemical engineering.

Intending candidates are invited to submit proposed study programs to the Head of the School for advice and recommendation. Each individual course must be approved by the Higher Degree Committee of the Faculty of Applied Science. An acceptable course would be a program of formal study aggregating approximately 20 hours weekly for two sessions full-time or ten hours weekly for four sessions part-time, and which could comprise:

1. A major strand of course material making up 75 per cent of the total program. This would include a project constituting not less than 15 per cent and not more than 30 per cent of the program.

2. A minor strand of broader-based supporting material making up to 25 per cent of the total program.

Undergraduate material may be included in one or both strands but may not exceed 25 per cent of the total program. Approximately 60 per cent of the program (including the project) must be taken in the School of Food Technology. The remainder, subject to approval and availability, may be undertaken in other schools within the University.

Graduate subjects in Food Technology may be selected from:

| Hours per week* | 38.151G Introductory Food Science | 1 |
|                | 38.152G Food Process Laboratory   | 2 |
|                | 38.153G Food Technology Seminar   | 1 |
|                | 38.155G Dairy Technology          | 2 |
|                | 38.156G Oenology                 | 1 |
|                | 38.157G Technology of Cereal Products | 1 |
|                | 38.158G Marine Products          | 1 |
|                | 38.161G Food Additives and Toxicology | 1 |
|                | 38.162G Postharvest Physiology and Handling of Fruit and Vegetables | 3 |
|                | 38.163G Methods in Food and Nutrition Education | 1½ |
|                | 38.164G Elements of Food Preservation | 2½ |
|                | 38.165G Plant Food Products       | 2 |
|                | 38.166G Animal Food Products      | 1½ |
|                | 38.350G Food Microbiology         | 2 |
|                | 38.351G The Microbial Ecology of Foods | 3 |
|                | 38.451G Advanced Food Engineering | 1½ |
|                | 38.452G Drying of Foods           | 1½ |
|                | 38.551G Advanced Nutrition        | 1½ |

*Weekly equivalent of total hours for subject. These hours may be concentrated in one session.

The work involved in the project must be embodied in a report and submitted in accordance with the requirements of the Faculty.

Depending on the candidate's background, enrolment in some of the above subjects may be accompanied by enrolment in related undergraduate subjects as prerequisites or co-requisites. A particular subject may not necessarily be conducted in any one year.

8035
Food Engineering Graduate Course
Master of Applied Science
MAppSc

This course is designed for graduates who have a degree in Engineering or a related field of study, and an interest in the processing of biological resources.

The formal components of the course provide professional training at an advanced level in food science and in food engineering. The studies in food science deal with nutrition, food chemistry, microbiology, food preservation and the technology of plant, animal and marine foods. These subjects have been specially prepared and no previous experience in these areas is necessary. The studies in food engineering are designed to strengthen and broaden the engineering background of graduates and will emphasize the use of fundamental principles in solving problems associated with food processing.

Problem-solving skills are further developed in a research project devoted to an area of food engineering.

The course requires three sessions of full-time study and students are admitted to the program in the second session of each year. The details of the course are as follows:

| Hours per week* | 38.601G Food Technology A | 3 |
|                | 38.602G Technology of Food Preservation A | 3 |
|                | 38.603G Food Engineering A | 3 |
|                | 38.604G Food Engineering B | 3 |
|                | 38.902G Reading Assignment or Elective Material | 3 |
|                |                                      | 15 |
Graduate Study

Session B

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>38.605G</td>
<td>Food Technology B</td>
<td>3</td>
</tr>
<tr>
<td>38.606G</td>
<td>Technology of Food Preservation B</td>
<td>3</td>
</tr>
<tr>
<td>38.607G</td>
<td>Technology of Food Processing A</td>
<td>3</td>
</tr>
<tr>
<td>38.608G</td>
<td>Food Engineering C</td>
<td>3</td>
</tr>
<tr>
<td>38.901G</td>
<td>Minor Project</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Elective Material</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>18</td>
</tr>
</tbody>
</table>

Session C

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>38.609G</td>
<td>Technology of Food Processing B</td>
<td>3</td>
</tr>
<tr>
<td>38.610G</td>
<td>Food Engineering D</td>
<td>3</td>
</tr>
<tr>
<td>38.611G</td>
<td>Food Engineering Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>38.612G</td>
<td>Food Engineering Field Work</td>
<td>3</td>
</tr>
<tr>
<td>38.901G</td>
<td>Minor Project</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

*Weekly equivalent of total hours for subject. These hours may be concentrated in one session.

Elective material may be selected from any subject offered by the University, subject to approval by the Head of the School of Food Technology. The Australian Government, through the Australian Development Assistance Bureau (ADAB), Department of Foreign Affairs, recognizes and supports this course as an Australian Development Assistance Course. Nominations for Australian awards to overseas graduates are considered only when made by national governments and submitted through the local Australian diplomatic mission.

5020

Food Technology Graduate Diploma Course

Graduate Diploma GradDip

The Graduate Diploma course is designed to provide professional training at an advanced level for graduates in Science, Applied Science or Engineering who have not had previous training in Food Technology.

Requirements are a first degree and, in some cases, the successful completion of assignments or examinations, as directed by the Head of the School.

The course is a blend of formal lectures and laboratory work at the undergraduate and graduate levels. The Graduate Diploma in Food Technology (GradDip) is awarded on the successful completion of one year of full-time study (17 hours/week), or two years of part-time study (8½ hours/week). It involves the following program:

- Introductory Food Science 3
- Food Process Laboratory 2
- Elements of Food Preservation 2½
- Plant Food Products 2
- Animal Food Products 1½
- Food Microbiology 2
- Principles of Nutrition 2
- Electives† 4

†Electives are to be selected from the following list of subjects according to availability and with the approval of the Head of School.

- Chemistry and Analysis of Foods 3
- Oenology 3
- Treatment and Utilization of Food Processing Wastes 1½
- Technology of Cereal Products 1
- Marine Products 1
- Postharvest Physiology and Handling of Fruit and Vegetables 3
- Methods in Food and Nutrition Education 1½
- Food Microbiology II 3
- Yeast Technology 1½
- Food Engineering II 3
- Food Engineering III 3
- Advanced Nutrition 1½
- Methods of Nutritional Assessment and Analysis 3
- Biotechnology A 3
- Principles of Biology 1½
- Principles of Biochemistry 1½
- Biochemical Methods 1½
- Biotechnology 1½
- Microbiology AS 5

or such other electives approved by the Head of School. In all cases the hours devoted to graduate subjects constitute at least 50 per cent of the total course hours.

School of Metallurgy

The School of Metallurgy conducts courses which lead to the award of Master of Applied Science.

In addition, the School welcomes enquiries from graduates in Science, Engineering and Applied Science who are interested in doing research leading to the award of the degrees of Master of Science, Master of Engineering or Doctor of Philosophy in metallurgy or ceramic engineering.
The Head of the School is pleased to give information about research scholarships, fellowships and grants-in-aid. Graduates are advised to consult him before making a formal application for registration.

### 8050 Metallurgy Graduate Course

**Master of Applied Science MAppSc**

This course provides for a comprehensive study of the theoretical and practical topics at an advanced level. It is designed to allow the maximum flexibility in choice of topics consistent with the standing of the award.

Intending candidates are invited to discuss proposed study programs with the Head of the School for advice and recommendation.

An acceptable program would be:

1. A program of formal study (including a project) totalling approximately twenty hours per week for two sessions full-time.

2. A project comprising about twenty per cent of the program.

At least eighty per cent of the total program must be composed of units selected from those available as part of the graduate subjects listed below, except that not more than eight hours per week for two sessions may be devoted to each of 4.211G Metallurgical Practice and 4.231G Advanced Theoretical Metallurgy and not more than six hours per week for two sessions may be devoted to 4.221G Advanced Metallurgical Techniques.

### Graduate Subjects

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
<th>Hours per week*</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.241G</td>
<td>Graduate Metallurgy Project</td>
<td>Not less than 4</td>
</tr>
<tr>
<td>4.211G</td>
<td>Metallurgical Practice</td>
<td>4 to 8</td>
</tr>
<tr>
<td></td>
<td>Detailed studies relating to one or more of the following:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Extractive Metallurgy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Metal working and forming</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Foundry practice</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Welding and metal fabrication</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Metal finishing and corrosion protection</td>
<td></td>
</tr>
<tr>
<td>4.221G</td>
<td>Advanced Metallurgical Techniques</td>
<td>1 to 2</td>
</tr>
<tr>
<td>4.231G</td>
<td>Specialist lectures in Advanced Theoretical Metallurgy</td>
<td>Offered in units of 7 hours (ie 1 hour/week for 7 weeks)</td>
</tr>
<tr>
<td>4.251G</td>
<td>Advanced Materials Technology</td>
<td>3</td>
</tr>
<tr>
<td>4.270G</td>
<td>Solid State and Mineral Chemistry</td>
<td>2</td>
</tr>
</tbody>
</table>

*These may be presented at twice the weekly rate over one session.

### 8055 Minerals Engineering Graduate Course

**Master of Applied Science MAppSc**

The course is designed to provide a comprehensive study of theoretical and practical aspects of mineral processing technology at an advanced level. Formal subjects represent approximately 75 per cent of the program, the remaining 25 per cent being devoted to a project. Election in choice of project work permits specialization in mineral processing or coal preparation. Candidates who do not have an appropriate academic background may be required to enrol in related undergraduate subjects as prerequisites. Consideration is given to full-time or part-time enrolment.
Subjects

<table>
<thead>
<tr>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
</tr>
<tr>
<td>7.013 Principles of Mining</td>
</tr>
<tr>
<td>7.361G Minerals Engineering I</td>
</tr>
<tr>
<td>7.362G Minerals Engineering II</td>
</tr>
<tr>
<td>7.363G Minerals Engineering Laboratory</td>
</tr>
<tr>
<td>7.364G Minerals Engineering III</td>
</tr>
<tr>
<td>7.365G Minerals Engineering Project</td>
</tr>
<tr>
<td>7.442G Minerals Industry Analysis</td>
</tr>
<tr>
<td>8056 Mining Geomechanics Graduate Course — Part-time (External)</td>
</tr>
</tbody>
</table>

1. When appropriate, and subject to the approval of the Head of the Department, up to 4 hours per week may be selected from approved courses offered within the University in place of units in which students have prior expertise.

2. Undergraduate material may not exceed 20 per cent of the total program.

3. The work involved in the project must be embodied in a report and submitted in accordance with the requirements of Faculty.

4. Attendance at field trips totalling up to one week may be required.

1. Graduate Study

2. Subjects

3. Hours per week

4. SI 82 7.013 Principles of Mining 2 0
5. 7.361G Minerals Engineering I 7 0
6. 7.362G Minerals Engineering II 8 0
7. 7.363G Minerals Engineering Laboratory 3 0
8. 7.364G Minerals Engineering III 0 8
9. 7.365G Minerals Engineering Project 0 10
10. 7.442G Minerals Industry Analysis 0 2
11. 20 20

3. When appropriate, and subject to the approval of the Head of the Department, up to 4 hours per week may be selected for study, subject to the approval of the Head of School and availability of the topics.

4. Assessment is by formal examination (at appropriate country centres where necessary) and by assignment work.

5. Core Subjects

6. Hours per week

7. S1 S2 S3
8. 7.515X Rock Mechanics Measurements 3 3
9. 7.525X Strata Control Engineering 3
10. 8.776G Rock Mechanics 3
11. 7.455X Mining Geomechanics Project 4 4

5. Optional Subjects

6. Group A

7. 7.535X Mine Fill Technology 2 2
8. 7.545X Advanced Rock Cutting Technology 2 2
9. 7.555X Blasting Technology 2 2
10. 7.565X Rock Slope Stability 2 2
11. 7.575X Subsidence Engineering 2 2
12. 7.585X Economics and Management of Geomechanics Projects 2 2

6. Group B

7. 8.777G Numerical Methods in Geomechanics 3
8. 8.778G Geotechnical Processes for Energy Resources 3
9. 8.780G Geological Engineering 3
10. 25.702G Hydrogeology* 3
11. 25.706G Geological Basis of Geomechanics 3
12. 25.708G Engineering Geology 3

*Subject not available in 1984. Offering to be reviewed.

4. The program is arranged as follows:

5. Year 1

6. The core subjects are taken, together with any approved combination consisting of either two options from Group A or one option each from Group A and Group B. In certain cases optional subjects may be replaced by undergraduate subjects up to a total of 25 per cent of the total program, subject to the approval of the Head of School.

7. Year 2

8. The project is carried out in Year 2, together with the remaining options or undergraduate subjects of the approved program.

9. Students may take three options from Group A or two options from Group A and one from Group B or one option from Group A and two Options from Group B.
5040
Mining and Mineral Engineering Graduate Diploma Course
Graduate Diploma GradDip
The Graduate Diploma course in Mining and Mineral Engineering is designed to provide professional training for graduates in Science, Applied Science or Engineering who wish to specialize in the fields of mining and mineral beneficiation. The course is concerned primarily with instruction in the scientific and engineering principles associated with the mining and beneficiation of minerals and coal.

The Graduate Diploma in Mining and Mineral Engineering (GradDip) will be awarded on the successful completion of one year full-time or two years part-time study. The course is a blend of lecture and laboratory work and allows the choice of elective specialization in either mining engineering or mineral processing and coal preparation.

It should be noted that some degree of specialization will be possible in the laboratory investigations.

When appropriate, certain sections of the course may be offered as a unit over a short period of time to permit mineral industry personnel to attend the advanced course in a particular area of that discipline.

Year 1 — Part-time

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.013</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>7.023</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>7.033</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>7.234</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>7.311G</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>7.111G</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

Year 2 — Part-time

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.122G</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>7.322G</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>7.132G</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>7.332G</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

A maximum of 8 hours per week of study may be selected from approved undergraduate subjects.

Graduate Diploma students are expected to work at the level of honours students in the undergraduate courses and to carry out prescribed study of current research material in the appropriate field.

5081
Wool and Pastoral Sciences Graduate Diploma Course
Graduate Diploma GradDip
The course leading to the award of the Graduate Diploma in Wool and Pastoral Sciences is specially designed for graduate students preparing themselves for careers in the pastoral industry. One of the principal functions of the course is to provide a bridge from other disciplines such as Agriculture, Veterinary Science and Pure Science for graduates who wish to study and work in the field of Wool and Pastoral Sciences, which is of such overall importance to Australia.

The normal requirement for admission to the course is a degree in Agriculture, Veterinary Science or Science in an appropriate field. In addition, students may be required to take a qualifying examination. Such qualifying examination will be of a standard which will ensure that the student has sufficient knowledge of the subject and the principles involved to profit by the course.

Applicants from Colleges of Advanced Education who have obtained credit passes or better in the Diploma of Applied Science (Agriculture) are eligible for consideration for direct entry into the Graduate Diploma course in Wool and Pastoral Sciences.

The following program may be completed either in one year on a full-time basis or over two years on a part-time basis. Students are required to carry out full-time study or its equivalent to the extent of eighteen hours lecture and laboratory work per week for two sessions. Both graduate subjects and undergraduate subjects may be chosen to suit the requirements of the student subject to their availability and the approval of the Head of the School.

Full-time Course

18 hours per week of which at least 10 must be chosen from:

<table>
<thead>
<tr>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.105G</td>
</tr>
<tr>
<td>9.205G</td>
</tr>
<tr>
<td>9.504G</td>
</tr>
<tr>
<td>9.803G</td>
</tr>
<tr>
<td>9.813G</td>
</tr>
</tbody>
</table>

A maximum of 8 hours per week of study may be selected from approved undergraduate subjects.

Graduate Diploma students are expected to work at the level of honours students in the undergraduate courses and to carry out prescribed study of current research material in the appropriate field.
Graduate Study

Conditions for the Award of Higher Degrees

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

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

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

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

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

<table>
<thead>
<tr>
<th>Title</th>
<th>Abbreviation</th>
<th>Calendar/Handbook</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor of Science</td>
<td>DSc</td>
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Master of Science (Acoustics) | MSc(Acoustics) | Architecture |
1. The degree of Doctor of Philosophy may be granted by the Council on the recommendation of the Professorial Board to a candidate who has made an original and significant contribution to knowledge and who has satisfied the following requirements:

2. A candidate for registration for the degree of Doctor of Philosophy shall:
   (1) hold an honours degree from the University of New South Wales; or
   (2) hold an honours degree of equivalent standing from another approved university; or
   (3) if the candidate holds a degree without honours from the University of New South Wales or other approved university, have achieved by subsequent work and study a standard recognised by the Higher Degree Committee of the appropriate faculty or board of studies (hereinafter referred to as the Committee) as equivalent to honours; or
   (4) in exceptional cases, submit such other evidence of general and professional qualifications as may be approved by the Professorial Board on the recommendation of the Committee.

3. When the Committee is not satisfied with the qualifications submitted by a candidate, the Committee may require the candidate, before being permitted to register, to undergo such examination or carry out such work as the Committee may prescribe.

4. A candidate for registration for a course of study leading to the degree of Doctor of Philosophy shall apply to the Registrar on the prescribed form at least one calendar month before the commencement of the session in which registration is to begin.
5. Subsequent to registration the candidate shall pursue a program of advanced study and research for at least six academic sessions, save that:

(1) a candidate fully engaged in advanced study and research for the degree, who before registration was engaged upon research to the satisfaction of the Committee, may be exempted from not more than two academic sessions;

(2) in special circumstances the Committee may grant permission for the candidate to spend not more than one calendar year of the program in advanced study and research at another institution provided that the work can be supervised in a manner satisfactory to the Committee;

(3) in exceptional cases, the Professorial Board on the recommendation of the Committee may grant permission for a candidate to be exempted from not more than two academic sessions.

6. A candidate who is fully engaged in research for the degree shall present for examination not later than ten academic sessions from the date of registration. A candidate not fully engaged in research shall present for examination not later than twelve academic sessions from the date of registration. In special cases an extension of these times may be granted by the Committee.

7. The candidate shall be fully engaged in advanced study and research, save that:

(1) the Committee may permit a candidate to undertake a limited amount of University teaching or outside work which in its judgment will not interfere with the continuous pursuit of the proposed course of advanced study and research;

(2) a member of the full-time staff of the University may be accepted as a part-time candidate for the degree, in which case the Committee shall prescribe a minimum period for the duration of the program;

(3) in special circumstances, the Committee may, with the concurrence of the Professorial Board, accept as a part-time candidate for the degree a person who is not a member of the full-time staff of the University and is engaged in an occupation which, in its opinion, leaves the candidate substantially free to pursue a program in a school* of the University. In such a case the Committee shall prescribe for the duration of the program a minimum period which, in its opinion, having regard to the proportion of the time which the candidate is able to devote to the program in the appropriate University school* is equivalent to the six sessions ordinarily required;

(4) the Committee may permit a candidate to transfer to part-time enrolment where that candidate has completed the research work, is writing the thesis, and has been registered as a full-time candidate for at least six academic sessions.

8. Every candidate shall pursue a program under the direction of a supervisor appointed by the Committee from the full-time members of the University staff. The work other than field work shall be carried out in a school* of the University save that in special cases the Committee may permit a candidate to conduct the work at other places where special facilities not possessed by the University may be available. Such permission will be granted only if the direction of the work remains wholly under the control of the supervisor.

9. Not later than two academic sessions after registration the candidate shall submit the topic of research for approval by the Committee. After the topic has been approved it may not be changed except with the permission of the Committee.

10. A candidate may be required by the Committee to attend a formal course of appropriate study.

Thesis

11. On completing the course of study every candidate must submit a thesis which complies with the following requirements:

(1) the greater proportion of the work described must have been completed subsequent to registration for the PhD degree;

(2) it must be an original and significant contribution to the knowledge of the subject;

(3) it must be written in English except that a candidate in the Faculty of Arts may be required by the Faculty on the recommendation of the supervisor to write the thesis in an appropriate foreign language;

(4) it must reach a satisfactory standard of expression and presentation.

*Or department where a department is not within a school.
12. The thesis must present the candidate's own account of the research. In special cases work done conjointly with other persons may be accepted, provided the Committee is satisfied on the candidate's part in the joint research.

13. Every candidate shall be required to submit with the thesis a short abstract of the thesis comprising not more than 350 words.

The abstract shall indicate:
(1) the problem investigated;
(2) the procedures followed;
(3) the general results obtained;
(4) the major conclusions reached;
but shall not contain any illustrative matter, such as tables, graphs or charts.

14. A candidate may not submit as the main content of the thesis any work or material which has previously been submitted for a university degree or other similar award.

15. The candidate shall give in writing two months' notice of intention to submit the thesis.

16. Four copies of the thesis shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses. The candidate may also submit any work previously published whether or not such work is related to the thesis.

17. It shall be understood that the University retains the four copies of the thesis submitted for examination, and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act, 1968, the University may issue the thesis in whole or in part, in photostat or microfilm or other copying medium.

18. There shall normally be three examiners of the thesis appointed by the Professorial Board on the recommendation of the Committee, at least two of whom shall be external to the University.

19. At the conclusion of the examination each examiner shall submit to the Committee a concise report on the merits of the thesis and shall recommend to the Committee that:
(1) the candidate be awarded the degree without further examination; or
(2) the candidate be awarded the degree without further examination subject to minor corrections as listed being made to the satisfaction of the head of the school*; or
(3) the candidate be awarded the degree subject to a further examination on questions posed in the report, performance in this further examination being to the satisfaction of the Committee; or
(4) the candidate be not awarded the degree but be permitted to resubmit the thesis in a revised form after a further period of study and/or research; or
(5) the candidate be not awarded the degree and be not permitted to resubmit the thesis.

20. If the performance at the further examination recommended under Rule 19. (3) is not to the satisfaction of the Committee the Committee may permit the candidate to re-present the same thesis and submit to a further oral, practical or written examination within a period specified by them but not exceeding eighteen months.

21. The Committee shall, after consideration of the examiners' reports and the reports of any oral or written or practical examination, recommend whether or not the candidate may be admitted to the degree.

22. A candidate shall be required to pay such fees as may be determined from time to time by the Council.

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* The reference to the head of the school* is later replaced with the head of the department.
### Master of Applied Science (MAppSc)

#### Qualifications

1. The degree of Master of Applied Science may be awarded by the Council on the recommendation of the Higher Degree Committee of the Faculty of Applied Science (hereinafter referred to as the Committee) to a candidate who has satisfactorily completed an approved program of advanced study.

2. (1) An applicant for registration for the degree shall normally be a graduate from an appropriate four-year, full-time undergraduate course in the University or other approved university or tertiary institute at a standard acceptable to the Committee.

   (2) The Committee may consider applications from graduates of three-year, full-time courses in the University or other approved university or tertiary institute who have satisfactorily completed an approved qualifying program of not less than one year full-time or its equivalent or have submitted evidence of attainment in appropriate graduate studies extending over a period of not less than one full-time year or its equivalent.

   (3) The Committee may also consider applications from graduates of the Bachelor of Science (Technology) and Bachelor of Science (Engineering) courses of the University who have satisfactorily completed an approved qualifying program of not less than one year part-time or who can submit evidence of academic attainment in appropriate graduate studies extending over the same period or its equivalent.

   (4) Notwithstanding any other provisions of these conditions the Committee may require an applicant to demonstrate fitness for registration by carrying out such work and taking such examinations as the Committee may determine.

#### Registration and Progression

3. (1) An application to register as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least two months before the commencement of the course.

   (2) A candidate for the degree shall be required to undertake such course of formal study, pass such examinations and, where specified, submit a report on a project, as prescribed by the Committee.

   (3) No candidate shall be considered for the award of the degree until the lapse of two sessions in the case of a full-time candidate or four sessions in the case of a part-time candidate from the date from which registration becomes effective. The Committee may approve remission of up to two sessions for a part-time candidate.

   (4) The progress of a candidate shall be reviewed annually be the Committee on the recommendation of the Head of School or Department in which the candidate is registered and as a result of such review the Committee may terminate the candidature.

#### Project

4. (1) Where specified, a report on a project approved by the Committee may be submitted at the completion of the formal section of the course, but in any case shall be submitted not later than one year after the completion of such course.

   (2) The format of the report shall accord with the instructions of the Head of School and shall comply with the requirements of the Committee for the submission of project reports.

   (3) The report shall be under the supervision of a member of the academic staff and shall be examined by two examiners. The satisfactory completion of the project shall be regarded as part of the annual assessment.

#### Recommendation for Admission to Degree

5. Having considered the candidate's results in the prescribed course of study, the Committee shall recommend whether the candidate may be admitted to the degree.

#### Fees

6. An approved candidate shall pay such fees as may be determined from time to time by the Council.

### Master of Engineering (ME)

1. The degree of Master of Engineering may be awarded by the Council on the recommendation of the Higher Degree Committee of the appropriate Faculty (hereinafter referred to as the Committee) to a candidate who has demonstrated ability to undertake research by the submission of a thesis embodying the results of an investigation.
2. (1) An applicant for registration for the degree shall have been admitted to the degree of Bachelor in the University of New South Wales, or other approved university or tertiary institution, in an appropriate school or department at a standard acceptable to the Committee.

Qualifications

(2) In exceptional cases a person may be permitted to register as a candidate for the degree if the person submits evidence of such academic and professional attainments, as may be approved by the appropriate Committee.

(3) Notwithstanding any other provisions of these conditions, the Committee may require an applicant to demonstrate fitness for registration by carrying out such work and sitting for such examinations as the Committee may determine.

Registration

3. (1) An application to register as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least one full calendar month before the commencement of the session in which the candidate desires to register.

Registration

(2) In every case, before permitting an applicant to register as a candidate, the Committee shall be satisfied that adequate supervision and facilities are available.

(3) An approved applicant shall register in one of the following categories:

(a) student in full-time attendance at the University

(b) student in part-time attendance at the University

(c) student working externally to the University

Registration

(4) Every candidate for the degree shall be required to carry out a program of advanced study to take such examinations and perform such other work as may be prescribed by the Committee which shall include the preparation and submission of a thesis embodying the results of an original investigation. The work shall be carried out under the direction of a supervisor appointed by the Committee or under such conditions as the Committee may determine. At least once a year and at any other time that the Committee sees fit, the candidate's supervisor shall present to the head of the school in which the candidate is registered, a report on the progress of the candidate. The Committee shall review the report and may, if it decides as a result of its review that the progress of the candidate is unsatisfactory, cancel registration or take such other action as it considers appropriate.

(5) No candidate shall be considered for the award of the degree until the lapse of four complete sessions from the date from which registration becomes effective save that, in the case of a candidate who obtained the degree of Bachelor with Honours or who has had previous research experience, this period may, with the approval of the Committee, be reduced by up to two sessions.

4. (1) A candidate for the degree shall be required to submit three copies of the thesis referred to in paragraph 3. (4) which shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses. The candidate may submit any work the candidate has published whether or not such work is related to the thesis.

Thesis

(2) For each candidate there shall be at least two examiners appointed by the Professorial Board, on the recommendation of the Committee one of whom shall, if possible, be an external examiner.

(3) It shall be understood that the University retains the three copies of the thesis submitted for examination and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act, 1968 the University may issue the thesis in whole or in part, in photostat or microfilm or other copying medium.

5. Having considered the examiners' reports the Committee shall recommend whether or not the candidate should be admitted to the degree.

Recommendation for Admission to Degree

6. An approved candidate shall pay such fees as may be determined from time to time by the Council.

Fees
Master of Environmental Studies (MEnvStudies)

Qualifications
1. The degree of Master of Environmental Studies may be awarded on the recommendation of the Higher Degree Committee of the Faculty of Applied Science (hereinafter referred to as the Committee) to a candidate who has satisfactorily completed a program of advanced study comprising formal course work and the submission of a report on a project approved by the Committee.

2. (1) An applicant for registration for the degree shall normally be a graduate from an appropriate four-year full-time undergraduate course in the University or other approved university or tertiary institution at a standard acceptable to the Committee.
   (2) An applicant may also be permitted to register as a candidate for the degree by submitting evidence of such academic or professional attainments as may be approved by the Committee.
   (3) Notwithstanding any other provisions of these conditions the Committee may require an applicant to demonstrate fitness for registration by carrying out such work and taking such examinations as the Committee may determine.

Registration
3. (1) An application to register as a candidate for the degree of Master shall be made on the prescribed form which shall be lodged with the Registrar at least two (2) months before the commencement of the course.
   (2) A candidate for the degree shall be required to undertake such course of formal study, pass such examinations and submit a report on a project as prescribed by the Committee.
   (3) No candidate shall be considered for the award of the degree until the lapse of two sessions in the case of a full-time candidate or four sessions in the case of a part-time candidate from the date from which registration becomes effective.
   (4) The progress of a candidate shall be reviewed annually by the Committee and as a result of such review the Committee may terminate the candidature.

Project
4. (1) A report on a project approved by the Committee shall be submitted at the completion of the formal section of the course, but in any case not later than one year after the completion of such course.
   (2) The format of the report shall accord with the requirements of the Committee for the submission of project reports.
   (3) (a) The report shall be examined by two examiners appointed by the Committee;
   (b) A candidate may be required to attend for an oral or written examination.

Recommendation for Admission to Degree
5. Having considered the examiners' report and the candidate's other results in the prescribed course of study, the Committee shall recommend whether or not the candidate should be admitted to the degree.

Fees
6. An approved candidate shall pay such fees as may be determined from time to time by the Council.

Master of Science (MSc)

Qualifications
1. The degree of Master of Science may be awarded by the Council on the recommendation of the Higher Degree Committee of the appropriate Faculty or Board of Studies (hereinafter referred to as the Committee) to a candidate who has demonstrated ability to undertake research by the submission of a thesis embodying the results of an original investigation.

2. (1) An applicant for registration for the degree shall have been admitted to the degree of Bachelor in the University of New South Wales, or other approved university or tertiary institution in an appropriate school or department at a standard acceptable to the Committee.
   (2) In exceptional cases a person may be permitted to register as a candidate for the degree if the person submits evidence of such academic and professional attainments as may be approved by the appropriate Committee.
   (3) Notwithstanding any other provisions of these conditions the Committee may require an applicant to demonstrate fitness for registration by carrying out such work and sitting for such examinations as the Committee may determine.
7 (1) An application to register as a candidate for the degree of Master of Science shall be made on the prescribed form which shall be lodged with the Registrar at least one full calendar month before the commencement of the session in which the candidate desires to register.

(2) In every case before permitting an applicant to register as a candidate the Committee shall be satisfied that adequate supervision and facilities are available.

(3) An approved applicant shall register in one of the following categories:

(a) student in full-time attendance at the University;
(b) student in part-time attendance at the University;
(c) student working externally to the University.

(4) Every candidate for the degree shall be required to submit three copies of a thesis embodying the results of an original investigation or design, to take such examinations and to perform such other work as may be prescribed by the Committee. This work shall be carried out under the direction of a supervisor appointed by the Committee or under such conditions as the Committee may determine.

(5) At least once a year and at any other time that the Committee sees fit, the candidate's supervisor shall present to the head of school or department in which the candidate is registered a report on the progress of the candidate. The Committee shall review the report and may, if it decides as a result of its review that the progress of a candidate is unsatisfactory, cancel registration or take such other action as it considers appropriate.

(6) Unless otherwise recommended by the Committee, no candidate shall be awarded the degree until the lapse of four complete sessions from the date of registration, save that the case of a candidate who obtained the degree of Bachelor with Honours or who has had previous research experience, this period may be reduced by up to two sessions with the approval of the Committee. A candidate who is fully engaged in research for the degree shall present for examination not later than six academic sessions from the date of registration. A candidate not fully engaged in research shall present for examination not later than twelve academic sessions from the date of registration. In special cases an extension of these times may be granted by the Committee.

4. (1) A candidate for the degree be required to submit three copies of the thesis referred to in paragraph 3. (4) which shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses. The candidate may submit also for examination any work he has published whether or not such work is related to the thesis.

(2) For each candidate there shall be at least two examiners, appointed by the Professorial Board on the recommendation of the Committee, one of whom, if possible, shall be external to the University.

(3) It shall be understood that the University retains the three copies of the thesis submitted for examination and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act, 1968, the University may issue the thesis in whole or in part in photostat or microfilm or other copying medium.

5. Having considered the examiners' reports the Committee shall recommend whether or not the candidate should be admitted to the degree.

6. An approved candidate shall pay such fees as may be determined from time to time by the Council.

1. Where it is not possible for candidates to register under the normal conditions for the degree of Master of Science, Master of Engineering or Master of Surveying by reason of their location at centres which are distant from University Schools or where effective supervision is not practicable registration may be granted in these categories under the following conditions:

2. An applicant for registration shall have been admitted to a degree of Bachelor in the University of New South Wales at a standard acceptable to the Higher Degree Committee of the appropriate Faculty (hereinafter referred to as the Committee).
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Physics

Undergraduate Study

Physics Level I Units

1.001 Physics I F L3T3

Prerequisites:  
- 2 unit Mathematics or
- 3 unit Mathematics or
- 4 unit Mathematics

HSC Exam Percentile Range Required

2 unit Mathematics or 71-100
3 unit Mathematics or 21-100
4 unit Mathematics (for 1.001 only) 1-100
2 unit Science (Physics) or 31-100
2 unit Science (Chemistry) or 31-100
4 unit Science (Multistrand) 31-100

Co-requisite: 10.021C or 10.001 or 10.011.

1.011 Higher Physics I F L3T3

Prerequisites: As for 1.001, plus permission of the Head of the School of Physics. Co-requisite: 10.001 or 10.011.

For students of all Faculties except Medicine who have a good secondary school record and who wish to do a more challenging course.

Vector algebra, kinematics, uniform circular motion, coriolis acceleration, dynamics of particles, motion in a resistive medium, work and energy, gravitation, rotational motion of rigid bodies about fixed axis, rotational motion about a fixed point. Harmonic motions, waves in elastic media. Sound waves, physical optics, polarization and double refraction. Electric charges, electric intensity, electric flux, Gauss' law, electric potential, capacity, dielectric materials, electric current and resistance, DC circuits, magnetic field, field due to current, electromagnetic induction, inductance, magnetic materials, transients, AC circuits, electronics, diode, rectifier circuit, simple power supplies, electronic amplifier systems, single loop feedback systems, signal processing circuits using operational amplifiers.

Physics Level II Units

1.002 Mechanics, Waves and Optics S1 L3T1

Prerequisites: 1.001 or 1.011, 10.001 or 10.011. Co-requisite: 10.2111. Excluded: 1.992, 10.4111, 10.4211.

Harmonic motion, systems of particles, central force problems, Lagrange's equations, coupled oscillations, traveling waves, pulses, energy and momentum transfer, polarization, birefringence, interference, thin films, gratings, lasers, holography, fibre optics, Faraday effect, photoelasticity.

1.012 Electromagnetism and Thermal Physics S2 L3T1

Prerequisites: 1.001 or 1.011, 10.001 or 10.011. Co-requisite: 10.2111. Excluded: 1.972.

Electric field strength and potential, Gauss' law, Poisson's and Laplace's equations, capacitance, dielectrics and polarization, magnetism, electro-magnetic induction, Maxwell's equations, electromagnetic waves. Laws of thermodynamics, kinetic theory, microscopic processes, entropy, solid state defects, Helmholtz and Gibbs functions, Maxwell's relations, phase diagrams, chemical and electrochemical potential.

1.022 Modern Physics F L1½T½

Prerequisites: 1.001 or 1.011, 10.001 or 10.011. Co-requisite: 10.2112. Excluded: 1.9322, 1.982.

Special theory of Relativity: time dilation, length contraction, simultaneity, Lorentz transformations, energy and mass. Photon properties, de Broglie relations, Uncertainty principle, operators in quantum mechanics, postulates of quantum mechanics, potential wells, steps and barriers, harmonic oscillator, H atom, angular momentum, magnetic moment, electron spin, nuclear spin. Atomic and molecular spectra, lasers, quantum statistics, free electron model of a metal, band theory; nuclear size, density, mass; nuclear models, fission and fusion, nuclear forces.

1.032 Laboratory F T3

Prerequisites: 1.001 or 1.011, 10.001. Excluded: 1.9222.

Alternating current circuits, complex impedance, resonance, mutual inductance, introductory electronics, diode and characteristics and circuits, power supplies, transistor characteristics, single stage and coupled amplifiers, experiments using AC circuits. Experimental investigations in a choice of areas including radioactivity, spectroscopy, properties of materials, Hall effect, nuclear magnetic resonance, photography, vacuum systems.
Terminating Physics Level II Units

1.9222 Electronics  
Prerequisites: 1.001 or 1.001 or 1.021. Excluded: 1.032.  
The application of electronics to other disciplines. Includes: principles of circuit theory and analogue computing; amplifiers, their specification and application, transducers; electronic instrumentation; industrial data acquisition.

1.9322 Introduction to Solids  
Prerequisites: 1.001 or 1.011 or 1.021. Excluded: 1.022, 4.402, 4.412.  
Introductory quantum mechanics and atomic physics; crystal structure; point and line defects; introductory band theory; conductors, semi-conductor and insulators; energy level diagrams.

Physics Level III Units

1.0133 Quantum Mechanics  
Prerequisites: 1.022, 10.2112. Excluded: 2.023A, 10.222F, 1.013.  
Revision of basic concepts, harmonic oscillator systems, spherically symmetric systems, angular momentum, H atom, first-order perturbation theory, identical particles, Exclusion Principle, atomic structure, spin-orbit coupling; Helium atom, introductory quantum theory of molecules.

1.0143 Nuclear Physics  
Nuclear shell model; theory of beta decay; the deuteron, nucleon-nucleon scattering; theories of nuclear reactions, resonances; mesons and strange particles, elementary particle properties and interactions; symmetries and quark models; strong and weak interactions.

1.023 Statistical Mechanics and Solid State Physics  
Prerequisites: 1.012, 1.022, 10.2112.  
Canonical distribution, paramagnetism, Einstein solid, ideal gas, equipartition, grand canonical ensemble, chemical potential, phase equilibria, Fermi and Bose statistics, Bose condensation, blackbody radiation. Crystal structure, bonding, lattice dynamics, phonons, free-electron models of metals, band theory, point defects, dislocations.

1.0333 Electromagnetism  
Prerequisites: 1.012, 10.2111, 10.2112. Excluded: 10.222C, 1.033.  
Electromagnetic fields; Maxwell's equations, Poynting theorem, electromagnetic potentials, electromagnetic waves. Reflection and transmission, Fresnel equations, waveguides, radiation fields, dipoles and antenna theory.

1.0343 Advanced Optics  
Fresnel and Fraunhofer diffraction, Fourier transforms, filtering, coherence length and time, stellar interferometers, laser theory, non-linear optics.

1.043 Experimental Physics A  
Prerequisite: 1.032.  
Basic experimental techniques and analysis of results in the following areas: electricity, magnetism, diffraction optics (including X-ray and electron diffraction, solid state physics, nuclear physics, atomic physics and spectroscopy, vacuum systems).

Chemistry

Undergraduate Study

2.002A Physical Chemistry  
Prerequisites: 2.121 or 2.141 and 10.011 or 10.001 or 10.021B & 10.021C.  
Thermodynamics: first, second and third laws of thermodynamics; statistical mechanical treatment of thermodynamic properties; applications of thermodynamics; chemical equilibria, phase equilibria; solutions of nonelectrolytes and electrolytes, electrochemical cells. Kinetics: order and molecularity; effect of temperature on reaction rates; elementary reaction rate theory. Surface chemistry and colloids: adsorption, properties of dispersions; macromolecules and association colloids.

2.002B Organic Chemistry  
Prerequisite: 2.131 or 2.141.  
Chemistry of the more important functional groups; aliphatic hydrocarbons, monocyclic aromatic hydrocarbons, halides, alcohols, phenols, aldehydes, ketones, ethers, carboxylic acids and their derivatives, nitro compounds, amines and sulphanic acids.

2.002D Analytical Chemistry  
Prerequisites: 2.121 & 2.131 or 2.141, 10.001 or 10.011 or 10.021B & 10.021C.  
2.003B Organic Chemistry

Prerequisite: 2.002B.

Alicyclic Chemistry: Stereochernistry of acyclic systems; classical and non-classical strain in cyclic systems; stereochemistry and conformation of monocyclic and polycyclic compounds; synthesis, actions and rearrangement of monocyclic compounds including stereochemical selectivity; transannular reactions in medium rings. Synthesis and reactions of fused and bridged polycyclic systems.


2.003H Molecular Spectroscopy and Structure

Prerequisite: 2.121 & 2.131, or 2.141.

Absorption and emission of radiation. Atomic spectra. Molecular spectroscopy: vibrational, including infrared and Raman; UV-visible; instrumentation and sample handling. Magnetic resonance. Mass spectrometry with particular reference to structure determination. Laboratory and tutorial work to illustrate the above, including inspection of major instruments.

2.003J Fundamentals of Biological and Agricultural Chemistry

Prerequisites: 2.121 & 2.131, or 2.141. Excluded: 2.013L, 41.101.

Aspects of the chemical and physical properties of materials important in biological systems. Methods of separation, purification and estimation, and correlations of structure with reactivity. Methods of separation and identification, such as gel permeation, analysed as appropriate to each topic. Significance of isomerism in biological systems, optical and geometrical, absolute configuration. Amino acids, peptides and introduction to protein structure. Relevant properties, acid/base properties, pK values, zwitterion, isoelectric points. Simple peptide synthesis. Treatment of carbohydrates, establishment of structures, reactivity. Chemistry of monosaccharides, disaccharides and polysaccharides. Methods of analysis, chemical and physiochemical. Fats, correlation of properties with saturated and unsaturated fatty acid composition. Structural chemistry of fatty acids. Reaction of unsaturated fatty acids, urea complexes. Detergents. Trace elements in biological systems. Chemistry of common heterocyclic systems with emphasis on molecules of biological importance.

2.030 Organic Chemistry

Prerequisite: 2.002B.

The spectroscopic identification of organic compounds, free radical chemistry and electro-organic processes, various aspects of the organic industrial processes such as industrial synthesis based on petrochemicals, and organometallic reactions of industrial interest. Selected topics from the dyestuff, pharmaceutical and agricultural industries discussing synthesis and reactions including degradation.

2.042C Inorganic Chemistry

Prerequisites: 2.121 or 2.131 or 2.141.

Chemistry of the non-metals including B, C, Si, N, P, and S. Chemistry of the metals of groups IA, IIA, and Al. Typical ionic, giant-molecule and close-packed structures. Transition metal chemistry, including variable oxidation states, paramagnetism, Werner's theory, isomerism of six and four-coordinate complexes, chelation, stabilization of valency states. Physical methods of molecular structure determination. Chemistry of Fe, Co, Ni, Cu, Ag, Au and Hg.

2.043A Environmental Chemistry

Prerequisites: 2.002A, 2.002D.


or

Simple digital and analogue computer models of ecological systems based on chemical data and physico-chemical properties.

or

Distribution of elements and nutrient cycles in water; organic carbon cycles, oxygen balance (redox processes in aquatic systems). Chemical models of these processes (including an introduction to simple computing). Practical project (mostly field work) dealing with nutrient cycles.

2.043L Chemistry and Enzymology of Foods

Prerequisite: 2.002B. Excluded: 2.013L, 2.023L, 2.053L.

Reference: 2.043L and 2.053L: only one of these double units may be chosen.

As for 2.013L but in greater detail and depth.

2.111 Introductory Chemistry

Prerequisite: None.

Note: Students who have passed 2.121 or 2.131 may not enrol in 2.111 or 2.141. Students meeting the 2.121 or 2.141 prerequisite are not permitted to enrol in 2.111 without the permission of the Head of the School of Chemistry. Students who enrol in 2.111 must pass 2.111 before they can proceed to 2.121 or 2.131 or 2.141.

Classification of matter and the language of chemistry. The gas laws and the ideal gas equation, gas mixtures and partial pressure. The structure of atoms, cations and anions, chemical bonding, properties of ionic and covalent compounds. The periodic classification of elements, oxides, hydrides, halides and selected elements. Acids, bases, salts, neutralisation. Stoichiometry, the mole concept. Electron transfer reactions. Qualitative treatment of reversibility and chemical equilibrium, the pH scale. Introduction to the diversity of carbon compounds.
2.121 Chemistry IA

Prerequisites: 2 unit Mathematics or 3 unit Mathematics or 4 unit Mathematics and 2 unit Science (Physics) or 2 unit Science (Chemistry) or 2 unit Science (Geology) or 2 unit Science (Biology) or 2.111.

This refers to the 2 Unit Mathematics subject which is related to the 3 Unit Mathematics subject. It does not refer to the subject 2 Unit Mathematics (Mathematics in Society).


Note: Students who have passed 2.121 or 2.131 may not enrol in 2.111 or 2.141. Students meeting the 2.121 or 2.141 prerequisite are not permitted to enrol in 2.111 without the permission of the Head of the School of Chemistry. Students who enrol in 2.111 must pass 2.111 before they can proceed to 2.121 or 2.131 or 2.141.

2.131 Chemistry IB

Prerequisite: 2.111 or 2.121.

Chemical equilibrium, equilibrium constants, quantitative calculations applied to acid-base and solubility equilibria; buffers, titrations, chemical analysis. Oxidation and reduction reactions, electrode potentials. Chemical thermodynamics, entropy, free energy. Chemistry of carbon compounds, stereoisomerism; alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, aldehydes, ketones, carboxylic acids and derivatives, amines.

2.141 Chemistry IM

Prerequisites: As for 2.121 Chemistry IA.

Note: As for note, 2.121 Chemistry IA.

The syllabus is an integrated one of 2.121 and 2.131 (see above). Students majoring in Chemistry may take 2.141 in lieu of 2.121 and 2.131.

2.951 Chemistry IME

Prerequisite: Nil.

A treatment of chemistry which illustrates the application of the principles of chemistry to problems of concern to mechanical engineers. Topics: Chemistry of materials, thermochemistry, chemical kinetics and equilibrium, radioactivity and nuclear power, electrochemistry and corrosion of metals. Introduction to organic chemistry, structure and properties of polymers, fuels and lubricants. Surface chemistry.

Graduate Study

2.251G Toxicology, Occupational and Public Health

F L1T2

Important classes of toxic materials found in the environment; treatment of pesticide residues, industrial chemicals of various types, toxic gases, mould metabolites and bacterial toxins occurring in food, carcinogenic substances, toxic metals, etc. Effects of these substances on living organisms, particularly man. Practical work: pesticide residue analysis, blood and urine analysis, gas sampling and analysis, trace metal determination and experiments on the animal metabolism of toxic substances.

2.271G Chemistry and Analysis of Foods

F L1T3

Illustrates the bases and application of analytical techniques as applied to foods. Emphasis is placed on the design of methods, on the preparation of material for instrumental analysis and on the interpretation of data. Includes: proteins and flesh foods, carbohydrates and saccharine foods, fats and oils, dairy and fermentation products, vitamins, food additives — preservatives and colouring matters, pesticide residues, metal contaminants — food microscopy.

Metallurgy

Undergraduate Study

4.001 Introduction to Materials Science

S1 or S2 L1

Forms part of 5.010 Engineering A.

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.

4.002 Introduction to Metallurgical Engineering

S2 L2

Forms part of 5.030 Engineering C.

History and significance of the exploitation of metals. Ores, mineral economics, mineral processing, and metal extraction and processing methods illustrated by reference to the Australian mineral and metal industries. Properties, uses, and applications of metallic materials. The role of the metallurgist in industry and in processing and materials research, and in relation to conservation and the environment.

4.024 Metallurgy Project

S1 S2 3

An experimental investigation of some aspects of metallurgy. Includes three weeks laboratory work during the mid-year recess.
4.034 Industrial Metallurgy Project  F3
An experimental investigation of some aspects of industrial metallurgy.

4.054 Metallurgy Seminar  F L2
Lectures on the preparation and presentation of technical papers. Each student is required to prepare and present a paper on a nominated subject.

4.121 Principles of Metal Extraction  F L2T1
The fundamental principles of metal extraction. Oxidation and reduction, roasting, slag reactions, distillation, leaching, precipitation and electrolysis.

4.131 Principles of Physical and Mechanical Metallurgy  F L3T0
A condensed treatment of physical and mechanical metallurgy.

4.141 Experimental Techniques in Physical Metallurgy  F L0T2
A condensed course of instruction in metallographic, crystallographic and X-ray diffraction techniques.

4.213 Chemical Ceramics  S1 L3T3 S2 L2T3
Structural principles: crystal chemistry, structure of glasses, defect solid state: phase equilibria and transformations; diffusion; solid state reactions. A systematic treatment of the chemistry of ceramic products. Students are required to take part in a series of factory inspections.

4.224 Physical Ceramics  F L2T4
Prerequisites: 4.213, 4.233.

4.231 Introduction to Ceramic Engineering  S2 L2
The nature of ceramics. The scope of ceramic industry. The origin, classification, physical properties and uses of clay minerals and other non-clay raw materials. Principal unit operations used in the ceramic industry. Drying and firing of ceramics, melt forming, hot forming and other forming procedures.

4.232 Ceramic Engineering I  S1 L3
The principles of operation, construction and fields of application of equipment used in the mining, preparation and fabrication of raw materials, and the drying and firing of ceramic products.

4.233 Ceramic Process Principles  F L1T2½

4.234 Ceramic Engineering II  F L2T2
Prerequisites: 4.232, 4.233, 8.112, 48.021, 48.025.

4.294 Project (Ceramic Engineering)  S1 T6 S2 T9
An experimental or technical investigation or design related to some aspect of ceramic engineering. Prerequisites and/or co-requisites are determined depending on the nature of the project.

4.302 Chemical and Extraction Metallurgy I  F L1T2
Co-requisite: 2.002A.
Metal extraction from ores in terms of unit operations and overall systems, illustrated by the extraction of iron, copper, aluminium and other metals. Elementary process analysis. Laboratory — analysis and solution of problems.

4.303 Chemical and Extraction Metallurgy II  F L3T2

4.312 Chemical and Extraction Metallurgy IA  S1 L1 TO S2 L2T3
Co-requisites: 2.002A
As for subject 4.302 above.

4.314 Chemical and Extraction Metallurgy IIIA  S1 L3 T1½
Prerequisite: 4.303.
A selection of advanced topics in chemical and extractive metallurgy.

4.324 Chemical and Extraction Metallurgy IIB
Prerequisite: 4.303.

4.374 Metal Extraction Processes
Analysis of pyrometallurgical and hydrometallurgical extraction and refining processes using the principles of chemical equilibrium and kinetics. Extraction and refining processes for commercially important ferrous and non-ferrous metals. Nature of the inter-relationship between raw material, extraction process and product characteristics. Economic factors in process selection and operation; acceptance standards for ores and concentrates; smelter charges, penalties and bonuses; by-products.

4.402 Physical Metallurgy I

4.403 Physical Metallurgy II
Prerequisite: 4.402. Excluded: 1.3032.

4.404 Physical Metallurgy III
Applications of dislocation theory to work hardening and annealing processes. Phase transformations in alloys. Mathematical crystallography, reciprocal lattice, diffraction. Electron and X-ray metallography. Selection of advanced topics in physical metallurgy including radiation damage, martensitic transformations, neutron diffraction, internal friction, sintering, creep, superelasticity, fracture, microplasticity.

4.412 Metallurgical Phases — Structure and Equilibrium, Part 1
The crystal structure of metallic phases. Crystal defects. Physical properties of solids. Phase equilibrium in alloy systems. The genesis of microstructure. Metallography.

4.414 Physical Metallurgy IIIA
Prerequisite: 4.403.

4.422 Metallurgical Phases — Structure and Equilibrium, Part 2

4.424 Physical Metallurgy IIB
Prerequisite: 4.403.
Selection of advanced topics in physical metallurgy including radiation damage, martensitic transformations, neutron diffraction, internal friction, sintering, creep, superelasticity, fracture, microplasticity.

4.433 Physical Metallurgy IIC
Prerequisite: 4.402.

4.502 Mechanical Metallurgy
Co-requisite: 4.402.
Combination of 4.512 and 4.522.

4.512 Mechanical Properties of Solids
Co-requisite: 4.402.

4.522 Mechanical Metallurgy
Prerequisite: 4.512.

4.504 Mechanical and Industrial Metallurgy
Prerequisites: 4.403 or 4.433, 4.502 or 4.522.
The application of metallurgical principles to industrial processing with particular reference to casting, welding, shaping, properties and selection of materials. Metal finishing. Metallurgical aspects in engineering design. Fracture mechanics, design against fatigue, brittle and ductile fracture.
4.514 Industrial Metallurgy

Description as for subject 4.504.

4.524 Metallurgical Engineering Project

(Includes three weeks laboratory work during the mid-year recess.)
An investigation of some aspects of metallurgical engineering.

4.602 Metallurgical Engineering I

Co-requisite: 4.302.
Mass and energy accounting in metallurgical processes. An introduction to the principles and applications of transport processes in systems with specific reference to industrial processes in primary and secondary metallurgy.

4.604 Metallurgical Engineering III

Prerequisite: 4.623.
Process dynamics and automatic control: Dynamics of simple linear systems; representation and analysis of some metallurgical processes by linear models; effect of various control elements; analysis by empirical models; design of control systems for metallurgical processes. Simulation: Objectives of simulation; analysis of a process into its principal phenomena; mathematical and logical representation of the phenomena; development of the computer program; validation of the program. Metal Manufacturing Economics: The economic framework of manufacturing. Types of companies; application of financial analysis to manufacturing; elements of costing and cost control budgeting; allocation of resources; job scheduling; the modelling of a manufacturing unit; project evaluation and control. Optimization: As for 48.042 Chemical Engineering IIIB, Unit 2. Water Pollution Control: As for the relevant part of 48.043 Chemical Engineering IIIC, Unit 2. Atmospheric pollution control. Plus a selection from the following topics, to be determined by the Head of School: Mineral chemistry; testwork design; design of technical information systems; design of sampling procedures; selection of process models; energy utilization and recovery; utilization and disposal of waste materials; safety aspects of metallurgical processes.

An overall aim is the development of a sound method for making technical decisions, in the context of design, through the procedure of specifying criteria, evaluating options, implementing and reviewing the decision. To illustrate the method, case studies of technical decision-making in major industrial projects are presented by the people responsible for the projects.

4.613 Metallurgical Engineering IIA

Prerequisite: 4.602.
An extension of the principles and applications of transport processes to metallurgical systems. The principles of metallurgical heating and cooling including fuels, refractories and furnace design and operation. Solidification in moulds, continuous casting. Process Economics: As for 48.031 Chemical Engineering IIA Unit 6.

4.623 Metallurgical Engineering IIB

Prerequisite: 4.613
Continuous Processes: The application of theoretical models and empirical data to the design of continuous processes involving two or more phases in contact. The principles of instrumentation and their application to research and on-stream measurement in metallurgical plants.

4.624 Metallurgical Engineering Project

(F3)

4.703 Materials Science

Co-requisite: 4.403.
The application of the principles of physical metallurgy to the development of modern materials. Particular attention is paid to the structure property relationships that determine the design of materials. The topics covered include materials used for structural purposes, high temperature application, corrosive environments, nuclear engineering, fuel cells, magnetic applications.

4.802 Metallurgical Physics

Prerequisites: 1.001 or 1.011.

4.813 Mathematical Methods

Prerequisites 10.031 or 10.211A.

4.823 Numerical Methods

Prerequisite: 10.031.
Consists of Unit 2 — Numerical Methods of 4.813 Mathematical Methods.

4.911 Materials Science

The atomic structure of metals. The grain structure of metals; origin; modification. Structure of alloys, theory. Structure, properties and heat treatment of commercially important alloys based on aluminium, copper and iron in particular. Corrosion. Control of structure and properties, commercial alloys, materials selection.

4.913 Materials Science

4.941 Metallurgy for Engineers


4.951 Materials Technology


4.972 Materials for Mining Engineers


4.974 Mining Materials


Graduate Study

4.211G Metallurgical Practice

Detailed studies relating to one or more specialized areas of metallurgical practice such as founding, welding, mineral treatment.

4.221G Advanced Metallurgical Techniques

Lectures and laboratory instruction will be offered in advanced techniques including the following: X-ray metallography; electron microscopy; electron probe microanalysis; quantitative metallography; stress and strain analysis; fracture toughness testing; metal melting and casting; mechanical testing; electrochemical technique; research techniques — physical; research techniques — chemical; mineral investigation techniques.

4.231G Advanced Theoretical Metallurgy

Covers a wide range of theoretical topics drawn from physical metallurgy, chemical and extractive metallurgy, mineral chemistry, physics of metals and mechanical metallurgy.

4.241G Graduate Metallurgy Project

An experimental or technical investigation or design related to a branch of metallurgy.

4.251G Advanced Materials Technology


4.261G Modern Microscopy of Materials

Descriptions of light optical and electron optical instruments from the point of resolution, depth-of-field, contrast and additional data obtainable from the specimen as well as the application of these instruments to the study of materials.

4.270G Solid State and Mineral Chemistry

Principles of crystal chemistry; structures of selected crystal types and glasses. Thermodynamics of solid systems; phase relation. Defects in crystals; non-stoichiometry. Solid state diffusion. Thermodynamics and kinetics of solid state reactions. Hydrothermal reactions. Stability of compounds at elevated temperatures; effect of heat on clay minerals; hydrothermal reactions between silica and lime; volatility of compounds; reactions in nuclear fields; solid state electrolytes; biodegradation of rock and minerals. Chemical strengthening of ceramics.

4.271G Refractory Technology I

Engineering Properties and Application: This subject deals with the philosophy and methods of development of refractories, the thermodynamic stability and volatility of high temperature materials and the manufacture and testing of refractory materials in industry. A detailed consideration is given to the composition, structure, and properties of typical refractory materials such as silica, alumina silicate, high alumina, basic and siconia materials and special single and mixed oxides, carbide, nitrides and oxynitrides. Furnace and kiln design is studied with respect to limitations imposed by the refractories used. Laboratory experiments and demonstrations will form part of the course.

Candidates are expected to have a background knowledge equivalent to that expressed in the syllabus for 4.232 Ceramic Engineering I.

4.272G Refractory Technology II

Chemical Property and Service Behaviour: Deals with the study of chemical reactions occurring between refractories and reaction products in typical industrial situations. It will provide a basis for evaluating the predicting refractory performance in the manufacture of ferrous and non-ferrous metals, glass, enamels and cements. A detailed consideration of the chemical reaction occurring between refractories and solid, liquid and vapour phases will be made. Laboratory experiments and demonstrations form part of the subject. Candidates are expected to have a background knowledge equivalent to that expressed in the syllabus for 4.213 Chemical Ceramics (Session 1).
4.281G Chemistry of Glass Melting

Pre- or co-requisites may be specified depending on student's background.

Glass structure: property relations; melting reactions and rates; refining; analytical techniques; economics of glass compositions; melting and refining agents; process chemistry; chemical durability; glass colour; glass-refractory reactions; phase transformations. Laboratory exercises.

5.030 Engineering C

Prerequisites: as for 5.010.

5.020 Engineering B

Prerequisite: 5.0101 or 5.010 or 8.170.

Engineering Dynamics: Kinematics of a particle in the plane: rectilinear and curvilinear motion; motion relative to a translating frame of reference. Kinetics of a particle in the plane: Newton's second law; D'Alembert's principle; work, power and energy; belt and rope drives; gear trains. Virtual work. Kinetics of a system of particles: impulse and momentum; moment of momentum; impact. Fixed-axis rotation


Mechanical and Industrial Engineering

Undergraduate Study

5.010 Engineering A

Prerequisite: HSC Exam

Percentile Range

Required

Neither

2 unit Science (Physics) or
4 unit Science (multistrand)
or
2 unit Industrial Arts or
3 unit Industrial Arts

31-100
11-100
31-100
11-100

Note: Students who wish to enrol in this subject in courses other than the full-time courses in Aeronautical Engineering, Civil Engineering, Industrial Engineering, Mechanical Engineering and Naval Architecture can make up for the lack of the prerequisite by work taken in Physics in the first half of the first year.

Statics: Composition and resolution of forces, laws of equilibrium. Friction. Statics of rigid bars, pin-jointed frames, and beams. Simple states of stress. Statics of fluids. Introduction to Engineering Design: Engineering method, problem identification, creative thinking, mathematical modelling, computer-aided design, materials and processes, communication of ideas, the place of engineering in society. Introduction to Materials Science: The structure and properties of the main types of engineering materials, with emphasis on the way in which properties may be controlled by controlling structure.

5.020 Engineering B

Prerequisite: 5.0101 or 5.010 or 8.170.

Introduction to Metallurgical Engineering

(Metallurgy students must take this option.) History and significance of the exploitation of metals. Ores, mineral economics, mineral processing, and metal extraction and processing methods illustrated by reference to the Australian mineral and metal industries. Properties, uses and applications of metallic materials. The role of the metallurgist in industry and in processing and materials research, and in relation to conservation and the environment.

4. Introduction to Mining Engineering

(Mining Engineering students must take this option.) Mineral deposits; metallic, non-metallic and fuels. Elements of prospecting and exploration. Basic mining techniques. Mining phases; development, exploitation, beneficiation and withdrawal. Mining and the environment. Mining services. Relevance of basic science and engineering subjects to mining design and operations.

5. Introduction to Ceramic Engineering

(Ceramic Engineering students take this option.) The classification of materials. The nature of ceramics. The materials science approach. The scope of the ceramic industry. The origin, classification, physical properties and uses of clay minerals and other non-clay raw materials. Principal unit operations used in the ceramic industry. Drying and firing of ceramics, melt forming, pot forming and other forming procedures.
5.0301 Engineering Drawing S1 or S2 L/T3
Fundamental concepts of descriptive geometry, including reference systems, representation of point, line and plane; fundamental problems of position and measurement. Application of descriptive geometry to certain problems arising in engineering practice. Special emphasis on ability to visualize problems and processes involved in their solution. Instruction in the correct use of drawing instruments and the application of drawing standards. Measurements and dimensioning. Orthographic and isometric projections.

5.0302 Engineering Drawing and Descriptive Geometry S1 or S2 L/T3

5.122 Mechanical Engineering Design II F L1T2
Prerequisite: 5.030. Pre- or Co-requisites: 5.330 or 5.0201, 5.622, 5.422 or 8.112, 8.250.
Application of design strategy to creative design projects. Modelling, analysis and design of basic engineering elements and systems with further engineering drawing practice. Review of current available mechanical technology and use of standard equipment items, codes and trade literature.

5.300 Engineering Dynamics IB S2 L1T1
Prerequisites: 1.001 or 1.951, 5.0201, 10.001.
Kinematics and kinetics of rigid bodies in planer motion: absolute motion and motion relative to translating and rotating frames of reference; constraint and degree of freedom; friction; extensions to Newton's second law; D'Alembert's principle; differential equations of motion; gyroscopic couple; work and energy, variational principles; impulse and momentum, impact.

5.333 Dynamics of Machines S2 L2T1
Prerequisites: 5.300 or 5.330, 10.022.

5.422 Mechanics of Solids II/Materials F L2T2½
Prerequisites: 5.421 or 5.040 or 5.020 or 8.171, 10.001.

5.622 Fluid Mechanics/Thermodynamics F L2T2
Prerequisites: 10.001 or 10.011, 1.951 or 1.001 or 1.11; 5.010 or 5.0101. Co-requisite: 5.300 or 5.330 (for students in Faculty of Engineering only).
Comprises 5.6221, 5.6222, 5.6223.

5.6221 Introductory Thermo Fluids S1 L2T2

5.6222 Fluid Mechanics S2 L1T1

5.6223 Thermodynamics S2 L1T1

Electrical Engineering and Computer Science

Undergraduate Study

6.611 Computing I S1 or S2 L3T3
Prerequisite: As for 10.001. Co-requisite: 10.001 or 10.011. Excluded: 6.600, 6.620, 6.021D (1.041 excluded for students enrolled in Program 6806 and Computer Science programs in the Science and Mathematics course).
Introduction to programming; design and correctness of algorithms and data structures; programming in a high-level algorithmic language which provides simple, high level program control and data structuring facilities. Problem solving: basic ideas of problem solving; introduction to abstract structures used for computing solutions to problems. Introduction to propositional logic, computing machinery, computer arithmetic, artificial intelligence, and operating systems.
6.621 Computing IIA

Prerequisites: 6.611 (Pass Conceded (PC) awarded prior to Session 2, 1983, is not acceptable for this subject), 10.001 or 10.011. Excluded: 6.620, 6.021D.

For those students who intend to take further subjects in computer science.

Expansion and development of material introduced in 6.611 Computing 1. Systematic program development: introduction to programming language semantics, reasoning about programs, program derivation, abstract programs, realization of abstract programs (conversion from abstract to concrete). Practice in programming in a high-level programming language. Data-structures: arrays, lists, sets, trees; recursive programming. Introduction to computer organization: a simple machine architecture. Introduction to operating systems.

6.851R Electronics and Instrumentation

Prerequisite: 1.001 or equivalent.

An applications-oriented introduction to electronics. Provides a basis of circuit theory and elementary electronics and then treats filters, frequency response, general amplifier characteristics, operational amplifiers and their use in instrumentation, power supplies, analog computers and their use in modelling non-electrical systems. Included is a project illustrating the application of electrical engineering to other disciplines.

6.852R Electrical Machinery and Supply

Prerequisites: 6.851R.

A user-oriented introduction to the usage of electrical power in industry, covering the characteristics and selection of electrical machinery, its interface with the prime power supply, protection, electrical safety and compliance with Australian standards. Included in the subject is a project illustrating the application of electrical engineering to various aspects of industry.

6.854 Electrical Power Engineering

Prerequisite: 1.001 or equivalent (1.9222 or 6.851 for students in Course 3140).

Extensive introduction to the theory and application of heavy current electrical engineering. Commences with the requisite circuit theory and then proceeds to consideration of the distribution of electrical power and the characteristics and selection of electrical machinery. DC power supplies, three-phase AC supply, voltage regulation, transformers, AC and DC machines and their rating; a project illustrating the application of electrical engineering to various aspects of industry. Consists of two 2-hour tutorial or laboratory sessions per week each commencing with a structured mini-lecture. Detailed lecture notes are provided.

Graduate Study

6.458G Decision and Syntactic Systems for Digital Pattern Recognition

Concepts and techniques in decision-theoretic pattern recognition systems with an in-depth study of both non-parametric and parametric methods. Includes: pattern, feature and classification spaces, feature selection, linear discriminant functions and training algorithms; piecewise linear, discriminant functions; decision rules; the Bayes framework, approximation of probability densities; clustering and dimensionality reduction. Structural pattern recognition, including such topics as formal linguistics, primitives, grammar and syntax analysis as a recognition procedure.


The fundamentals of image processing including such topics as visual perception and the image model; uniform and non-uniform sampling and quantization; image transforms; image enhancement, sharpening and smoothing; image restoration and least squares filtering; image encoding, mapping, quantizing and encoding; image segmentation and description, grammars, languages and similarity. Material oriented towards scene analysis and world models for industrial robots including scenes; labelling; shadows; shape information; structural descriptions and representing knowledge; computer vision for robots.

6.468G Computer Display Systems and Interactive Instrumentation

Prerequisite: 6.060G.

Man-machine-process communication and control, and associated microprocessor based instrumentation. Review of appropriate analog and digital technology. Microcomputer hardware and programming for interactive communication using both machine and high-level languages. Display devices, operating principles and performance limitations. Hardware and software techniques for computer-generating and processing of pictures. Colour and movement. Interactive design and graphics creation. The geometry of transformations and projections. Light pens and other input devices. Non-visual communications including speech input-output.

6.580G Image Analysis in Remote Sensing

Prerequisites: 10.361 or similar.

Techniques for extracting information from remotely sensed data with particular emphasis on satellite imagery. Topics taken from: nature and characteristics of earth resources and related satellites; satellite sensors and data formats; image enhancement techniques; image classification methods, including clustering, classification and feature selection; image classification methodologies; new horizons in remote sensing image analysis.
Mining Engineering

Undergraduate Study

7.013 Principles of Mining

7.023 Mineral Process Engineering

7.033 Mineralogical Assessment
Assessment of the physical and chemical properties of economic minerals. Significance of the textures of minerals on the selection of mineral beneficiation processes. Destructive and non-destructive testing of bore cores. Factors influencing effective comminution and liberation.

7.044 Mining Economics

7.111 Introduction to Mining Engineering
Forms part of 5.030 Engineering C.


7.113 Mining Methods

8.587G Computer Techniques
in Remote Sensing Image Analysis
Prerequisite: 6.580G or similar.

A detailed treatment of computer methods for implementing analytical techniques used with remotely sensed data. Topics include: software requirements for image enhancement and analysis; structure and capabilities of the software packages LARSYS, ORSER, BICEP, LASP; implementation of classification methodologies, introduction to image processing hardware and associated operating systems; interactive image processing.

7.113R Mining Methods

7.114 Geotechnical Engineering

7.123 Geomechanics

### Subject Descriptions

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#### 7.124 Coal Face Mechanization

#### 7.132 Fluid Mechanics and Machines
Prerequisites: 1.001 or 1.011 or 1.951, 5.010, 5.0201, 8.171, 10.001. Co- or prerequisite: 10.022.


#### 7.133 Mine Transport

#### 7.142 Mine Development

#### 7.143 Mine Environment and Safety Engineering
Prerequisites for 7.143: 7.132, 7.142.

#### 7.144 Surface and Offshore Mining

#### 7.153 Power Supply In Mines
Prerequisites for 7.153: 19222 or 6.851, 7.132.

#### 7.154 Petroleum Engineering

#### 7.163 Excavation Engineering

#### 7.173 Computer Applications in Mining
Prerequisite: 10.022.
FORTRAN programming. Simulation of mining problems. Application of selected programs to mining exploration, operations, economics and design.
7.174 Mining Legislation
An appreciation of the laws relating to mining practice and to safety and health in mines.

7.184 Underground Metalliferous Mining
Not available to students who have completed 7.134. Prerequisite: 7.133.

7.194 Tunnel Engineering and Shaft Sinking
Shaft sinking in different ground conditions. Ground treatment before excavation. Shaft lining.

7.193R Mine Technology
A program of tutorials and laboratory work as the alternative to concurrent industrial experience. The student is given reading and technical assignments to complement the study of third year subjects in a full-time course.

7.194R Mine Design Practice
The student is given exercises in the application of mine equipment, and in safety and environmental precautions, to complement the lecture materials in third and fourth years of a full-time course. This is the alternative to concurrent industrial experience.

7.213 Mine Surveying
7.213R Mine Surveying
Prerequisites for 7.213: 10.301 and 29.441.
Surveying methods applied to the development and extraction of minerals. Instruments of special value in mine surveying. Correlation of underground and surface surveys. Progress measurement. Determination of reserves. The surveying and logging of boreholes. Preparation of mine plans.

7.214 Mine Economics and Planning
7.214R Mine Economics and Planning
Prerequisite for 7.214: 7.113.

7.224 Operational Management
7.224R Operational Management

7.234 Mineral Economics

7.313 Minerals Engineering Processes
Prerequisites: 25.520 or 25.201, 5.030.

7.313R Mineral Processing
A combination of 7.313, with selected topics from 4.374.

7.314 Mineral Process Technology
7.314R Mineral Process Technology
Prerequisite: 7.313 or 7.313R.
7.414 Minerals Industry Project

Candidates are required to submit a dissertation or thesis on a mining, minerals engineering or other topic approved by the Head of School. The work may take the form of an engineering analysis, experimental investigation, theoretical study or design project. Candidates may be required to present themselves for oral examination on the subject of their submission.

7.414R Minerals Industry Project

Periods are set aside each week to provide time for the students to consult library references, prepare notes and undertake experimental work. The project supervisor is available for discussion at agreed times but the student is expected to work on his or her own initiative. The only examination is by assessment of a submitted written thesis, which must consist of two parts: a literature survey and a report on research.

The thesis is to be based on a modest, but significant, research project, which may be on some aspects of a staff member's or mine company research interests. Most projects are experimental in nature but some may be largely theoretical.

7.416R Minerals Industry Project

A shorter version of 7.414R above.

7.424 Industrial and Research Seminars

The program includes two types of seminar. One deals with research work being undertaken or recently completed by members of the School of Mining Engineering. The other involves engineers and scientists from industry, other University Schools and research establishments discussing projects of special or topical interest in mining and allied fields.

7.424R Feasibility Studies and Seminars

Group work on the creation of a mining complex from an original mineral deposit with its approximate costing. Appraisal of the result as an investment. The work draws on all other courses and consists mainly of tutorials and seminars by students, and by visiting lecturers. Students are expected to present written technical reports and memoranda for assessment.

7.425 Mining Geology Project

7.434 Advanced Mining Laboratory

A program of mining laboratory experiments for Year 4 students, requiring the submission of appropriate laboratory reports.

Graduate Study

Generally these subjects are of three hours' duration per week or multiples of that time.

7.001G Exploratory Drilling and Development


7.111G Mining Engineering


7.122G Mining Engineering Technology


7.132G Mining Engineering Laboratory

A selection of advanced laboratory investigations in sampling and valuation, mine support, temporary or long term; mine design and plant related to extraction and servicing functions; rock properties; programming of mining methods and transport; non-entry mining; petroleum engineering; gasification; solvent processes.

7.151G Ground Control and Excavation Engineering


7.152G Mining Conservation

The reclamation of excavated land; integration with operational stages of mining. Mining cycles of alluvial, strip, and open cuts. Land clearing, stabilizing the mined area, socio-economic aspects of mining, rehabilitation costs, government regulations. Examination and evaluation of a current operation.

7.153G Environmental Conditions in Mines

The energy equation applied to ventilation, sources of heat in mines. Geothermal gradients, thermodynamics, pressure-volume diagrams. Practical aspects of high air temperatures and the control of atmospheric conditions in deep underground mines. Fan design, installation and testing. Psychrometry, ventilation planning. Computer applications. Selected laboratory experiments and network designs.
7.154G Rock Excavation and Transportation
Rock fragmentation drilling, blasting large rounds. Loading tech-
niques, shovels, draglines, bucket wheel excavators, dredges, front-
end loaders, tractor scrapers. Operating factors, selection pro-
ductures, cost estimating. Materials handling, continuous, semi-contin-
uous, batch systems, cost analysis.

7.311G Mineral Beneficiation
Prerequisite: 7.023.
Processing economics: mineral processing and its integration with
mining, metallurgical and chemical operations. Principles of roasting,
leaching, electrolysis, cementation, solvent extraction and ion
exchange. Particle mechanics size, shape, surface area, size distrib-
ution functions. Relative and bulk densities. Theory of fracture
mechanisms, comminution, energy requirements. Processes of ag-
glomeration. Physical separation methods, electronic sorting, elect-
trostatic and magnetic separation.

7.322G Mineral Beneficiation Technology
Prerequisite: 7.311G.
1. Fluid mechanics of mineral pulps, free, hindered and zone setting,
thickening, classification, hydrocyclones, dewatering, filtration. Grav-
ity concentration, jigging, sink and float, filtering film, fluidized beds.
2. Interfacial phenomena, the structure of solid-water, air-water, solid-
air and oil-water interfaces. Experimental techniques applicable to
the study of these interfaces. Electrokinetic theory, electrical double
layer interaction. Adsorption mechanisms. Collectors, activators, de-
pressants, modifiers, frothers, flocculants. 3. Sulphide mineral flota-
tion, xanthate chemistry, oxide mineral flotation, salt mineral flotation.
Coal preparation, coal constitution, bore core evaluation, selective
preparation, blending for utilization. 4. Process design. Feasibility
studies, extraction processes and environmental conditions. Select-
ion and location of equipment, fluid-solids flow, design of auxiliary
units, development and presentation of flowsheets. Sampling and
experimental techniques, batch, continuous and pilot plant testing.
Scale up. Product disposal. Principles of chemical analysis, instru-
mentation, measurement of variables in mineral processing, control-
ners, use of computers. Technical management.

7.323G Mineral Engineering Laboratory
Prerequisite: 7.311G.
Laboratory investigations may be selected from the following accord-
ing to availability and specialization, metalliferous ore concentration;
coal preparation; beneficiation of non-metallics; processing of mineral
fluids.

7.351G Mineral Beneficiation
Prerequisite: 7.313 or 7.311G.
Process design based upon mineral properties; extraction processes and
environmental conditions. Selection of technology to be adopted.
Basis of feasibility studies. Special considerations for coal prepara-
tion and treatment of industrial minerals. Flowsheet planning, solid
and fluid flows, auxiliary units, materials handling, product disposal.
Experimental techniques used in testing. Scale up procedures. Plant
control, automation, use of computers. Management of mineral
processing operations.

7.361G Minerals Engineering I
Prerequisite: 7.361 G and 7.362G.
1. Principles of mineral deposition. Constitution of coal. Fuel technol-
yogy Coke making. Principles of extractive metallurgy. Beneficiation
and utilization of industrial minerals. Materials balances. 2. Fluid
fluendy of mineral pulps. Rheology of fluids and particulate suspensions.
Dynamic of particle and bubble motion and collision. Flow
through porous media. Fluidized beds. Flow in pipes, open channels
and thin films. 3. Materials handling: Flow characteristics of granular
materials. Belt and mechanical conveyors. Stockpiles, bins and hoppers.
Sampling theory and practice. 4. Particle statistics: Concepts of
Specific surface. Shape factors. Number, Surface and Volume
mean sizes. 5. Interfacial phenomena: Free surface energy. Surface
tension. Three phase contact. Electrokinetic theory. Double layer
interaction. Chemical and physical adsorption. Experimental tech-
niques. Foams.

7.362G Minerals Engineering II
Prerequisite: 7.311G.
Grindability. Conventional comminution equipment. Feed and prod-
uct characteristics. Open and closed circuit operation. Vibratory and
fluid energy mills. 2. Screening and classification: Screening as a
process of chance. Screen loading. Factors affecting screen capaci-
ties. Types of screen. Probability screens. Optical imaging. Hy-
draulic, mechanical and cyclone classifiers. 3. Physical concentration
processes: Gravity concentration. Jigs, heavy media and flowing
films. Electronic and optical sorting. Electrical and magnetic separa-
tors. 4. Chemical concentration processes: Leaching. Solvent extrac-
tion and ion exchange. Cementation. Cyanidation and amalgamation.
5. Flotation: Collectors, activators, depressants, modifiers, frothers.
Conventional and novel cells. Flotation kinetics. Entrainment. Soluble
salt flotation. Reverse flotation. Agglomeration and carrier flotation.
Selective flocculation and agglomeration. 6. Liquid-solid separation
Dewatering by screens, and cyclones. Centrifuging. Dryers. Tailings
dams. Tailing utilization including mine fill, reclamation. Pollution
control.

7.363G Minerals Engineering Laboratory
Prerequisite: 7.311G.
A series of laboratory investigations relating to material covered in
subjects 7.361G and 7.362G.

7.364G Minerals Engineering III
Prerequisite: 7.364G.
Washability curves. The Mayer curve. Computer models of commi-
nution, sizing and concentration processes. Laboratory and pilot
scale testing. Scale up procedures. 2. Process design: Process
appraisal. Selection of technology based upon mineral properties,
extraction processes, energy requirements and environmental con-
ditions. Feasibility studies. Special considerations for coal prepara-
tion and treatment of industrial minerals. Process flowsheet planning,
equipment selection and details of solid and fluid flows. Engineering
flowsheets showing details of major and auxiliary units, materials
handling, product disposal, water and electricity, distribution and
control equipment. 3. Instrumentation and control: Principles of
chemical analysis. Laboratory and pilot scale analysis. Flow
and density gauges. Level detectors. Belt weighers. Controllers and
control strategies. Automation. 4. Plant design: Factors influencing

7.365G Minerals Engineering Project  S2 T10
Laboratory work to evaluate information necessary for the design of a process for the beneficiation of ore from a metalliferous deposit, preparation of coal or treatment of industrial minerals. Candidate’s report to include a process flowsheet, an equipment and materials flowsheet and a plant design layout.

7.442G Mineral Industry Analysis  S2 L2

7.455X Mining Geomechanics Project  F 4
Individual project on an investigation related to an actual mining geomechanics problem, the topic to be chosen after consultation with a staff member. A report is required.

7.515X Rock Mechanics Measurements  S1 3

7.525X Strata Control Engineering  S2 3

7.535X Mine Fill Technology  F 2

7.545X Advanced Rock Cutting Technology  F 2

Civil Engineering

Undergraduate Study

8.021 Environmental Aspects of Civil Engineering  SS L2T1
Prerequisite: 8.301 or 8.312.
Examination of the professional issues arising from the environmental impact of civil engineering planning, design and construction. Methodologies for environmental impact evaluation and general project evaluation. Environmental legislation, institutional procedures and decision-making processes. Case studies and project work in the above context.
8.112 Structures  

8.171 Mechanics of Solids I  
**Prerequisite:** 8.170. (Students who have failed 8.170 may apply for permission to enrol in 8.170 and 8.171 concurrently.)


8.172 Mechanics of Solids II  
**Prerequisite:** 8.171.


8.250 Properties of Materials  
**Mechanical behaviour of materials. Response to static loading in tension, compression, shear and bending. Use of static test data in analysis and design; variability of material properties; factors of safety. Hardness tests. Creep in solid materials. Response to dynamic loading; fatigue, impact. Deterioration of engineering materials. Rheological classification of materials.**

**Graduate Study**

8.402G Transport, Environment, Community  
**Effect of transport on public health, environment and communities. Analysis of unwanted effects of transport activity: accidents, noise, pollution, intrusion; causation, measurement, preventative and remedial action. Community reaction to transport activity: government, bureaucracy and public involvement in transport policy and environment impact statements.**

8.403G Theory of Land Use/Transport Interaction  
**Theoretical aspects of land use transport planning. Basic concepts, data collection methods, systems models and equation of state (functional behavioural, optimizing). Introduction to land use-transport modelling (land use, generation, distribution, modal assignment, network assignment, evaluation). Planning methodologies (short-, medium-, long-term; action planning, strategic planning; local, urban, regional, national).**

8.413G Transport Economics  
**Cost and price analysis to each of the transport modes (road, rail, air and sea). Welfare analysis and taxation theory with respect to transport. Economics of location, economics of land use models; regional trade model.**

8.701G Economic Decision Making in Civil Engineering  
**Review of practical engineering decision-making problems and relevant techniques. Engineering economics, benefit/cost analysis, consideration of inflation and taxation in investment decisions, bidding, decision theory, microeconomic theory; objectives and criteria, multiple objective planning.**

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

8.753G Soil Engineering  

8.775G Rock Mechanics  
**Strength and deformation characteristics of rock mass and joints; flow through joints and porous rock; failure criteria; stresses and deformations around underground openings; tunnel lining and rock anchors; stability of slope sections; stabilization of rock slopes; stability of underground excavations related to mining; foundations of dams in fissured and layered rocks.**

8.777G Numerical Methods in Geomechanics  
**Fundamentals of finite element and boundary element methods; deformation and flow problems; linear and non-linear analysis; applications to underground opening, stability of slopes, foundations, mining excavation; seepage and consolidation; soil-structure interaction problems, earth pressures, retaining walls and buried pipes; thermal stress analysis.**

8.778G Geotechnical Processes for Energy Resources  
**Principles of rock fragmentation: blasting patterns; prediction and estimation of ground vibrations; damage criteria; numerical techniques for the prediction of rock fracture; grouting materials and techniques.**
8.780G Geological Engineering


8.820G Structural Analysis and Finite Elements I


8.833G Free Surface Flow

Theory of waterflow in open channels. Application of theory to design of hydraulic structures, spillways, control gates, energy dissipators, channel transitions. Use of hydraulic models.

8.837G Hydrological Processes

Hydrologic cycle, water and energy balances, atmospheric moisture, precipitation process, evaporation and transpiration, storm runoff process, land use and management, stream gauging, instruments.

8.838G Flood Design

Excluded: 8.846G.

Introduction to flood estimation, design rainfall data, hydrograph analysis, storm runoff, loss rates, rational method, unit hydrographs, introduction to urban drainage design, flood frequency.

8.839G Advanced Flood Estimation

Flood routing, catchment characteristics, runoff routing, synthetic unit hydrographs, urban runoff, regional empirical flood estimation methods, advanced unit hydrograph theory.

8.842G 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.

8.847G Water Resources Policy

Resource economics, water supply, water demand, multiple objective planning, multiple purpose projects, water law, water administration, case studies.

8.848G Water Resource System Design

Principles of the optimal design and operation of multiple purpose, multiple component, water resource systems; evaluation of cost and benefits in complex and simple systems.

8.849G Irrigation

Soils, soil-water relationships, plants, climate, crop requirements; water budgets, sources, quality, measurement; irrigation efficiency. Design of irrigation systems, appurtenant works, distribution.

8.850G Drainage of Agricultural Land

Characteristics of drainage systems, steady and unsteady state drainage formulae, conformal transformation solutions, soil characteristics field measurement of hydraulic conductivity and soil water pressure, significance of unsaturated zone, practical aspects.

8.860G Investigation of Groundwater Resources I

Occurrence and extraction of groundwater, investigation and drilling methods, systems approach, optimization techniques, conjunctive use studies, quality of groundwater.

8.861G Investigation of Groundwater Resources II

Geophysical methods, remote sensing, photo-interpretation, arid-environment studies, analog models, case studies.

8.864G Arid Zone Hydrology

Co-requisite: 8.837G, 8.838G.

Arid zone rainfall characteristics, data collection and instrumentation, runoff processes, infiltration, transmission loss, recharge processes, flood characteristics and design; water yield, storage of water; evaporation and evaporation suppression; sediment transport and measurements.

8.865G Arid Zone Water Resources Management

Water as a resource demand for and supply of water; works and management to match demand with supply. Special features of the arid zone climate, water uses, quantification of demand quantities and qualities; measurement of flow rate, volume, quality. Engineering works: design, construction, operation and maintenance of works, including excavation tanks, dams, pipelines, pumps, windmills, engines and motors, troughs; costs; reliability, energy sources for pumping. Special practices: water spreading, irrigation including trickle irrigation; evaporation reduction, desalination.

8.909G Project

A minor research investigation involving analysis and interpretation of data, or a critical review and interpretation of literature on a selected topic, or a design project.

8.918G Project Report

As for 8.909G but involving more substantial investigation.
Wool and Pastoral Sciences

Undergraduate Study

9.001 Project F T6

Students are required to conduct an experimental or theoretical investigation under supervision and to submit a thesis describing the results of their investigations. Throughout the year students are required to submit progress reports to their supervisors and to present seminars. The written reports of the project shall be submitted by the last day of Session 2.

9.002 Seminar F T1

Seminars deal with research and/or development work being undertaken or recently completed by members of the School of Wool and Pastoral Sciences, other University schools and research organisations. There are also seminars on communication in wool and pastoral sciences and on problems facing rural industries.

9.101 Biology of Grazing Sheep and Cattle F L2T4

The biology of wool growth and fibre structure; production and use of pastures; principles of the nutrition of grazing ruminants; the biology of reproduction of sheep and cattle.

Field excursions and laboratory work are integral parts of the course.

9.111 Livestock Production I F L2T1

Prerequisite: 9.101.

The sheep and beef cattle industries and their place in the economic life of Australia; levels of production and trends. The physical biological, managerial and economic conditions influencing production. Sheep producing zones. Sheep breeds for wool production. Crossbreeding, prime lamb production. Sheep and cattle management; nutrition, reproduction, survival.

A field excursion of the one week's duration is held in Session 1.

9.112 Livestock Production II S1 L2T1

Prerequisite: 9.111.

The scope for intensification of ruminant production. The behaviour, nutrition, environmental physiology and health of intensively managed animals. Housing and environmental control of facilities. Examples of intensification, eg feed lots, sea transport.

9.113 Livestock Production III F L1T2


9.131 Animal Health I S2 L2T1

Prerequisite: 9.111.

Managerial prevention and control of grazing livestock health, the animal species involved, the concept of economic approach to animal health. Introductory immunology. Skin health; sheep and cattle. Control of external parasites, particularly by insecticides. Reproductive health; sheep and cattle. Internal parasites: flukes, cysticercosis and tapeworms, nematodes. Legal and Public Health responsibilities; Acts of Parliament relating to animal health.

9.132 Animal Health II S1 L2T1

Prerequisite: 9.131.


9.201 Agronomy F L2T2

Prerequisite: 9.101.


9.202 Pastoral Agronomy F L2T1

Prerequisite: 9.201.


9.203 Crop Agronomy S2 L2T1

Prerequisite: 9.201.


9.204 Range Management S2 L1T2

Co- or Prerequisite: 9.202.


Involves one week of instruction at Fowlers Gap Research Station.

9.301 Agricultural Economics and Management I F L2T1

The subject covers two broad strands: basic economic principles, and applied methods for farm management planning. The material on economic principles centres on (a) the theory of production economics, which provides the background for many of the tools of
applied farm management; and (b) price theory with emphasis on agricultural markets.

The management planning strand emphasises basic farm planning procedures such as partial, whole-farm and parametric budgeting, and gross margins analysis. As necessary background for the application of such methods, the course also includes coverage of valuation principles, land tenure, systems of title, discounting procedures, depreciation methods, tax and credit structures, and discussion of the design and use of farm record systems.

9.302 Agricultural Economics and Management II  
Prerequisite: 9.301.
Analysis of agricultural policies: agricultural marketing concepts; and an introduction to international trade theory. Investment appraisal and cost-benefit analysis.

Quantitative methods in agricultural economics and farm management with emphasis on — (i) Response surface estimation and analysis; (ii) Linear programming methods, with an introduction to other mathematical programming methods; (iii) Systems analysis and simulation methods.

9.412 Agricultural Chemistry II  
Prerequisite: 2.003J.

Animal milks, analysis and heat treatment changes and detection. Roles of trace metals in biological processes, metal complexes with proteins and metal catalysis.


9.421 Animal Nutrition  
Prerequisite: 9.601.

While particular emphasis is given to nutritional requirements of sheep, those of other farm livestock are dealt with in this section.

9.501 Wool Science I  
Prerequisite: 9.101.
Raw materials and fibre identification; yarn manufacture; fabric manufacture; dyeing and finishing; testing and quality control. Wool biology; wool growth; wool fibre properties. Physical fleece characteristics; clip preparation; fleece defects; wool marketing procedures.

9.502 Wool Science II  
Prerequisite: 9.501.
The effect of clip preparation on textile processing; wool metrology (raw wool); distribution of fibre parameters.

9.503 Wool Science III  
Co- or prerequisite: 9.502.
Evaluation and typing; organizational structure of the wool industry.

Marketing schemes; commercial (reserve price; AWC marketing plan); technical (traditional, sale by sample, sale by separation, sale by description).

Wool metrology, advanced appraisal and evaluation; current wool outlook; research developments.

9.601 Animal Physiology I  
Prerequisite: 17.041.
Physiological systems of mammals are treated with special attention to homeostasis. Cell membranes; blood and body fluids; the immune reaction. Cardiac control, functions and haemodynamics. Respiration. The endocrine system with particular emphasis upon growth, reproduction, lactation and stress. The nerve impulse, its excitation and transmission. Physiology of digestion, the gastro-intestinal tract and of the kidney. Heat tolerance and climatic adaptation.

9.602 Animal Physiology II  
Prerequisite: 9.601.

9.801 Genetics I  
Prerequisite: 9.111.

9.802 Genetics II  
Prerequisite: 9.801.
9.811 Biostatistics I
Prerequisite: 45.101.


9.812 Biostatistics II
Prerequisite: 9.811.


9.813G Quantitative Methods

Selected topics in: biostatistics and economic statistics, with emphasis on experimental design and on least squares procedures; response surface estimation and analysis; mathematical programming methods for rural industries; data processing and computer programming; systems analysis and simulation methods.

9.901 Rural Extension

Development of communication skills through experiential or active learning situation. Educational, psychological and sociological factors relating to the diffusion of innovations. Program planning and evaluation.

Mathematics

Undergraduate Study

10.001 Mathematics I
Prerequisite: HSC Exam

2 unit Mathematics* or
3 unit Mathematics or
4 unit Mathematics or
10.021B.

Excluded: 10.011, 10.021B, 10.021C.

*This refers to the 2 Unit Mathematics subject which is related to the 3 Unit Mathematics subject. It does not refer to the subject 2 Unit Mathematics (Mathematics in Society).

Calculus, analysis, analytic geometry, linear algebra, an introduction to abstract algebra, elementary computing.

10.011 Higher Mathematics I
Prerequisite: HSC Exam

3 unit Mathematics or
4 unit Mathematics

Excluded: 10.001, 10.021B, 10.021C.

Calculus, analysis, analytic geometry, linear algebra, an introduction to abstract algebra, elementary computing.
10.021B General Mathematics IB S1 L4T2

Prerequisite: 10.021A. Excluded: 10.011, 10.001.

This refers to the 2 Unit Mathematics subject, which is related to the 3 Unit Mathematics subject. It does not refer to the subject 2 Unit Mathematics (Mathematics in Society).

10.021C General Mathematics IC S2 L4T2

Prerequisite: 10.021B. Excluded: 10.001, 10.011.

10.022 Engineering Mathematics II F L2T2

Prerequisite: 10.001.

10.031 Mathematics F L1T1

Prerequisite: 10.001 or 10.011. Excluded: 10.021A.

Note A: As for Note A in 10.031 Mathematics.

Note B: Mathematics 10.032 is included for students desiring to attempt only one Level III Mathematics unit. If other Level III units in Pure Mathematics, Applied Mathematics or Theoretical Mechanics are taken, 10.032 Mathematics will not be counted.

10.032 Mathematics F L1½T1

Prerequisite: 10.031.

Note A: As for Note A in 10.031 Mathematics.

Note B: Mathematics 10.032 is included for students desiring to attempt only one Level III Mathematics unit. If other Level III units in Pure Mathematics, Applied Mathematics or Theoretical Mechanics are taken, 10.032 Mathematics will not be counted.

10.111A Pure Mathematics II — Linear Algebra F L1½T1

Prerequisite: 10.001 or 10.011. Excluded: 10.121A.

10.1113 Pure Mathematics II — Multivariable Calculus S1 or S2 L1½T1

Prerequisite: 10.001 or 10.011. Excluded: 10.1213.

Multiple integrals, partial differentiation. Analysis of real valued functions of one and several variables.

10.1114 Pure Mathematics II — Complex Analysis S1 or S2 L1½T1

Prerequisite: 10.001 or 10.011. Excluded: 10.1214.

Analytic functions, Taylor and Laurent series, integrals. Cauchy's Theorem, residues, evaluation of certain real integrals.

10.121A Higher Pure Mathematics II — Algebra F L2T½

Prerequisite: 10.011 or 10.001 (DN). Excluded: 10.111A, 10.1111.


10.1213 Higher Pure Mathematics II — Multivariable Calculus S1 L2T½

Prerequisite: 10.011 or 10.001 (DN). Excluded: 10.1113.

As for 10.1113 but in greater depth.

10.1214 Higher Pure Mathematics II — Complex Analysis S2 L2T½

Prerequisite: 10.1213. Excluded: 10.1114.

As for 10.1114 but in greater depth.
10.211 Applied Mathematics II — Vector Calculus
Prerequisite: 10.001 or 10.011. Excluded: 10.2211, 4.813.
Vector fields; divergence, gradient, curl of a vector; line, surface, and volume integrals. Gauss' and Stokes' theorems. Curvilinear co-ordinates.

10.212 Applied Mathematics II —
Mathematical Methods for Differential Equations
Prerequisites: 10.001 or 10.011. Excluded: 10.2212, 4.813.
Series solution or ordinary differential equations; numerical methods. Partial differential equations: separation of variables. Fourier series, Bessel functions.

10.221 Higher Applied Mathematics II —
Vector Analysis
Prerequisite: 10.011 or 10.001 (DN). Excluded: 10.2111.
As for 10.2111 but in greater depth.

10.222 Higher Applied Mathematics II —
Mathematical Methods for Differential Equations
Prerequisite: 10.2211. Excluded: 10.2112.
As for 10.2112 but in greater depth.

10.301 Statistics SA
Prerequisite: 10.001 or 10.021C. Excluded: 10.311, 10.311A, 10.311B, 10.321A, 10.321B, 45.101.
Probability, random variables, independence, binomial, Poisson and normal distributions, transformations to normality, estimation of mean and variance, confidence intervals, tests of hypotheses, contingency tables, two sample tests of location, simple and multiple linear regression, analysis of variance for simple models.

10.331 Statistics SS
An introduction to the theory of probability, with finite, discrete and continuous sample spaces. The standard elementary univariate distributions: binomial, Poisson and normal; an introduction to multivariate distributions. Standard sampling distributions, including those of $\chi^2$, $t$ and $F$. Estimation by moments and maximum likelihood (including sampling variance formulae, and regression); confidence interval estimation. The standard tests of significance based on the above distributions, with a discussion of power where appropriate. An introduction to experimental design; fixed, random and mixed models, involving multiple comparisons and estimation of variance components.

12.100 Psychology I
FL3T2
An introduction to the content and methods of psychology as a basic science, with emphasis on the biological and social bases of behaviour, relationship to the environment, and individual differences. Training in the methods of psychological enquiry, and in the use of elementary statistical procedures.

13.111 Textile Technology I
FL3T5

13.112 Textile Technology II
FL5T7
Part A. Textile Technology III  F L4½T2


13.211 Textile Science I  F L2T1


13.212 Textile Science II  F L2


13.213 Textile Science III  F L2T2


13.223 Advanced Textile Chemistry  F L2


13.233 Advanced Textile Physics  F L2


13.311 Textile Engineering I  F L1

Mill illumination. Elements of strength of materials — tension, compression, shear, torsion and bending. Dynamics of rotary motion and mechanical power transmission. Industrial electricity.

13.312 Textile Engineering II  F L1½


13.313 Advanced Textile Engineering  F L2

(a) Same as (a) in 13.233 Textile Physics.

(b) Heat and mass transfer. Conveying of gases, fluids and solids.

13.411 Project  F T7

Students are required to carry out a research project and to submit a thesis describing the results of their investigations. It is usual for students to be allocated projects in areas related to the particular course strand they are studying. The following examples are typical.

Textile Chemistry: Topics related to the dyeing and finishing of textiles and to the chemistry of fibres. Textile Engineering: Engineering design work, some engineering aspect of textile processes, or some other topic of an engineering nature. Textile Manufacture: A topic related to textile processing or a topic of a commercial nature, such as some aspect of marketing, management or economic planning as applied to the textile industry. Textile Physics: The application of some aspects of physics to textile processing or to fibre, yarn or fabric structure and properties.
Undergraduate Study

15.001 Microeconomics I

Commerce/Arts/Applied Science
Prerequisite: 15.002 or 15.012

HSC Exam
Percentile Range
Required
2 unit A English or
31-100
2 unit English or
21-100
3 unit English
11-100

Introduction to micro-economic analysis and its application to
temporary policy issues. Indifference curve approach to consumer
behaviour, income and substitution effects, market demand, con-
sumer surplus. Isoquants, cost concepts, supply curves. Perfect and
imperfect product markets, agricultural intervention schemes. Partial
and general equilibrium, concept of efficiency, international trade
and tariffs. Productivity of factors of production, labour markets,
unilateral monopoly, wage fixing in Australia. Public goods, pollution
and property rights.

15.002 Microeconomics II

Commerce/Arts/Applied Science
Prerequisites: 15.001 plus
HSC Exam
Percentile Range
Required
2 unit Mathematics or
51-100
3 unit Mathematics or
21-100
4 unit Mathematics
1-100

Excluded: 15.012, 15.072

Revealed preference theory of demand, index numbers and aggre-
gation; externalities, time preference, consumer surplus and com-
ensation concepts. Short and long-run costs, returns to scale, pro-
cducer surplus and quasi-rents. Monopolistic competition, oligo-
poly, cartels, public enterprise. Investment criteria, benefit-cost
analysis. Efficiency and equity trade-offs, microeconomic policy in a
second best framework.

15.003 Macroeconomics III

Commerce/Arts/Applied Science
Prerequisite: 15.042.

Macroeconomic theory and policy including an introduction to the
ty of economic policy, the structure and dynamic characteristics
of macro-models, recent developments in monetary theory and pol-
cy, theories of inflation and policy in a dynamic setting.

15.011 Macroeconomics I

Commerce/Arts/Applied Science
Prerequisite: 15.001.

The economics of output, employment and inflation, including social
accounting, consumption and investment functions, the Keynesian
goods market model, supply and demand for money, interactions
between the goods and money markets in equilibrium and disequili-
brium situations, inflation and the balance of payments.

15.042 Macroeconomics II

Commerce/Arts/Applied Science
Prerequisites: 15.011 plus
HSC results as for 15.002. Excluded: 15.052, 15.062.

Extensions to the Keynesian model of income determination to in-
clude the government and overseas sectors and a more detailed
examination of both demand and supply functions; money and
financial institutions; an introduction to dynamic economics.

15.043 Marxian Political Economy

Commerce/Arts/Applied Science
Prerequisite: 15.011.

Varieties of political economy, Marx and the classics, the Marxian
system, Marxian economics since Marx, Marx and socialist planning,
Marxian analysis of current economic problems.

15.053 Economics of Developing Countries

Commerce/Arts/Applied Science
Prerequisite: 15.072 or 15.103 or
15.113.

Aspects of economic development in the less developed countries.
Characteristics of these countries and the policies available to them,
simplified models of under-development, phenomenon of structural
change in the development process, role of industrialization in pro-
moting structural change, international relationships of developing
countries and strategies of development based on industry or agri-
culture.

15.062 Applied Macroeconomics

Commerce/Arts/Applied Science
Prerequisite: 15.011. Ex-
cuded: 15.052.

Economic growth and fluctuations in Australia. Inflation, unemploy-
ment and balance of payments issues. Fiscal, monetary, exchange
rate and incomes policies. Changes in the structure of the Australian
financial system and its links with the international monetary system.
Effects of restrictions on capital markets.

15.072 Applied Microeconomics

Commerce/Arts/Applied Science
Prerequisite: 15.011. Ex-
cuded: 15.012 and 15.002.

Structural change in the Australian economy. The effect of different
market structures on firms and consumer welfare. The consequences
of markets failure and the effects of government regulation. Invest-
ment decisions in the public and private sectors, including the
estimation of future benefits, revenues and costs, the measurement
of consumer and producer surplus. The economics of non-renewable
and other resources. Australia's international trade and investment
and the effects of restrictions on international trade and investment.

15.073 Natural and Environmental Resources

Commerce/Arts/Applied Science
Prerequisite: 15.002 or 15.012 or
15.072.

Arts Prerequisites: 15.103 or 15.113 or 15.062 and 15.072.

Classification of renewable and non-renewable resources: reserves,
resources and resource base; the concept and measurement of
resource scarcity, costs, prices and rents; exhaustion of resources,
recovery, exploration, availability of substitutes; uncertainty of
discovery, technical progress, market imperfections; renewable re-
sources, sustainable yield concepts. Policy issues, with particular
reference to Australia's role in the international economy.
15.082 Labour Economics

Commerce/Applied Science Prerequisite: Any Year 2 economics subject.
Arts Prerequisites: 15.002 or 15.062 or 15.072 plus 15.402 or 15.421.

Not offered in 1984.

Theories of the labour market and segmented labour markets and applications to the Australian situation, including labour supply and demand with emphasis on structural changes in the labour force, and the effects of technology and migration; work-leisure preferences, job satisfaction and worker participation; unemployment and under-employment, wage theory and practice, with reference to market forces, collective bargaining and government regulation; the Australian Arbitration System and its interaction with other wage determinants; wage differentials.

15.083 Public Finance

Commerce/Applied Science Prerequisite: 15.002 or 15.012 or 15.072 or 15.042 or 15.041.

Arts Prerequisites: 15.002 or 15.072 plus 15.402 or 15.421.

General aspects of public sector expenditure and its financing with special reference to Australia: role of government in the economy; principles and types of public expenditure, tax sharing and revenue systems; economic and welfare aspects of different types of taxes and social service systems; inflation and tax indexation; loan finance and the public debt; fiscal policy, the Budget and the economy.

15.093 Public Sector Economics

Commerce/Arts Prerequisite: 15.002 or 15.012 or 15.072. Applied Science Prerequisite: 15.002 or 15.072 plus the approval of the Head of the Department of Economics.


15.103 International Economics

Commerce/Applied Science/Sciences Prerequisite: 15.002 or 15.012. Arts Prerequisites: 15.002 or 15.072 plus 15.402 or 15.421. Excluded: 15.113.


15.143 Microeconomics III

Commerce/Applied Science/Sciences Prerequisite: 15.002 or 15.012.


15.163 Industry Economics and Australian Industrial Policy

Commerce/Applied Science Prerequisite: 15.002 or 15.012 or 15.072. Arts Prerequisites: 15.402 or 15.421 plus 15.072 or 15.012 or 15.002.

Structure of industry; interrelationships between the role of the business firm and industrial structure; multinational corporations; factors affecting size-structure and performance such as economies of scale; barriers to entry, vertical integration, diversification and mergers, patents, the development and transmission of technology; industrial policy in Australia with special reference to competition policy; foreign investment and mergers, and some specific industry policies (eg on motor vehicles, electronics, steel, petroleum).

15.501 Introduction to Industrial Relations

For students enrolled in Faculties other than Commerce and Arts. Designed to provide a practical introduction to important industrial relations concepts, issues and procedures. Includes: 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 NSW 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.

For further information regarding the following subject see the Faculty of Arts Handbook.

15.666 Australia in the International Economy in the Twentieth Century

HSC Exam

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<th>Percentile Range</th>
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<tr>
<td>2 unit A English</td>
<td>31-100</td>
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<tr>
<td>2 unit English</td>
<td>21-100</td>
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<tr>
<td>3 unit English</td>
<td>11-100</td>
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</tbody>
</table>

The international economy at the end of the nineteenth century: trade, factor flows, and payment arrangements. Problems of the international economy between the wars: The impact of World War II and the international economy in the post-war era. Australian economic development and its relationship with the international economy; economic fluctuations; problems of the inter-war period; growth of manufacturing; government policy and action; the importance of the mining industry; economic development and the distribution of income and wealth.

15.777 Management Strategy and Business Development

Commerce/Applied Science/Sciences Prerequisite: 15.601 or 15.666.

The strategy and structure of large scale business enterprise over the past century. An analysis of the process of growth from small family firms and partnerships to corporate enterprises and multinational corporations. The external business environment. Case studies of managerial hierarchies, investment strategy and diversification of firms in transport, mass retailing and mass production.
Prerequisites: 10.031, 10.331.

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 organizations, functions, inter-relationships and information flow. Sampling techniques in quality control, control charts. Introduction to Inventory Control: Analysis of some engineering planning decisions. Introduction to Operational Research: The formation and optimization of mathematical models of industrial processes. The development of decision rules. Some techniques of operational research and applications, eg mathematical programming, queueing theory, inventory models, simulation.

18.131 Operations Research

Introduction to Operational Research: The formation and optimization of mathematical models of industrial processes. The development of decision rules. Some techniques of operational research and applications, eg mathematical programming, queueing theory, inventory models, simulation.

18.551 Operations Research

Prerequisites: 18.603 or 18.121, 5.072 or 10.031 or 10.331.

The formulating and optimization of mathematical models. The development of decision rules. Some techniques of operations research such as mathematical programming, queueing theory, inventory models, replacement and reliability models, simulation. These techniques applied to situations drawn from industrial fields, eg production planning and inventory control. Practical problems of data collection, problem formulation and analysis.

17.021 Engineering Economy: Economic objectives of the firm. Economic measure of performance: net present value, annual equivalent value and the DCF rate of return (including the incremental rate of return).
Applied Geology

Field tutorials are an essential part of these subjects, and are held during weekends and/or recesses. Dates and costs are available during the first week of the subject. Attendance is compulsory.

Undergraduate Study

25.110 Earth Materials and Processes S1 L2T4


25.112R Geology for Mining Engineers IIA

Prerequisite: 25.520.


25.120 Earth Environments and Dynamics S2 L2T4

Prerequisites:

<table>
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<th>HSC Exam</th>
<th>Percentile Range</th>
<th>Required</th>
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<tr>
<td>2 unit Mathematics* or 3 unit Mathematics or 4 unit Mathematics and 2 unit Science (Physics) or 2 unit Science (Chemistry) or 4 unit Science (multistrand)</td>
<td>71-100</td>
<td>31-100</td>
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<td>and 25.110.</td>
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*This refers to the 2 Unit Mathematics subject which is related to the 3 Unit Mathematics subject. It does not refer to the subject 2 Unit Mathematics (Mathematics in Society).


25.122R Geology for Mining Engineers IIB

Prerequisite: 25.520.


25.201R Mineragraphic Laboratory Work

Comprises the mineralogy and Introductory Mineragraphy topics from 25.112R Geology for Mining Engineers IIA.

25.211 Earth Materials I S1 L2T4

Prerequisite: 25.120.


25.212 Earth Environments I S1 L3T3

Prerequisite: 25.120.


25.221 Earth Materials II S2 L3T3

Prerequisite: 25.211.

Sedimentary Petrology: The influence of transportation, deposition and diagenesis on the composition, texture and structure of detrital sedimentary rocks. The chemically formed sedimentary rocks including the phosphates, zeolites, evaporites, ferruginous and siliceous
Economic geology, mathematical geology, geophysics.

25.304R Geoscience III

Economic geology, mathematical geology, geophysics.

25.314 Mineral and Energy Resources I

Prerequisite: 25.221.

Metallic Resources: Classification and origin of the ore deposits, geochemical processes, research methods. Orthomagnetic, hydrothermal, porphyry, volcanic-sedimentary, Mississippi Valley type, chromium, iron, manganese ores, residual and mechanical ores. Introduction to mineral exploration. Laboratory study of hand spec-

25.311 Earth Materials III

Prerequisite: 25.221.


25.321 Earth Materials IV

Prerequisite: 25.221.


25.312 Earth Environments II

Prerequisite: 25.212 (note: it is desirable that students taking this unit have also taken 25.223).


25.223 Earth Physics

Prerequisite: 25.110


25.2261 Mathematical Geology I

Prerequisite: 25.120.

Geological Statistics: Measurement scales in geology. Probability distributions and their properties, sampling and test of significance. Application of these techniques using geological data. Geological Computing: FORTRAN programming; text editing; control language for VAX and CYBER.

25.301R Geoscience IIIA

Stratigraphy, palaeontology, oceanography.

25.302R Geoscience IIIB

X-ray crystallography, mineralogy, metamorphic petrology, structural geology, tectonics.

25.303R Geoscience IIIC

Igneous petrology, geochemistry, clay mineralogy, sedimentary petrology.

25.304R Geoscience IIID

Economic geology, mathematical geology, geophysics.
mens, thin sections and polished sections of various ore types; study of selected mining areas representing various genetic types of ore.

Economic Mineralogy: Nature of reflected light. Ore textures and their interpretation. Phase relations and paragenesis of ore minerals. Practical work in optical properties of ore minerals, hardness and reflectivity measurements: study of selected ores and ore minerals under the microscope including textural studies. Field Work of up to four days is a compulsory part of the subject.

25.3162 Mathematical Geology II S1 L2T1
Prerequisite: 25.2261.
Application of the mathematical techniques listed below to geological data processing and analysis. Analysis of variance. Introduction to development of regression analysis; trend surface analysis; Markov chain analysis. Introduction to nonparametric statistics. Introduction to multivariate statistics. Practical work based on the use of SPSS, BMDP and other library programs.

25.321 Earth Materials IV S2 L3T3
Prerequisite: 25.221.

25.324 Mineral and Energy Resources II S2 L3T3
Prerequisite: 25.212.

25.325 Engineering and Environmental Geology S2 L4T2

25.3261 Geochemical Analytical Techniques S1 L1T1
Prerequisite: 25.311.

25.3271 Advanced Structural Geology S2 L1T1
Prerequisite: 25.221.
Advanced Structural Geology: Analysis of structural elements at the microscopic, mesoscopic and macroscopic scales. Detailed studies of the analysis of metamorphic terrains, eg Cooma Complex, Broken Hill. Field Work of up to three days is a compulsory part of the subject.

25.333 Exploration Geophysics S1 L3 and S2 L1T1
Prerequisite: 25.120.
Physical properties of rocks and soils. Introduction to seismic, gravity, magnetic, electrical, electromagnetic and radiometric methods of geophysical exploration. Application of these methods in the search for mineral deposits, petroleum, coal and groundwater and in civil and mining engineering projects. Interpretation of geophysical data. Field Work of up to three days is a compulsory part of the subject.

25.410 Resource Geology S1 L3T6

25.4101 Topics in Advanced Geology S1 L3

Topics in geology selected from a list of subjects available from the Head of School.

25.4121 Advanced Sedimentology S1 T6

Detailed field and laboratory study of sedimentary textural and structural characteristics of a sedimentary sequence and determination thereof from its palaeogeographic setting.

25.4122 Seismic Stratigraphy and Log Analysis S1 L1T1

Structural and stratigraphic interpretation of seismic records at both regional and prospect scales. The application of wire-line logs to stratigraphic analysis and formation evaluation and the integration of log and seismic data in sedimentary basin analysis.

25.4123 Geology of Selected Oil and Gas or Coal Fields S1 L1T1

Literature study and seminars on typical Australian and, in particular, overseas productive regions and fields.

25.4124 Palynology or Foraminiferal Micropalaeontology S1 L1T1

Laboratory based studies in the application of palynology to geological problems; or, use of foraminifera in dating, correlation and stratigraphic subdivision; also diagnostic techniques as applied to principle zonal species.

25.4141 Mineral Exploration S1 L1½ T1

The use of geology in mineral exploration and area selection involving the development of conceptual models, the organization of exploration programs, radiometric methods, exploration ground tenure in New South Wales and exploration drilling.

25.4142 Geological Sampling and Analytical Methods S1 L1T1

Methods of collection of samples in exploration geochemistry including waters, soils, drainage sediments and rocks. Methods in estimating and monitoring sampling and analytical errors. Determination of selected elements in soil and stream samples by atomic absorption, fluorometric, specific ion electrode and colorimetric methods.

25.4143 Research Project S1 L1T1½

An integrated study involving literature review and laboratory analysis of an appropriate mineralized environment.

25.4151 Hydrogeology S1 L1T2


25.4152 Engineering Geology S1 L1T2


25.4153 Environmental Geology S1 L1T2

Geological factors in waste disposal — domestic, industrial and radioactive. Environmental parameters of coasts and beaches.

25.4154 Engineering Project S1 L1T3

A field and laboratory project in an aspect of engineering geology.

25.420 Field Project S2

A major field-laboratory project, which generally includes geological mapping, on some aspect of mineral or sedimentary basin resources, engineering or environmental geology or resource geophysics.

25.510 Geology for Geomorphologists and Pedologists S2 L2T3

Prerequisites: 25.211, 25.221, 25.212.


25.520 Geology for Mining Engineers I

Outline of the main branches of geology and their application to Mining Engineering. Introduction to geomorphological processes and resulting landforms. Fundamentals of the atomic structure of minerals including major rockforming minerals and ore minerals, their crystal symmetry, their physical and chemical properties. Igneous Rocks: formation, texture, composition and classification of the more important igneous rocks. Sedimentary Rocks: processes of formation and depositional environment, composition and classification. Metamorphic Rocks: metamorphic processes and metamorphic structures, classification and description of metamorphic rocks. Physical properties of rocks including porosity, permeability and capillarity. Weathering processes of rocks and minerals. Deformation of rocks and the resulting effects such as folds, faults, joints and foliation. An introduction to modern theories of tectonism. Integration of geological observations. Practical Work: Laboratory work consists of exercises related to the Lecture course: geological mapping including structure contour problems. Study of minerals and rocks in hand specimens. Field Tutorials: Two field tutorials are conducted at which attendance is compulsory. Satisfactory reports must be submitted. Note: Total hours: 56. The subject is divided equally between lectures and laboratory work. Field tutorial hours are additional.
25.5212 Sedimentology  S1 L1T1
Prerequisite: 25.120. Excluded: 25.212.
Sedimentology, as in 25.212 Earth Environments I. Available only to Course 3145.

25.523 Mineralogy
Crystallography, crystalline state and crystal growth of minerals. Fundamentals of the atomic structure of minerals, with examples of Bravais lattices and introduction to space lattice group theory. Physical properties of crystals; cleavage, gliding, secondary twinning, elasticity. Elements of crystal optics in polarized light. Classification, descriptive mineralogy and occurrence of primary and secondary minerals with special emphasis on economic metallic and non-metallic minerals. Introduction to petrology. Mode of formation of minerals and ores in the igneous, sedimentary and metamorphic cycles. Examples of principal types of economic mineral deposits, their mode of formation, paragenesis, textures and intergrowths. Elements of fuel geology, construction and refractory materials. Laboratory: Crystallography — Examination of crystals and crystal models for symmetry. Stereographic projection of crystals. Optical Mineralogy — Examination of minerals and rocks in transmitted and incident light using the polarizing microscope. Determination of refractive indices of crystal fragments by the immersion method. Descriptive and Determinative Mineralogy — Macroscopic examination of common minerals with emphasis on economic minerals. Study of texture and intergrowths of common mineral parageneses including the principal rock types in which they occur.

25.530 Geology for Mining Engineers II
Palaeontology and Stratigraphy: principles of stratigraphy; the use of fossils in stratigraphic correlation and bore logging. Structural Geology: elements of structural geology; stereographic projection and fracture analysis applied to mining operations. Geology of Fuels: origin of coal, oil and natural gas; stratigraphic and structural considerations of oil and coalfields. Hydrogeology: principles of hydrogeology. Transmission of ground water in rocks and soils applied to mining operations. Ore Deposits: mineralogy of industrially important metallic and non-metallic minerals; theories of ore formation including secondary enrichment processes. Exploration Procedures: theories and application of exploration techniques in mineral and coalfield exploration including geological and geophysical methods. Field Tutorial: a geology field excursion is held at the end of Session 1, attendance is compulsory.

25.5311 Aqueous Geochemistry  S1 L0
Prerequisite: 25.221.
Aqueous Geochemistry, as in 25.311 Earth Materials III. Available only to Course 3145. Note: Tutorials comprise 10 hours total in Session 1 only.

25.5312 Geological Field Mapping  S1 L2
Prerequisite: 25.5212. Excluded: 25.312.
Field Mapping, as in 25.312 Earth Environments II. Available only to Course 3145.

25.5313 Stratigraphy  S1 L2T1
Prerequisite: 25.5212. Excluded: 25.312
Stratigraphy, as in 25.312 Earth Environments II.

25.532 Advanced Engineering Geology
Prerequisite or co-requisite: 8.272.
The fabric of rocks at various scales; fabric analysis at the mesoscopic scales; the influence of anisotropy on rock properties, engineering applications. The role of geological structure in determining the stability of slopes and excavations; probability analysis of structures in slope studies; case histories. Petrology of rock and earth construction materials; fabric changes with weathering, soil fabrics; engineering aspects, and engineering classification of weathered rocks.

25.542 Mining Geology Project  S2

25.9311 Gravity and Magnetic Methods  S1 L2T1
Prerequisites: 1.001 and 10.001.
Fundamental principles. Field procedures and instruments. Reduction of field data. Regions, class analysis. Effects of sources of simple geometrical shapes and generalized two and three-dimensional distributions. Applications. Field Work of one day is a compulsory part of the subject.

25.9312 Seismic Methods  S1 L2T1
Prerequisites: 1.001 and 10.001. It is desirable that students taking this unit have a background in geology.

25.9313 Electrical Methods  S1 L2T1
Prerequisites: 1.001 and 10.001. It is desirable that students taking this unit have a background in geology.
Introductory theory and field practice of resistivity, self-potential, induced polarization and airborne and ground electromagnetic methods. Geological interpretation of field data. Geophysical logging. Field Work of one day is a compulsory part of the subject.

25.9315 Regional Geophysics  S1 T1 5
Qualitative and quantitative appraisal of geophysical data for a selected area.

Servicing Subjects
These are subjects taught within courses offered by other schools or departments in a different faculty.

For further information regarding the following subjects see the Combined Sciences Handbook.
25.412 Sedimentary Basin Resources
See Sedimentary Basin Resources strand in Applied Science Course 3000 Applied Geology Year 4. Available only to programs 2501, 5831.

25.414 Mineral Resources
See Mineral Resources strand in Applied Science Course 3000 Applied Geology Year 4. Available only to programs 2501, 5831.

25.415 Engineering and Environmental Geology
See Engineering and Environmental Geology strand in Applied Science Course 3000 Applied Geology Year 4. Available only to programs 2501, 5831.

25.434 Geology Honours (Single Major)

25.621 Marine Geology I
Prerequisites: 25.601 or both 25.110 & 25.120.
The form and nature of ocean basins; the origin, transport, distribution and deposition of suspended matter in ocean water. Principal groups of oceanic index fossils. Igneous and sedimentary rock types of the ocean floor and their significance. Tectonics of ocean basins. Field Work of two days is a compulsory part of the subject.

25.622 Hydrological and Coastal Surveying
Prerequisites: None.
General principles of surveying, with particular reference to coastlines and off-shore techniques. Optical and electronic methods of distance measuring and position fixing. Methodology for short-term and long-term measurement of tides and flow currents. Bathymetric surveys in shallow and deep water conditions. Coastline morphologies and their relationship to the behaviour of water masses. Analysis of sedimentary systems in deltaic, estuarine and near-shore environments. Data collecting, processing and storage. Shallow-water investigations for bedrock morphologies. Field Work of five days is a compulsory part of the subject.

25.631 Marine Geology II
Prerequisite: 25.621.
Sedimentary and tectonic processes of the ocean basins and continental margins; ocean basin stratigraphy and the environmental and chronological utility of the principal groups of index fossils. Stratigraphical history and correlation of sedimentary rocks in the deep ocean basins and on continental shelves. Changes of sea level. The Quaternary history of the oceans. Reefs and carbonate sedimentation. Deep sea consolidated sediments. Magnetism and palaeomagnetism. Field Work not exceeding two days is a compulsory part of the subject.

25.632 Estuarine Geology
Prerequisite: None.

25.6341 Marine Mineral Deposits and Oceanic Minerals

25.6342 Exploration and Seismic Methods
Geophysics of ocean basins and off-shore areas and the techniques of their study. Seismic refraction, reflection and computational methods, instrumentation of seismic and acoustic sources, recording systems and signal processing. Geological and physical interpretation of results. Practical work on instrumentation, recording and interpretation of field data.

25.635 Marine Resources
Prerequisite: 25.621. Co-requisite: 25.631.
Resources important to human civilization of a biological, fluid and mineral nature. Mining of ocean resources. Geological aspects of waste disposal and engineering works in the ocean. Tidal energy. Off-shore drilling.

25.9314 Geological Applications
Prerequisite: 25.120.
A subject of ten weeks' duration. Structural Geology: Elements of structural geology, stereographic projection and fracture analysis. Geology of Fuels: Origin of coal, oil and natural gas; stratigraphic and structural consideration of oil and coalfields. Hydrogeology: Principles of hydrogeology; transmission of groundwater in rocks and soils. Field Work of one day is a compulsory part of the subject.

25.931 Geophysics
See Geophysics strand of Applied Science Course 3000 Applied Geology Year 4. Available only to programs 2501, 5831.

25.9321 Geophysical and Geological Applications
Prerequisite: 25.120. Excluded: 25.6342.
Geological Interpretation of Geophysical data: Seismic stratigraphy. Coal-seam geometry from high resolution seismic and in-seam data. Geology of Ore Deposits: Mineralogy of industrially important metallic and non-metallic minerals. Theories of ore formation including secondary enrichment processes. Available only in program 2503.
Subject Descriptions

Graduate Study

25.702G Hydrogeology S1 L1½T1½

Surface and sub-surface methods of geological and geophysical investigation; ground water exploration of confined and unconfined aquifers. Geological and hydraulic characteristics of rocks; aquifer boundaries, groundwater storage and quality. Hydraulics of wells. Hydrogeological systems analysis, including computer methods, mapping techniques and groundwater resources evaluation. Hydrogeology of arid and semi-arid zones. Case history studies of ground-water fields.

25.703G Project (Engineering Geology Graduate Course) S2

The project is a research investigation consisting of field and laboratory work in any of the disciplines. Engineering Geology, Hydrogeology, Environmental Geology.

25.704G Environmental Geology S1 L1½T1½ C3


25.705G Engineering Geophysics S1 L2T1

Shallow seismic refraction: elastic theory, sources and equipment. Determination of fracture index, rippability. Applications to damsites, highways, depth of weathering, material quality. Seismic reflection. Sparker and boomer profiling, side scan sonar with application to coastal harbours, sewer outfalls. Electrical methods, direct current geoelectric theory, resistivity sounding and profiling with applications to determination to bedrock depth, location of water table, clay filled dykes, shear zones. Magnetic, electro-magnetic and gravity methods as applied to engineering problems. Geophysical well logging: resistivity, self-potential, gamma ray and sonic logs applied to determination of rock properties and location of clay-filled joints. Field tutorials. Short field tutorials are included.

25.706G Geological Basis of Geomechanics S1 L2T1


25.707G Geopollution Management S1 L1½T1½ C3


25.708G Engineering Geology S1 L2T1

Co-requisite: 25.706G.

Soil and rock slope stability analyses and stabilization methods; geological, geomorphic and engineering considerations. Construction materials exploration, evaluation and assessment of standards, concrete aggregate requirements, tests. Practical site investigation procedures: drill core logging, R.O.D., drilling programs. Engineering classifications of weathered rocks. Weathering and engineering works. Discontinuities in rock masses, analysis, influence on engineering properties. Soil fabric analysis; principles and application to engineering behaviour of soil masses. Engineering geology organization; contracts, critical path analysis and geological investigations; communication between geologists and engineers. Field tutorials: Several field tutorials are included.

25.710G Coastal Environmental Geology S1 L1½T1½ C3


25.711G Arid Zone Engineering Geology S1 L2T1 C3


25.712G Project in Terrain Management S2 T9** C9

A practical exercise to illustrate the application of engineering geology in terrain evaluation and management, to be carried out at Fowler's Gap Research Station. A report is required.

25.713G Research Project in Terrain Management F T9** C18

A substantial research project involving the application of engineering geology in terrain evaluation and management. Involves fieldwork at Fowler's Gap Research Station. A report is required.

**Equivalent contact hours, but also including fieldwork out of session.
25.714G Geology of Foundations  S1 L2T1
A detailed review of case histories of the geological factors influencing the foundations of dams, buildings, bridges, roads and airfields. The geology of large underground cavities. Methods of geological investigation.

25.800G Seminar  S1* Sem 2
A weekly seminar to present and discuss student papers on exploration topics; speakers from industry are invited to attend and present papers from time to time.

25.801G Geology in Exploration I  S1* L4
The development of conceptual models in mineral exploration and formulation of exploration programs. Consideration of significant guides to ore including structure, lithology, alteration and gossans.

25.802G General Introduction to Exploration Geophysics  S1* L3
A basic introduction to the theory and practice of exploration geophysics, including treatment of applications and limitations of the main methods of seismic, electric, electro-magnetic, gravity, magnetic and radiometric methods to geological problems in hydrocarbon, coal, ground water, mineral and engineering exploration. Treatment includes fundamental aspects of the method and case histories illustrating application areas. Field tutorial survey camp: An integrated, geological, geophysical and geochemical field tutorial survey camp of seven days' duration is an integral part of this subject.

25.803G Introduction to Exploration Geochemistry  S1* L3
Basic principles of exploration geochemistry and the role of exploration geochemistry in the generalized exploration sequence. Principles and problems of anomaly recognition. Examples of main applications.

25.804G Introduction to Data Processing and Interpretation  S1* L3
FORTRAN and computer programming; use of terminal facilities. Basic data storage and retrieval. Simple interpretative procedures for exploration data.

25.805G Resource Economics I  S1* L1
Interdependence of political, economic and technical factors in mineral resource supplies. Examination of the main factors in reserves and resources estimation.

25.807G Exploration Geophysics  S1* L6
An introduction to the theory and practice of all geophysical methods in exploration and upon energy, minerals, groundwater and engineering applications. These will include seismic reflections, seismic refraction, electrical, electro-magnetic, magnetic, gravity and radio-metric methods of exploration, including the planning and conduct of field surveys for general and particular applications, and the theory and practice of the interpretation of geophysical results in terms of geological problems, conditions and occurrences.

25.808G Exploration Project  S1* T6
Interpretation of exploration case-history data designed to familiarize students with the type of information normally required by exploration companies.

25.811G Advanced Geology in Exploration  S1* L4
Definition of the geological environment and search techniques for major categories of mineral deposits including porphyry coppers, carbonate- and shale-hosted lead-zinc ores, volcanic massive sulphide ores, vein and sandstone uranium. Geological aspects of reserve estimation. Exploration case histories.

25.815G Resource Economics II  S1* L2
Distribution, production, consumption and trade in minerals. Supply adequacy and resource assessments and projected requirements. Review of the Australian minerals industry in a global context.

25.816G Remote Sensing  S1* L4
The physics of various remote sensing techniques; interpretation of conventional aerial photography in exploration; infra-red remote sensing techniques; side linking airborne radar; theory and applications of Landsat imagery; enhancement techniques for satellite imagery; interpretation of Landsat photographic products and application to several case history areas. Integration of remote sensing information with the overall data base as applied to exploration.

25.817G Mining Law and Exploration Management  S1* L1
Mining law in Australia with special reference to land tenure and lease acquisition; organization and management of exploration programs.

25.818G Exploration Project  S1* T6
Design and costing of exploration program by students. This may be based on simulated conditions or actual situations.

25.819G Field-Laboratory Project  S2
An individual exploration project that requires the student to acquire field and laboratory data on geological, geochemical and geophysical aspects of an actual exploration problem. As far as possible the project should be designed in consultation with the exploration industry. A report is required.

25.821G Geology in Exploration II  S1* L2
Specialized search techniques for selected types of metallic ores, with appropriate case histories.

*Weeks 1-7 only.
†Weeks 8-14 only.
25.823G Advanced Exploration
   Geochemistry S1† L2T6
Detailed consideration of the main techniques with emphasis on soil, drainage and rock surveys. All applications and problems will be examined on the basis of case-histories of actual surveys. Special consideration is given to problems of applications under Australian conditions.

25.824G Advanced Data Processing
   and Interpretation S1† L2T2
Advanced concepts of data storage and retrieval, problems of display of geochemical data, multi-variate statistical data interpretation. Students are encouraged to supply their own data sets for processing.

25.827G Laboratory Methods S1† L1T3
Instruction in the main techniques of sample preparation and instrumental analysis appropriate to exploration geochemistry. Practical experience with AAS and XRF. Students are encouraged to supply their own samples.

25.828G Exploration Project S1† T6
Interpretation of exploration data from geochemical surveys; this may be based on data from actual surveys, or data generated by the students themselves.

25.829G Field-Laboratory Project S2
An individual research project designed to contribute to the solution of a practical exploration problem; as far as possible the project should be chosen in consultation with the exploration industry to ensure relevancy to current exploration problems. In general the project involves collection of field data and samples, chemical analysis of samples, and interpretation of the results. A report is required.

25.813G Geological Interpretation S1† T2
The geological interpretation of geophysical data and geophysical models in seismic electrical, electromagnetic, gravity and magnetic methods, including selected case studies from petroleum, coal, mineral and engineering exploration.

25.832G Advanced Exploration
   Geophysics S1† L16
An extension of, and considerable advanced treatment of the subject matter in 25.807G, in the theory and practice of field and interpretational procedures in all methods and aspects of exploration geophysics, including instrumentation, manual and electronic data processing and interpretation. Specific applications areas for prominent geophysical exploration techniques in the solution of relevant geological problems, are treated in detail in both field and theoretical aspects of the methods.

25.839G Field-Laboratory Project S2
Exploration geophysical project on one or more topics of relevance in energy, water, mineral or engineering exploration. Includes tutorial sessions and seminars on relevant topics of geophysical/geological/geochemistry exploration.

†Weeks 8-14 only

25.840G Seminar S1† Sem2
A weekly joint seminar of Mineral Exploration, Exploration Geochemistry, and Exploration Geophysics students who present papers on aspects of their own particular specialization. Outside speakers from industry and government organizations are invited to participate in the seminars from time to time.

25.915G Project in Hydrogeology
Small project involving the analysis of hydrogeological data from Fowlers Gap.

25.916G Research Project in Hydrogeology
Research projected on some aspect of the hydrogeology of an arid region.

Geography

Undergraduate Study

27.111 Applied Physical Geography I F L2T3
Prerequisite:

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<tr>
<th>HSC Exam</th>
<th>Percentile Range Required</th>
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<tbody>
<tr>
<td>2 unit Science (Physics) or</td>
<td>31-100</td>
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<tr>
<td>2 unit Science (Chemistry) or</td>
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<tr>
<td>2 unit Science (Geology) or</td>
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<tr>
<td>2 unit Science (Biology) or</td>
<td>31-100</td>
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<tr>
<td>4 unit Science (multistrand)</td>
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Excluded: 27.301, 27.311, 27.801, 27.811.

A systematic introduction to physical geography as a basis for applied studies. Principles of meteorology and climatology with particular emphasis on climatic controls at global and regional scales. Weather systems and forecasting methods. Climatic classification and the regional pattern of climates in Australia. Geologic and climatic factors in landforms and soils, and in the physiographic build and major landforms of Australia. Mass movement and hillslope form. River action and associated valley and channel forms. Coastal environments, processes and forms. Properties and types of soil, with emphasis on factors and processes controlling global and regional distribution. Soil profiles and laboratory measurement of soil properties. Principles of soil classification and mapping. Spatial organization of plants and animals, and factors and processes relating to that organisation. Composition, structure, population dynamics and classification of vegetation. Laboratory classes concerned with the interpretation of various forms of data in physical geography and their representation quantitatively and graphically. Field work of up to three days is an integral part of the subject.
27.121 Pedology for Pastoral Sciences

Properties and types of soils, with emphasis on factors and processes controlling global and regional distribution, soil profiles and laboratory measurement of soil properties; principles of soil classification and mapping.

27.133 Pedology

Prerequisites: 27.111 or any two units from 2.111, 2.121, 2.131, 2.141, and 27.811 or 27.111 or 25.012 or 25.022.

Methodology of pedogenic studies and the application of these studies to the understanding of soil-landform relationships. Soil physical and chemical properties and their interrelationships, emphasizing clay-mineral structure and behaviour, soil solution chemistry, soil water movement and the application of these properties to elements of soil mechanics. Soil properties in natural, rural and urban landscapes, including assessment of soil fertility, swelling characteristics, dispersibility, erodibility and aggregate stability. Laboratory analysis of soil physical and environmental characteristics with emphasis on properties associated with land capability assessment. Statistical analysis of soil data and its application to mapping. The use of soil micromorphological and mineralogical studies in pedology.

27.143 Biogeography

Prerequisites: 27.311/811 or 17.031 or 17.041 or 27.111.


27.153 Climatology

Prerequisites: 1.001, 27.311/811 or 25.110 & 25.120 or 17.031 & 17.041 or 27.111.


27.162 Geographical Statistics and Computing

S1 L2T2 S2 L1T1

Fundamental concepts in descriptive statistics and univariate inferential statistics, introduction to bivariate and multivariate statistics. Computer-compatible data assembly and storage; standard analysis with computer packages; simple BASIC and FORTRAN programming; typical case studies in Physical Geography exemplifying the above techniques.

27.163 Methods in Physical Geography

F L1

Research design and data sources for studies in physical geography. Quantitative methods having application over several areas in physical geography, including forms of multivariate analysis, time series analysis, use of stochastic models including Markov applications, numeric taxonomic methods and simulation. Laboratory work includes use of CYBER and HP30 facilities. In Session 2 students undertake a project in their specialist areas based upon an application of one of the basic methodologies studied in Session 1.

27.1711 Introduction to Remote Sensing

S1 L2T1

Prerequisite: Successful completion of a Year 1 program in Applied Science, Science or Arts (or equivalent) as approved by the Head of School.

Principles and technical aspects of remote sensing. Forms of available imagery, their utility and facilities for interpretation. Basic airborne and satellite techniques relevant to environmental assessment. Introduction to principles of the electromagnetic spectrum, photometry and radiometry. Sensor types, image formation and end products associated with selected satellite programs, including LANDSAT. Land-cover and land-use interpretation procedures in visual image analysis. Basic procedures in machine-assisted image enhancement.

27.1712 Remote Sensing Applications

S2 L2T1

Prerequisite: 27.1711.

Spectral characteristics of natural phenomena and image formation. Ground truthing, collection and calibration. Introduction to computer classification procedures. Multitemporal sampling procedures. Image to image registration and map to image registration. Major applications of remote sensing in the investigation of renewable and non-renewable resources to include: soils, geology, hydrology, vegetation, agriculture, rangelands, urban analysis, regional planning, transportation and route location and hazard monitoring.

27.172 Environmental Measurements

F L2T4

Prerequisite: 27.111.

Sampling strategies and survey methods for the collection of environmental data. Data analyses using laboratory and statistical methods. The collection and analyses of weather and climatic data, and the maintenance of meteorological stations. Methods of field surveying and instrumentation for the study of geomorphologic and hydrologic processes. Drainage basin morphometry, dynamics and function, including controls on run-off and sediment transport. The measurement of soil physical and chemical properties in the field and laboratory with special reference to plant growth and soil water and geomorphologic processes. The relationships between weathering processes and soil properties. Methods of surveying, classifying and mapping soils. Measurement and description of vegetation. Vegetation survey, sampling and species abundance measure. Monitoring energy and nutrient flow and the effects of man on ecosystems.
27.183 Geomorphology  S1 L2T3

Prerequisites: 25.110 & 25.120 or 27.311/811 or 27.111. Excluded: 27.860.


27.193 Environmental Impact Assessment  S1 L1½

Rationale and basic objectives standardized types of Environmental Impact Assessment (EIA), including Matrix Approach, adopted methods of EIA in NSW and other Australian states. Frequently used assessment techniques and their limitations meteorological, hydrological, biological, socio-economic. Environmental decision making and planning under conditions of uncertainty. Local case studies exemplifying various techniques and issues. Trends, changes and likely future developments in EIA. Practical exercises representing components of typical EIA's.

27.194 Assessment and Management of Physical and Biological Resources  S1 L6T6

A core of study relating to methods of assessment of resources and of natural and man-made environments; assessment of land capability and conservation management; evaluation of risk from natural hazards, application of remote sensing for mapping and assessing land, water and biological resources; investigational procedures relating to community and governmental perception and response. This core is supplemented by study in two of the following areas, chosen as to suit the project:


27.423 Environmental Impact Evaluation  F L1T3

Rationale and basic objectives: principal methods of impact evaluation; techniques for assessing impacts of resource developments on physical and socio-economic environments. Australian and overseas legislation and procedures. Environmental decision making and planning under conditions of uncertainty. Practical work focuses on local case studies exemplifying the use of various techniques and approaches to environmental impact assessment and evaluation.

27.433 Geographic Data Analysis  F L1T2

Principles of research design, field survey methods, and exploratory data analysis. Numerical taxonomy, multivariate methods, and categorical data analysis. Introduction to additional computer software and applications.

27.432 Computer Mapping and Data Display  S1 L1T2

Principles of graphic information processing. Introduction to thematic mapping and automated cartography; theoretical and practical problems in displaying and mapping data by computer. Review and application of computer mapping packages including SYMAP, SYMVU, CALFORM, GIMMS and SURFACE II.

27.494 Assessment of Human and Physical Resources  S1 L6T6

A core of study relating to methods of assessment of resources and of natural and man-made environments, land capability and risk from natural hazards. In addition to the core component, students select one area from those listed under 27.194 Assessment and Management of Physical and Biological Resources, and one of the following: 1. Resource Planning and Decision Making: Quantitative methods of resource evaluation in relation to urban and regional development, forecasting the social and economic requirements and impacts of resource projects and policies; planning and conflict resolution methods. 2. Human Resources: Examination of the potential of populations for economic development, and the implications of demographic structure for economic growth, energy needs, and housing and service requirements, stressing the skill potentials or deficiencies of sub-populations, and emphasising regional aspects.

27.504 Projects  S1 T10 and S2 T16

Biogeography or Bioclimatology: study of the vegetation in an area, and detailed consideration of a problem arising from this survey, preferably with an applied aspect, or a study of the climate of some well defined plant or animal habitat as related to characteristics of the vegetative cover and substrate. Economic Geography: a problem in applied economic geography involving experimental design, the acquisition and manipulation of field data and the presentation of a report. Geomorphology or pedology: an area study introducing soils-landscape relationships in a dynamic or chronologic sense; or a systematic study which may be primarily geomorphic or pedologic, but with some interdisciplinary aspect. To include a field element and a supporting laboratory program.

27.514 Practical Applications in Geography  S2 T3

Seminars with practitioners in the fields of urban and regional analysis and environmental studies, including environmental impact statements; research proposals; report writing; the roles of government agencies and consultants; and budgeting for research projects.
27.611 Applied Economic Geography I  

Prerequisite:  
HSC Exam  
Percentile Range  
Required  
2 unit English (general) or  
31-100  
2 unit English or  
21-100  
3 unit English  
11-100

Consists of four modules each of which emphasises the acquisition and practical application of basic skills and concepts in the solution of typical problems in economic geography, with particular reference to resources development. Stress on Australian case studies. Laboratory classes emphasise the handling and presentation of data in economic geography, the interpretation of spatial data, and elementary problem solving.

27.612 Applied Economic Geography II A  

Focus on the understanding of problems arising from processes of change in non-metropolitan areas, with particular reference to their effects on the functional structure of country towns in NSW. Topics include: functional classification, service provision, economic base, rural mobility, decentralization and settlement policies, and urban systems.

27.613 Applied Economic Geography III A  

Selected topics in applied economic geography with particular reference to urban and regional analysis and planning.

27.614 Applied Economic Geography IV A  

Analysis of the population dynamics of small towns and regions, with emphasis on the measurement and forecasting of change, and on problems of service provision and infrastructure support for sub-populations with different requirements. Stress on problems and policies in non-metropolitan areas of New South Wales.

27.621 Geographic Thought and Perspectives

Aspects of social science theory and philosophy as they relate to the development of human landscapes and as they enter into planning and policy making. Themes to include: The persistent utopian element; utilitarianism and positivist economic geography; conflict approaches; value-critical stances; the political economy critique; participation, advocacy and action-research; humanistic and welfare approaches; ideology and planning; theories of the state and the basis for intervention.

27.632 Geographic Data Analysis II  

Focus on inferential statistics and hypothesis testing in the analysis of spatial data and the application of multivariate methods in economic geography. Laboratory work is based on the use of SPSS and other statistical packages with particular reference to the major techniques used in geographical analysis.

27.633 Geographic Data Analysis III  

Principles of research design; field survey methods; numerical taxonomy; non-metric measurement techniques; multivariate methods, introduction to additional computer software. Student projects and development of Year 4 thesis topics.

27.641 Data Processing Systems  

The acquisition of basic knowledge and skills for the effective use of the University's mainframe computer network, including command languages, editing systems, an introduction to FORTRAN, SPSS procedures, and related matters.

27.642 Mathematical Methods for Spatial Analysis

Offered subject to availability of staff.

The application of selected mathematics to spatial problems including: Algebra of space and principles of system description using concepts of co-ordinate geometry; quadrat analysis and network theory; matrix algebra and the use of matrices in spatial analysis; differential and integral calculus in modelling geographic systems; optimization methods — constraint maximization; algorithmic methods including linear programming; stochastic processes.

27.644 Seminars in Applied Geography  

Seminars on selected topics relating to problems of rural areas: urban land-use; spatial activity systems; and regional problems and planning.

27.652 Geographic Information Systems  

An introduction to information systems of particular relevance for economic geography with special reference to computer-based systems for resource evaluation. Problems of data structures, geocoding, and spatial identifiers. Model-based information systems. Project work: case study evaluation and the development of information systems for monitoring spatial change.

27.662 Urban Systems  

The nature of urban systems and urban problems, the extent of urbanization and the links between urban functions and the dimensions of urban systems. Focus on specific theories of the internal structure of cities and associated urban problems. Topics include land-use structure, urban sprawl, speculation, population density models, segregation, slums, urban commercial structure, accessibility, transport and congestion, and welfare issues relating to optimal cities and equity within urban areas.

27.672 Transport and Land Use  

The relationships between transport and land use, mobility, accessibility, and activity systems in urban and rural environments. Emphasis on policy issues and case studies from Australia. Simple transport-land use models, introduced in laboratory classes.
27.713 Marketing Geography
Prerequisite: 28.042.

Spatial reality as a result of consumer and producer decisions. The relationship between consumer spatial behaviour and the pattern and structure of marketing establishments. Organization and operation of the marketing function with emphasis upon the pattern of consumer oriented enterprises and the structure of market areas in intra-urban areas. Spatial behaviour of consumers including search and decision processes. Workshop seminars on analytical techniques and issues raised in lectures.

27.723 Transport Geography
Offered subject to availability of staff.

The analysis of the transportation system in terms of its relationship with economic and geographical indicators. Focus is on network analysis, trip generation models, freight movement, transport impact studies and the transport energy problem. Lectures are accompanied by seminars which stress the consideration of major problem areas in transportation in Australia.

27.733 Regional Policy and Planning
Not offered in 1984.

Regional forecasting and techniques for evaluating regional plans are emphasised. Topics include: Regional information systems and budgets; exploratory and normative forecasting methods; time series projections; integrated forecasting models; cost-benefit analysis; planning balance sheets, goals — achievement matrix methods of evaluation; reviews of plans and programs for regional development in Australia. Lectures are accompanied by workshop sessions which stress the consideration of major problem areas in transportation in Australia.

27.743 Regional Population Analysis
Offered subject to availability of staff.

The primary emphasis is on regional population estimation and forecasting with reference to Australian conditions and the use of Australian data. The secondary emphasis is estimation for regions in adjacent Third World countries. The population forecasting is handled within the framework of demographic theory and component analysis; migration analysis is given particular attention because of the importance of mobility in Australia. The derivation of regional and local social indicators in the context of population change and service provision in Australia.

27.753 Social Welfare and Urban Development
Not offered in 1984.

A consideration of welfare aspects of urban development, including social policies and urban structure; social costs and benefits of urban renewal especially in the inner city; growth centres and new towns; distributional aspects of social services; and spatial disparities in social well-being.

27.773 Spatial Aspects of the Housing Market
Offered subject to availability of staff.

Advanced residential location theory; housing market models; determinants of house prices and the cost of housing; residential growth on the urban fringe; inner city housing and urban renewal. Housing problems in Australia and the determination of housing policy.

27.783 Spatial Impacts and Opportunities
Offered subject to availability of staff.

Selected problems in the location of public services and measurement of spatial opportunity; methods for assessing the local and regional effects of new facilities; multiplier models; and socio-economic impact studies, and spatial implications of technological change.

27.793 Models of Spatial Systems
Offered subject to availability of staff.

The design and development of models of spatial systems, including: Entropy maximization methods; control theory; evaluation of alternative models; and case studies of models in urban and regional analysis.

Servicing Subjects
These are subjects taught within courses offered by other schools or departments in a different faculty.

For further information regarding the following subjects see the Faculty of Architecture, Arts, Commerce, Engineering and Combined Sciences Handbooks. Subject numbers beginning 27.3 refer to the Combined Sciences Handbook, numbers beginning 27.8 refer to all other handbooks listed.

27.295 Physical Geography for Surveyors
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.

27.604 Geography IV (Honours)
Prerequisite: 27.880.

Honours students in their final year are required to prepare a thesis of not more than 20,000 words and to attend a series of seminars on their thesis and supporting topics. The thesis topic must be approved by the Head of the School during second half of the year preceding entry into the final year; while the thesis must be submitted before the examination period in November of the final year. It is expected that research work for the thesis is undertaken during the summer vacation preceding the final year. In addition, students are required to undertake advanced studies in a branch of geography appropriate to the area of research chosen for the thesis.
27.301 Introduction to Physical Geography  S1 L2T2½
27.801 Introduction to Physical Geography  S1 L2T1½
Prerequisite: Nil. Excluded: 27.111.

Themes selected from the mechanisms of the physical environment, with particular reference to Australia and to the Sydney Region; landscape as an expression of dynamic response. Energy and Atmospheric Circulation over Australia: local climate and weather patterns. Climate-related Problems: the hazards of fire and flood. Geological Control of Landform Character: the development and stability of hillslopes. Soil, Vegetation and Drainage Relationships: soil erosion. The Coastal Ecosystem: problems of risk and management in the coastal zone. Lectures are supplemented with tutorials, laboratories and a field tutorial. Students are required to provide some materials for practical work and to contribute towards the cost of the field tutorial.

27.302 Introduction to Human Geography  S2 L2T2½
27.802 Introduction to Human Geography  S2 L2T1½
Prerequisite: Nil.

Human geography as a problem-oriented and policy-relevant endeavour. Themes from the development and current state of human landscapes in Australia including aspects of growth and decline in the settlement system, utilization of agricultural and mineral resources and associated impacts, human aspects of environmental management and the spatial impacts of economic, social and technological change. Lectures are supplemented by tutorials, laboratories and a field excursion.

27.311 Physical Geography  S2 L2T2½
27.811 Physical Geography  S2 L2T2½
Prerequisites: 27.301/801, 27.2813 (in special circumstances a student may apply to the Head of School for permission to take 27.2813 as a co-requisite). Excluded: 27.111.

Emphasising inter-dependence of climate, hydrology, landforms, soils and vegetation in major zones. Classification of climates and world climatic patterns. Soil zonality and world soil patterns. World vegetation types and distribution, and their controls. Studies of selected zones with particular reference to the Australasian region. Laboratory classes: climatic analysis and mapping, and analysis of natural landscapes, including airphoto interpretation, together with appropriate statistical exercises.

27.312 Human Geography  S1 L2T2½
27.812 Human Geography  S1 L2T1½
Prerequisites: 27.302/802, 27.2813 (in special circumstances a student may apply to the Head of School for permission to take 27.2813 as a co-requisite).

The urbanization process in underdeveloped and industrialized societies. Theories, concepts and principles relating to the location, size and spacing of settlements; the economic and social structure of urban areas; city-region relationships. Geographical perspectives on contemporary urban problems are offered, particularly those associated with the concentration of people and activities between regions and within cities; emphasis on spatial variations in housing, employment and service provision. Laboratory classes: case studies, methods of analysis and practical applications in the local region including a compulsory field excursion equivalent to sixteen tutorial hours.

27.2813 Geographic Methods  SS L1T2
Prerequisites: 27.111 or 27.301 or 27.801 (in special circumstances a student may apply to the Head of School for permission to take 27.2813 as a co-requisite) and 27.302 or 27.802.

Statistical procedures used in both human and physical geography. Includes: measures of dispersion; samples and estimates; hypothesis testing; association; correlation and regression; tests for distribution in space; data collection and analysis.

27.2814 Geographic Field Methods  S2 T2
Prerequisites: 27.111 or 27.301 or 27.801 & 27.301/801, 27.2813.

Field methods as used in both human and physical geography. The subject involves a three-day field tutorial and associated laboratory work.

27.324 Spatial Population Analysis  S2 L2T2
27.824 Spatial Population Analysis  S2 L2T1
Prerequisite: 27.312/812, or (for non-majoring Arts students) completion of Arts or other subjects approved by the Head of School, carrying at least 24 credit points. Excluded: 27.835.

Population growth and structure in an urban and regional context. The components and processes of population change; fertility, mortality and migration set within the framework of demographic transition theory. Theories of migration and mobility and of optimal populations. Demographic and social indicators for urban and regional analysis and their implications for disparities in living conditions, residential differentiation and regional growth. The adjustment of immigrant and migrant populations to the urban environment.

27.325 Urban Activity Systems  S1 L2T2
27.825 Urban Activity Systems  S1 L2T1
Prerequisite: 27.312/812, or (for non-majoring Arts students) completion of Arts or other subjects approved by the Head of School, carrying at least 24 credit points. Excluded: 27.835.

The understanding of problems arising from processes of change in non-metropolitan areas, with particular reference to their effects on the functional structure of country towns in NSW. Topics include: functional classification, service provision, economic base, rural mobility decentralization and settlement policies, and urban systems.

27.326 Urban and Regional Development  S2 L2T2
27.826 Urban and Regional Development  S2 L2T1
Prerequisite: 27.312/812, or (for non-majoring Arts students) completion of Arts or other subjects approved by the Head of School, carrying at least 24 credit points. Excluded: 27.836.

Theories of urban and regional change leading to assessment of the role of planning. Emphasis on resource allocation, conflict resolution and evaluation techniques including cost-benefit analysis and environmental impact assessment. Lectures accompanied by seminars and workshop sessions which concentrate on methodology.
27.327 Environment and Behaviour  S1 L2T2
27.827 Environment and Behaviour  S1 L2T1
Prerequisite: 27.312/812, or (for non-majoring Arts students) completion of Arts or other subjects approved by the Head of School, carrying at least 24 credit points. Excluded: 27.837.

Socio-economic and behavioural issues relating to urban development, with special reference to social impact studies and the external effects of service provision. Examples selected from inner city and suburban districts, in metropolitan areas and new towns.

27.834 Spatial Population Analysis (Advanced)  S2 L3T2
Prerequisites: Graded passes in 27.312/812, 27.2813. Excluded: 27.324/824.
Additional and more advanced work relating to the content of 27.324/824 Spatial Population Analysis.

27.835 Urban Activity Systems (Advanced)  S1 L3T2
Prerequisites: Graded passes in 27.312/812, 27.2813. Excluded: 27.325/825.
Additional and more advanced work relating to the content of 27.325/825 Urban Activity Systems.

27.836 Urban and Regional Development (Advanced)  S2 L3T2
Prerequisites: Graded passes in 27.312/812, 27.2813. Excluded: 27.326/826.
Additional and more advanced work relating to the content of 27.326/826 Urban and Regional Development.

27.837 Environment and Behaviour (Advanced)  S1 L3T2
Prerequisites: Graded passes in 27.312/812, 27.2813. Excluded: 27.327/827.
Additional and more advanced work relating to the content of 27.327/827 Environment and Behaviour.

27.860 Landform Studies  S1 L2T2½
Prerequisite: 27.301/801 or 27.111. Co-requisite: 27.311/811. Excluded: 27.183, 27.870.

The study of landforms, with particular reference to Australian examples. Geomorphic regions. Planation surfaces and processes and associated weathering features. The evolutionary and dynamic approaches to landforms, with particular reference to fluvial landforms. Coastal processes and forms. Desert landforms. Landforms as evidence of climatic change.

27.862 Australian Environment and Natural Resources  S2 L2T2½
Prerequisite: 27.111 or 27.311/811 or 27.312/812. Excluded: 27.872.
Not offered in 1984.
Continental and regional patterns of land, water and energy resources in Australia and its territorial waters, and natural factors affecting their development, including climate, soils and terrain; problems of limited surface and underground water resources and of conflicting demands, exemplified through particular basin studies; comparable reviews of energy, minerals and forest resources, human resources and development.

27.363 Ecosystems and Man  S2 L2T2½
27.863 Ecosystems and Man  S2 L2T2
Prerequisites: Graded passes in 27.111 or 27.311/811 or 27.312/812. Excluded: 27.325/825.
Additional and more advanced work relating to the content of 27.325/825 Urban Activity Systems.

27.870 Landform Studies (Advanced)  S1 L3T3
Prerequisites: Graded passes in 27.111 or 27.311/811, 27.2813. Excluded: 27.860.
As for 27.860 Landform Studies with additional and more advanced work.

27.872 Australian Environment and Natural Resources (Advanced)  S2 L3T3
Prerequisites: Graded passes in 27.111 or 27.311/811 or 27.312/812. Excluded: 27.862.
Not offered in 1984.
As for 27.862 Australian Environment and Natural Resources, with additional and more advanced work.

27.873 Ecosystems and Man (Advanced)  S2 L3T2
Prerequisites: Graded passes in 27.111CR or 27.311/811CR or 27.2813CR. Excluded: 27.363/863.
Offered subject to availability of staff.
As for 27.363/863 Ecosystems and Man, with additional and more advanced work.

27.880 Advanced Geographic Methods  F L1T2
Prerequisites: Graded passes in 27.111 or 27.311/811 or 27.312/812 and 27.2813.
Additional quantitative research techniques normally taken by Honours students in their third year. Research organization; computer analysis; collection and organization of data; statistical description; hypothesis testing and sampling; simple and multiple association analysis; nonparametric methods.
27.890 Thesis and Associated Seminars  F T3

Prerequisites: Graded passes in 3 nine-credit-point subjects in Geography. Co-requisite: 27.893 or 27.894 or 27.895.

Honours students in their final year are required to prepare a thesis of not more than 20,000 words and to attend a series of seminars on their thesis and supporting topics. The thesis topic must be approved by the Head of the School during the second half of the year preceding entry into the final year, while the thesis must be submitted before the examination period in November of the final year. It is expected that research work for the thesis is undertaken during the summer vacation preceding the final year.

27.893 Honours Physical Geography  S1 L3T3

Prerequisites: Graded passes in 3 nine-credit-point subjects in Geography. Co-requisite: 27.890.

Advanced studies in a branch of physical geography appropriate to the area of research chosen for the thesis.

27.894 Honours Urban Geography  S1 L2T4

Prerequisites: Graded passes in 3 nine-credit-point subjects in Geography. Co-requisite: 27.890.

Offered subject to the availability of staff. Check with School Office.

The study of the urban environment and the changing nature of urban geography. The impact of quantification and problems of theory building are stressed. Concern is with the individual in increasingly complex urban and regional environments. Problems and issues discussed are viewed from a policy perspective.

27.895 Honours Social Geography  S1 L2T4

Prerequisites: Graded passes in 3 nine-credit-point subjects in Geography. Co-requisite: 27.890.

Offered subject to the availability of staff. Check with School Office.

Changing views of social geography in the twentieth century. The decline and resurrection of humanistic perspectives in geography. The impact of quantification and problems of theory building are stressed. The above themes are developed through consideration of such substantive areas as population-resource relationships; urbanism; social problems and social change; urban and rural relationships.

Graduate Study

27.043G Remote Sensing Applications  S1 L1T2 C3

The application of remotely-sensed data and information in the description, classification and assessment of earth resources and environmental conditions. Different types of remote sensing data and imagery; their attributes, acquisition and uses. Relevance of remote-sensing data and imagery to a range of applications, including assessment of conditions of terrain, soils and surface materials; multi-temporal monitoring and inventory of rangelands, croplands and forests; rural and urban land use assessment; surveillance of surface water resources and sedimentation; appraisal of changes in the coastal zone. Use of remote sensing in environmental management and in environmental impact assessment.

27.171G Directed Problems in Remote Sensing  S2 L1T1C3

A detailed investigation of a particular aspect of remote sensing technology or an area of applications relevant to candidates interests and background.

27.174G Remote Sensing Instrumentation and Satellite Programs  S1 L2T1C3

Aircraft and satellite platforms; sensor types; image formation and end products including panchromatic, colour, colour IR and thermal IR photographic products, microwave imagery and computer tape products. The organization, acquisition, processing and analysis of imagery obtained from the following satellite programs: Landsat, Skylab, Heat Capacity Mapper Mission, Geodynamics Experimental Ocean Satellite, NOAA-7, Nimbus Coastal Zone Color Scanner, Seasat, Space Shuttle, Spot and Soyuz-Salyut.

27.202G Environmental Planning and Evaluation  C3

Lectures and seminars on environmentalism and political economy, environmental information, impact assessment, and economic evaluation.

27.644G Computer Mapping and Data Display  C2

Introduction to automated cartography and thematic mapping; theoretical and practical problems in displaying and mapping data by computer; review and application of selected computer mapping packages.

27.672G Geographic Information Systems  C2

Study of selected geographic information systems; problems of data capture and display, data storage and manipulation, system design and development; cartographic displays and computer mapping.

27.901G Geomorphology for Hydrologists  S2 L1T1C3

Offered subject to availability of staff.


27.902G Meteorological and Hydrological Principles  S2 L3 C3

27.904G Geomorphology for Engineering Geologists  
S2 L1½T1½ C3

Offered subject to availability of staff.


27.910G Geomorphology of Arid Lands  
S1 or S2 L2T4 C6


27.911G Soil Erosion and Conservation  
S1 or S2 L2T4 C6


27.912G Arid Zone Climatology  
S1 or S2 L2T4 C6

Definitions of aridity based on climatic data and their relevance at different scales from hydrologic and biologic considerations. Meteorological controls of aridity at global and regional scales, and distinctive features of arid climates over the world. Characteristics and physical controls of the radiation, water and heat budgets as commonly found within arid environments. Climate as a fact in resource utilization considered in terms of plant growth and development, animal ecology, insects and diseases, soil erosion, and human adjustments to arid conditions, including problems of comfort, health, buildings design and energy use. Laboratory and field work is directed towards 1. instrumentation and measurements of climatic variables of special interest in arid environments, particularly those important to the radiation, water, and heat budgets; and 2. statistical and other quantitative methods for summarization and interpretation of single and combined climatic elements to provide relevant information required for sound management of arid lands.

27.913G Soil Studies for Arid Lands Management  
S1 or S2 L2T4 C6

Soil forming processes in arid regions. Physical, mineralogical and chemical characteristics of arid soils, with emphasis on properties significant for land capability. Chemical and physical properties of saline and alkaline soils. Soil response to irrigation, secondary salinization and alkalinization. Classifications and distribution of arid zone soils and their environmental relationships. Field methods and soils survey techniques, statistical analysis of soil data and its application to mapping. Laboratory analyses of physical and chemical characteristics of soils, with emphasis on properties significant for land capability.

Based on 27.133 Pedology, with additional reading, tutorials, seminars and practical classes to stress the features of arid zone soils.

The formal component of the above teaching is completed at Kensington. However, a number of tutorial and laboratory hours are devoted to a field-based soil mapping project based at Fowlers Gap Research Station.

27.914G Terrain Evaluation  
S1 or S2 L2T4 C6

Methods of defining and mapping land units for resource assessment and management. Principles of land capability classification with reference to pastoral, agricultural and irrigation land use in arid and semi-arid regions. Physical indicators of desertification and land degradation in dry regions including accelerated wind and water erosion and secondary salinization.

27.915G Project in Land Evaluation  
S2 T9 C9

Practical application of a system of land classification in an arid or semi-arid environment as a basis for land management or land-use planning, or a comparative review of existing approaches to land evaluation. Involves fieldwork, probably at Fowlers Gap Research Station, and the preparation of a report. Tutorial hours are equivalent contact hours, but also involve fieldwork out of session.

27.916G Research Project In Land Evaluation  
F T9 C9

As for 27.915G Project in Land Evaluation, but involving more substantial research over a longer period. Tutorial hours are equivalent contact hours, but also involve fieldwork out of session.

27.917G Project in Soil Conservation  
S2 T9 C9

A practical investigation of soil degradation associated with the deterioration of rangeland on Fowlers Gap Research Station, or in another part of arid or semi-arid Australia, in relation to soil-vegetation characteristics and land use. May involve investigation of techniques used in combating soil erosion problems. Involves the preparation of a report. Tutorial hours are equivalent contact hours, but also involve fieldwork out of session.

27.918G Research Project In Soil Conservation  
F T9 C9

As for 27.917G Project in Soil Conservation, but involving more substantial research over a longer period. Tutorial hours are equivalent contact hours, but also involve fieldwork out of session.
Applied Science

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**Marketing**

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**Undergraduate Study**

**28.012 Marketing Systems**

Prerequisite: Nil.

Conceptual introduction to marketing from the systems viewpoint. Evolution and characteristics of marketing systems, buyer behaviour, marketing channel flows (equalizing supply and demand, communication, ownership, finance, physical distribution); marketing activities in the firm (planning and marketing program, co-ordination and control of marketing activities, problem solving, product planning, promotion and pricing, physical distribution management), resources allocation by competition, the expanding role of government, social performance of marketing and social efficiency of marketing.

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**28.032 Behavioural Science**

Prerequisite: Nil.

Major concepts and research in the behavioural sciences which reveal the dynamics of human behaviour and the variety of viewpoints that can be adopted in explaining behaviour. Nature and scope of behavioural science, culture, social institutions, groups, social class, interpersonal and mass media communication, learning, perception, personality. Prerequisite for 28.042 Consumer Behaviour.

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**28.042 Consumer Behaviour**

Prerequisite: 28.032.

Specific sociological and psychological topics in Behavioural Science applied to the problem of understanding the consumer in the marketing context. Motivation and arousal; consumer behaviour as a decision process; problem recognition; search behaviour; choice behaviour; purchasing processes; post-purchase behaviour.

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**28.052 Marketing Research**

Prerequisite: 15.421 or approved substitute.

Sources and types of marketing information. Design, conduct, analysis and reporting of market surveys and experiments. Technique of statistical inference.

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**Surveying**

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**Undergraduate Study**

**29.441 Surveying for Engineers**


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**29.491 Survey Camp**

A one-week field camp for students studying 29.441 Surveying for Engineers.

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**Graduate Study**

**29.520G Photogrammetric Production Processes**

SS L1½T1½ C3


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**29.600G Principles of Remote Sensing**

S1 L2T1 C3


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**29.601G Remote Sensing Principles and Procedures**

S1 L2T1 and S2 L1½T1½ C6


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**29.604G Land Information Systems**

SS L2T1 C3

Land information as maps and records. Methods of data collection, integrated surveys and coordinate systems. Legal boundaries. Land tenure. Identifiers. Computerisation of land information. Data input methods. Data storage methods. Data processing and manipulation, including management, searching, existing data base languages, and interactive data editing. Data output, including computer graphics, line printer maps, and digital plotters.
Organizational Behaviour

Due to uncertainties in staffing, it is not possible for the Faculty of Commerce to give an assurance that all subjects in Organizational Behaviour listed in the handbook will be offered in future years.

Graduate Study

30.935G Organization Behaviour A

Organizations are examined as open systems exhibiting a variety of structural patterns within an external, economic, social, political and technological environment which is uncertain and rapidly changing. Against this background the subject lays the foundations for gaining insight into human behaviour in organizations.

30.958G Organizational Communications

Prerequisite: 30.935G.

Communication is both an end and a means to an end for members of complex organizations. As an end, the patterned inputting, processing and outputting of information is the network of interdependent relationships that we come to call an organization. Thus communication is organizing. As a means to an end, communication suggests the ways — the meanings, the rules, the procedures — that govern the interaction of organizational members exchanging messages in service of such outcomes as decision making, innovation, etc. Organizational communication therefore is the study of the flow of messages in an information network as well as the uses made of those messages by network participants for the overall attainment of organizational goals.

30.960G Technology and Organizations

Prerequisite: 30.935G or other approved subject.

The complex relationships between technological change and organizations, workforces and skills in societies using advanced technology such as, Australia, California, Japan, Germany and Scandinavia. Students carry out projects analyzing the relationship between technological change and organizational variables; such as control and power; employment and skill formation in an industry, organization or group (eg engineers, women, immigrants); working environment, socio-technical systems, quality of working life, occupational health and safety, recurrent education, new patterns of work, industrial relations and industrial democracy.
Landscape Architecture

Undergraduate Study

Students should contact the Head of School before enrolling in any of the following subjects.

**37.3015 Environment Impact Assessment I**

S1 L1T1

2 credit points. Prerequisite: 156 credit points, or as otherwise approved by Subject Authority.

Not offered in 1984.

**37.3016 Environmental Impact Assessment II**

S2 L1T1

2 credit points. Prerequisite: 37.3015.

Not offered in 1984.

The environment defined in terms of bio-physical and socio-economic factors. Introduction to the general principles of environmental survey and analysis and the assessment of impact. Specific methodologies are reviewed on a comparative basis. The importance of communication between the environmental sciences and professions and the problems of objectivity. Emphasis upon the role that environmental impact assessment should play as part of the planning process; landscape assessment methodologies reviewed with specific reference to their adaptability for use as a 'before and after' technique for comparatively assessing impact in relation to visual/aesthetic factors.

The student undertakes a specific study of current social significance on a group basis in two phases over two consecutive sessions, in the same year. Each phase is used as a partial assessment of progress.

**37.5816 Land Systems**

S2 L2T1


**37.5817 Land Management**

S1 L1T1

An investigation of resources and their management, with reference to managed landscapes, both cultural and natural. Conservation and rehabilitation methods are studied in relation to rural and urban landscapes, including coastal processes. Rehabilitation methods are related to land use types with studies of specific examples, following investigations of human impacts and their assessment.

**37.7145 Landscape Planning I**

S1 L2T2

Basic methods and techniques of resource data collection, analysis and valuation. History of landscape planning in Australia and overseas with reference to pioneering case studies. Projects include the use of maps, air photos and simple computer programs.

37.7146 Landscape Planning II

S2 L2T2

Classification of planning methods. Study of complex methods and techniques used in recent landscape planning models. Development of land use suitability models for recreation, residential, industrial, commercial, grazing, agriculture, forestry and conservation. Projects include the use of remote sensing techniques and advanced computer programs.

School of Food Technology

Undergraduate Study

**38.122 Man and Food**

S1 L1

Food in history; world food production and trade; world food problems; world food agencies; food developmental programs. Food habits, attitudes and beliefs, food choice. Principles of food preservation.

**38.131 Principles of Food Preservation**

S1 L4

Prerequisites: 38.122, 38.421, 38.521.


**38.132 Plant Food Science**

S1 L3


Classification, distribution, production and trade of world plant foods. The science and technology of Fruit and vegetables: genetic and environmental effects on composition and quality: biology of development, maturation and ripening; harvesting; concept of deterioration of fresh fruit and vegetables; technology of wine production; technology of juice and beverage production; chemical and sensory quality control procedures. Cereals: structure, composition and uses of wheats, rice, rye, sorghum; wheat milling, flour properties; modern techniques. Technology of food preservation by heat, chilling and freezing, sun drying and dehydration. Use of salt, sugar, acid, chemical preservatives, ionising radiations in food preservation. Chemical and microbial stability of foods. Packaging requirements for preserved foods. Water relations of foods. Production and storage stability of intermediate moisture foods. Water quality criteria, treatment of water. Nutritional consequences of food processing. Plant-derived products. Sugars: sources, types, composition, uses with other foods; sugar milling, refining, confectionery manufacture, control of spoilage. Lipids: sources, composition, extraction, purification processes, chemistry; processing of cooking oils, margarine, shortenings; uses with other foods. Proteins: sources, extraction procedures, nutritional and toxicological factors, texturizing processes, use with other foods.

Methods of pest control.
### 38.133 Animal Food Science

**Prerequisites:** 2.002A, 2.002B, 2.002D, 38.122, 38.521.

*Meat:* animal resources, breeds, growth and development. Slaughter, carcass composition, post-mortem biochemistry, meat composition, structure and quality factors, meat microbiology. Cold storage, chilling, freezing, ageing, curing, drying and packaging of meat and meat products; their microbiological and biochemical implications.

*Marine products:* nature and distribution of world resources; harvesting of teleostean and elasmobranch species; spoilage reactions, their control and quality assessment, chilling, freezing, salting, drying, smoking and fermentation of fishery products; fish meal and fish protein concentrates.

*Egg products:* structure, composition of the avian egg, quality assessment and microbiology of intact and liquid egg products. Egg pulping, freezing and drying with reference to functional and microbiological qualities.

*Milk and dairy products:* chemical and physical properties of milk; general composition, proteins, lipids, carbohydrates, vitamins, minerals, flavour, colour; milk contaminants: antibiotics, pesticides, radio-nuclotides, sanitizer residues; milk microbiology: spoilage, public health, pasteurization; chemistry, biochemistry, microbiology and manufacture of milk products: homogenized, dried and condensed milks, cream, butter, ice cream, cheese, yoghurt.

### 38.134 Food Science Laboratory

**Prerequisites:** 2.002A, 2.002B, 2.002D, 41.101. **Co-requisites:** 38.131, 38.132, 38.133, 38.331, 38.431.

An integrated program of laboratory and pilot plant exercises designed to illustrate the principles and procedures presented in the subjects 38.131, 38.132, 38.133, 38.331 and 38.431. Includes examination and use of food processing equipment; food packaging materials; the evaluation of unit processes used in the preservation and modification of foods of plant and animal origin including fruit and vegetables, cereals, sugars, lipids, meat, fish, eggs and dairy products; their properties, uses, microbiological, chemical, biochemical and nutritional status and changes undergone during processing and storage.

### 38.135 Food Quality Assessment

**Co-requisites:** 10.301, 38.134.

*Food quality:* review of characteristics of food quality; review of instrumental assessment of food quality. *Sensory assessment of food:* review of theories of sensory perception; practical aspects of sensory assessment such as experimental design, questionnaire design, laboratory design, choosing a test method; outline of test methods, their execution and results analysis; sensory interactions; consumer testing methodology; correlation of subjective and objective methods; case studies; field studies involving evaluation of the role of sensory assessment in the Australian food industry; laboratory exercises.

### 38.140 Food Technology Project

**Prerequisite:** 38.134. **Pre- or co-requisites:** 38.131, 38.132, 38.133.

The student undertakes an individual project involving a literature survey, an experimental investigation, and the final preparation of a detailed report on a selected topic in food science or technology.

### 38.141 Food Regulation and Control

**Prerequisites:** 38.131, 38.132, 38.133, 38.134, 38.331.

*Food legislation:* State and NH&MRC food standards and mechanisms; Codex standards; case studies in food standards development; food and nutrition policy. *Food additives:* functions and modes of action of various classes of food additives; consequences of their use; National, State and International attitudes and standards; principles of toxicological testing and evaluation of results. *Product development:* needs for new food products; role of market research, advertising and food technology in the generation of new product ideas; steps in the development of a new product; new product failure and success; practical exercises in new product development. *Microbiological quality control:* good manufacturing practice; in-plant testing; microbiological sampling; sampling plans; decision criteria; microbiological criteria for foods, Hazard analysis and critical control point (HACCP) concepts, case studies.

### 38.142 Oenology

**Prerequisite:** 38.132.

History and nature of grape wines; grape and wine statistics; concept of cultivars within *Vitis vinifera*; other *Vitis* species; wine and grape physiology and biochemistry; maturity assessment and significance; influence of climate, soil, and other factors on wine quality; harvesting procedures; oenological procedures including crushing, sulphiting, pressing and draining, fermentation, maturation and storage, stabilization and clarification, bottling, packaging, and distribution; wine types and composition; quality assessment; quality control and analytical procedures; distillation and production of fortifying spirit and brandy; world wine industry; wine organizations, wine literature; social uses of alcohol.

### 38.143 Cereal Technology

**Prerequisite:** 38.132.

A treatment in greater depth of the following topics dealt with in graduate and undergraduate courses: production, storage, marketing and quality of cereal grains; current trends in these areas, technology of bread, biscuit and cake manufacture; chemical, physical and biochemical interactions in wheat flour doughs; flour milling and assessment of flour quality. Additional topics include cereal protein analysis, properties and behaviour; wheat variety identification; meat-cereal combinations; cereal enzymes; non-food uses of cereals; preparation and uses of cereal protein, starches and lipids.

### 38.144 Treatment and Utilization of Food Processing Wastes

**Prerequisite:** 38.131.

Ecological effects of waste discharges into the marine environment. Purification of water for domestic and industrial applications; water reuse; process modifications for effluent reduction. Origin, composition, treatment, disposal and utilization of wastes from food processing operations. Legal and economic aspects of waste disposal. Inspections of water and waste treatment plants. Seminars, assignments.
Applied Science

38.145 Marine Products Technology  S1 L2
Prerequisite: 38.133.
Fish species, quality control and operations used in fish canning, problems encountered with canned marine products. Fish farming, processing of carp and fish roe. Preparation of individual fish portions and utilization of commercially unattractive species. Harvesting, handling, processing and spoilage of molluscs and crustaceans. Utilization of unusual marine organisms. Industrial fishery products.

38.146 Inspections  S2 T3
Inspection of food processing plants, growing areas and research stations in Sydney metropolitan area, New South Wales, Victoria and South Australia.

38.149 Postharvest Technology of Fruit and Vegetables  S1 L1T5
Prerequisite: 38.132.
The systems available for the storage and handling of fruit and vegetables after harvest and the causes of wastage and deterioration in these systems. The effects of temperature, humidity, atmosphere control of the physiology and biochemistry of the product. The application of basic knowledge to develop improved commercial storage and marketing systems.

38.331 Food Microbiology I  S1 L3
Prerequisite: 44.143 or other equivalent introductory Microbiology subject.

38.341 Food Microbiology II  S2 L2T4
Prerequisite: 38.331.
A detailed theoretical and practical treatment of the ecology, taxonomy and biochemistry of bacteria, yeasts, fungi and viruses involved in food spoilage, food-borne disease and food fermentations. Emphasis on specific methodologies for the detection, enumeration and identification of food associated bacteria, yeasts and fungi. Problems of enumerating microorganisms in foods; techniques of food and surface sampling, formulation, performance and evaluation of selective-differential media, sublethal injury; the value of indicator organisms. Rapid methods for microbial enumeration and identification. Control of microorganisms in foods; microbiological quality control in food production; sanitation and disinfection; food legislation and microbiological standards.

38.344 Yeast Technology  S2 L2T1
Prerequisite: 38.331.

38.421 Food Engineering I  S2 L2T1
Raw materials, markets, organisation of the Australian food processing industries, food processing equipment, use of computers and automated control; dimensions, units, dimensionless groups, thermal and physical data of foods; material and energy balances. Includes appropriate factory inspections.

38.431 Food Engineering II  S1 L2T1
Prerequisite: 38.421.
Food rheology, fluid flow; selection of fluid flow equipment; steady-state heat transfer; selection of insulation, heat exchangers; materials of construction for food processing equipment; measurement and control of process variables.

38.441 Food Technology (Chemical Engineering)  L4T3

38.443 Food Engineering III  S1 L4T2
Prerequisites: 38.421, 38.431.
Multiple effect and vapour recompression evaporation, vapour compression and absorption refrigeration; distillation, gas absorption, liquid-liquid and liquid-solid extraction; use of computing equipment; transient heat transfer; economic decision making; specification of equipment for filtration, mixing, concentration, refrigeration and handling of foods; laboratory work involving automatic flow control, evaporation, computer control.

38.444 Computer Applications in Food Technology  S1 L1T1
Introduction to VAX/VMS, KRONOS and other control languages; the use of SPSS, MPOS and other program packages to solve problems in food technology.
38.521 Introductory Nutrition

Co- or Prerequisite: 41.101 Introductory Biochemistry

Dietary patterns. Role of nutrients in human structure and function. Nutritional needs of vulnerable groups, particularly infants, children, pregnant and lactating women, the elderly. Dietary imbalance: disorders related to the affluent diet including obesity, coronary heart disease, dental caries; problems of undernutrition including protein, energy, mineral and vitamin deficiencies. Assessment of nutritional status: use of dietary allowances, food groups, tables of food composition.

38.541 Advanced Nutrition

Prerequisite: 38.521.

Detailed study of the role of nutrients in human structure, function and disease, including study of micronutrients and trace minerals. Regulatory mechanisms such as appetite, control of nutrient metabolism and growth. Nutrition and infection. Alcoholism. Therapeutic nutrition and formulation of special dietary foods.

38.544 Nutritional Evaluation of Foods

Prerequisites: 2.043L, 38.134.

Analytical methods for nutrients in foods, including advanced analytical techniques. Evaluation of nutrients in specific food groups, and the effect of processing and preparation on nutrient value of foods.

38.151G Introductory Food Science

An introduction to the history of food preservation and human nutrition. Current world food patterns, organisations and trade. Food development programs, regional and international agencies and activities. Parameters of food quality; food choice and social behaviour, food and society. Students present a seminar on aspects of food science in Session 2.

38.152G Food Process Laboratory

An integrated series of laboratory and pilot plant exercises illustrating the principles and procedures involved in processing and examination of foods.

38.153G Food Technology Seminar

Students present material arising from literature and/or laboratory assignments and/or plant investigations in the food and related industries. Critical assessments are made of the results of research in food science and technology.

38.155G Dairy Technology

A detailed review of trends in dairy industries at the national and international levels. The microbiology and biochemistry of dairy products with particular reference to the technology of milk, butter and cheese production. The development of new dairy products, the use of dairy products in other foods. Emphasis is placed upon the use and development of new technologies in the broad areas of dairy product processing.

38.156G Oenology


38.157G Technology of Cereal Products

Prerequisite: 38.132 or 38.165G.


38.158G Marine Products

Prerequisite: 38.133 or 38.166G.


38.161G Food Additives and Toxicology

Functions, modes of action of food additives, consequences of use, ethical and legislative considerations. National, State and international attitudes and standards. Principles of toxicological testing, the evaluation of results.

38.162G Postharvest Physiology and Handling of Fruit and Vegetables

Biochemistry and physiology of metabolism in fresh fruit and vegetables; respiration measurements as an index of metabolism, maturation and senescence; concept of climacteric and non-climacteric produce; physiological and metabolic changes occurring during ripening. Effect of temperature on metabolism — constraints of high and low temperatures; role of humidity control and water loss in quality maintenance; use of atmosphere control to delay senescence and ripening. Physiological disorders of stored produce; microorganisms of importance to postharvest tissue; physical and chemical methods of control; postharvest disinfection and quarantine measures. Examination of current commercial storage and marketing operations.

38.163G Methods in Food and Nutrition Education

Co-requisite: 38.553G.

Community food and nutrition habits, knowledge and beliefs. Programs for nutrition education; design and evaluation. Communication and educational skills including use of instructional media and preparation of audiovisual materials.
38.164G Elements of Food Preservation


38.165G Plant Food Products

Fruits and vegetables: significance in world nutrition, trade; harvest, post-harvest deterioration and control; aspects of development, maturation, ripening; technology of juice, wine production, assessment procedures. Cereals: structure, composition, uses; wheat, rice milling; baking technology. Sugars: sources, types, composition, milling, refining; function in foods. Lipids: isolation, purification, chemistry, processing for frying, spreads, shortening, other food uses. Proteins: sources, extraction, texturising, processing; nutritional and toxicological considerations.

38.166G Animal Food Products

Meat: animal distribution, breeds; slaughter, pre- and post-mortem handling; meat composition, structure, microbiology, quality; preservation by chilling, freezing, curing, drying, packaging; meat by-products. Marine products: types, distribution, harvesting, microbiology, analytic and chemical changes; measurement and control of spoilage, use of microbiological and chemical methods, low temperature, drying. Eggs: production, preservation, structure, composition, microbiology; functional properties of components; egg quality; freezing and drying processes. Dairy products: milk composition, physical properties, microbiology; conversion to other dairy products; contaminants, sanitisers; chemistry and biochemistry of cream, butter, cheese, ice-cream, yoghurt; dried, condensed and homogenised products.

38.350G Food Microbiology

Microbiological examination of foods: sampling methods, plans, specifications, standards; enumeration, rapid methods; sub-lethal injury. Food spoilage: ecology, associations, dominant species; biochemistry, physiology of growth, enzyme production; off-flavours, odours and slimes. Food fermentations: ecology and biochemistry; fermented milks, vegetable, meat, cereal and marine products; Asian fermented foods; yeast and autolysates; single cell protein. Foodborne microbial disease: foods as vectors of disease, food poisoning; incidence, occurrence of infection and intoxication; ecology and taxonomy of common bacterial pathogens; food-borne viral disease; mycotoxins; methods of detection and enumeration of pathogens, indicator organisms; control and prevention of food-borne disease, standards, legislation, food hygiene.

38.351G The Microbial Ecology of Foods

Prerequisites: An introductory subject in microbiology, 38.350G or 38.331.

An integrated lecture and laboratory course covering the ecology, taxonomy and biochemistry of bacteria, yeasts, fungi and viruses involved in food spoilage, food-borne disease and food fermentations. Emphasis on specific methodologies for the detection, enumeration and identification of food associated bacteria, yeasts and fungi. Problems of enumerating microorganisms in foods: techniques of food sampling; formulation, performance and evaluation of selective-differential media; sublethal injury; indicator organisms. Rapid methods for microbial enumeration and identification. Control of microorganisms in foods; microbiological quality control, food legislation, microbiological criteria.

38.451G Advanced Food Engineering

Prerequisites: 38.421 and 38.431 or an introductory subject in material and energy balances, heat transfer and fluid mechanics.

Mathematical representation using vector calculus of heat and mass transfer and fluid mechanics in foods; numerical methods of solution; thermodynamic analysis of processes; laboratory work on the thermophysical properties of foods.

38.452G Drying of Foods

Prerequisite: 38.451G.

Psychrometry; water activity of foods; transport in porous media; spray drying, fluidized bed drying, freeze drying, batch and continuous drying; drying of grain in bulk silos; solar drying of fruit and vegetables.

38.551G Advanced Nutrition

Prerequisite: 38.553G.

Detailed treatment of the role of the nutrients in health and disease at different stages of the human life cycle. Nutritional topics of particular relevance to developing countries including population, infection, rehabilitation, productivity, education.

38.552G Methods of Nutritional Assessment and Analysis

Co-requisite: 38.551G.

Nutrient assay of foods including bench and instrumental techniques. Human nutritional assessment by anthropometric, dietary and biochemical methods.

38.553G Principles of Nutrition

The role of the nutrients in human structure and function, including nutritional imbalance states. Includes simple anthropometry and dietary intake study.

38.601G Food Technology A

S2 L3

The principles of nutrition, digestion and absorption with reference to carbohydrates, fats, proteins and amino acids; mineral substances; calcium, phosphorus, iron, iodine and fluorine; vitamins A, C, D, E, K, the B-group vitamins; foodstuffs and nutrition; nutritional problems of SE Asia; an introduction to the chemistry and structure of carbohydrates, fats, proteins and amino acids, vitamins; enzymology of foods.

38.602G Technology of Food Preservation A

S1 L2T1

Brief history and principles of food preservation; current status of food preservation in developing countries with emphasis on the use of salt, sugar, acids and other chemical preservatives; effect of water activity on chemical and microbial stability of foods; intermediate moisture foods; preservation by heat, chilling and freezing, spoilage mechanisms; effects of processing on nutritional quality and functional status; prospects for food irradiation.
38.603G Food Engineering A
An introduction to food engineering concepts; foods of developing and developed countries; world trade in food and agriculture; international food organisations; food hygiene and public health; standards for foods; parameters of food quality; food choice and social behaviour.

38.604G Food Engineering B
Thermal and physical data for foods; food processing equipment; rheology of foods; non-Newtonian fluid flow; specification of equipment for the processing of fluid foods.

38.605G Food Technology B
Microorganisms associated with foods; factors affecting microbial growth and survival; enumeration of microorganisms in foods; ecology of microbial food spoilage; food-borne microbial disease; food hygiene; microorganisms and fermented food products; simple laboratory procedures for the microbial and chemical analysis of foods.

38.606G Technology of Food Preservation B
Drying of foods; psychrometry; batch and continuous drying; drying of grain in storage silos; solar drying, sun drying of foods; spray, spouted bed, fluidized bed drying; nature and control of postharvest losses of cereal grains, grain legumes, tubers, fruit, vegetables, the role and use of packaging materials, container function and construction; storage life assessment of packaged foods.

38.607G Technology of Food Processing A
The science and technology of meat, marine, poultry and milk products; livestock and fishery resources, meat structure, composition, postmortem changes; meat microbiology; ambient storage and distribution; cold storage, chilling and freezing processes; meat, drying, salting, curing and smoking; milk composition, properties, microbiology, pasteurisation processes, milk products; egg structure, composition, quality, defects; preservation of shell eggs, liquid egg products and uses; fish handling, spoilage and preservation; fish meals and protein concentrates; emphasis on upgrading of traditional products and procedures.

38.608G Food Engineering C
Non-Newtonian heat transfer; specification of heat transfer equipment for food processing; materials of construction for food processing equipment; principles of liquid food evaporation; vapour compression and absorption refrigeration; liquid-liquid and liquid-solid extraction; transient heat transfer; measurement and control of process variables; economic decision-making.

38.609G Technology of Food Processing B
The science and technology of plant-derived foods; cereals, legumes, tubers, spices, fruit, vegetables and sugars; composition of cereal grains; processing, storage of traditional products; processing of legume products, fruit, vegetables, tubers; sources, composition, processing of fats and oils, functional properties and use with other foods; deteriorative changes; sugar processing from beet and cane; refining processes.

38.610G Food Engineering D
The transport phenomena approach to heat transfer, mass transfer and fluid flow in continuous and discontinuous phases; numerical methods of solution; use of computer packages for statistical and other calculations; thermodynamic analysis of processes in both simple and complex food processing operations.

38.611G Food Engineering Laboratory
Laboratory and pilot plant exercises illustrating the principles and procedures involved in food processing and food quality assessment. Where applicable, emphasis on middle-level technology and nature of indigenous foods.

38.612G Food Engineering Field Work
Inspection of food processing factories, agricultural and food research stations and the major food and grain producing areas in Queensland, New South Wales, Victoria and South Australia.

38.900G Master of Applied Science
Major Project

38.901G Master of Applied Science
Minor Project

38.902G Reading Assignment
Special reading assignments are set and examined by the School of Food Technology.

Graduate School of the Built Environment

Graduate Study

39.908G Community Noise Control
Introduction; sound and sound propagation; sound power, sound pressure, decibels; sound perception, psychoacoustics; loudness, annoyance, phons and dBA; hearing conservation; acoustic measuring and analysing instruments — sound level meters, filters, analysers, recorders; sound sources; community noise assessment; the NSW Noise Control Act; practical exercises in sound recording, analysis and assessment; noise control — source noise reduction, use of barriers, enclosures, distance, sound absorbing materials; sound transmission through building elements; noise components of environmental impact statements.
Biochemistry

Undergraduate Study

41.101 Biochemistry S1 L4T8
Prerequisites: 17.041, and 2.121 & 2.131, or 2.141. Excluded: 2.003.J.

The chemical properties of amino acids, peptides and proteins, carbohydrates, nucleic acids and lipids and the biological roles of these compounds. The nature and function of enzymes: The intermediary metabolism of carbohydrates, lipids and nitrogenous compounds. The molecular mechanism of gene expression and protein synthesis. Photosynthesis. Practical work to amplify the lectures.

41.111 Biochemical Control S2 L2T4
Prerequisite: 41.101.

The relationship between structure and function of enzymes, selected protein systems and hormones. Metabolic networks and control mechanisms. Practical work to amplify the lectures.

41.102A Biochemistry of Macromolecules S1 L3T9
Prerequisites: 41.101 or 41.111 (students must obtain a clear pass (PS) in either of these subjects), 2.002B.

Polysaccharides and glycoproteins including bacterial cell walls. Chemistry and biology of polynucleotides. Methods of amino acid and nucleic acid sequence analysis. Protein structure and synthesis. Active centres of some proteins. Sub-unit organization of proteins. Enzyme kinetics. Practical work to illustrate the lectures and to provide experience in modern biochemical techniques.

41.102B Physiological Biochemistry S2 L3T9
Prerequisites: 41.101 or 41.111 (students must obtain a clear pass (PS) in either of these subjects), 2.002B.


41.102C Plant Biochemistry S2 L2T4
Prerequisites: 41.101 or 41.111 (students must obtain a clear pass (PS) in either of these subjects), 2.002B.

The biochemistry of the major pathways characteristic of plants will be studied; topics include the energetics and carbon path of photosynthesis, glyoxylate cycle, growth hormones and regulatory phenomena, nitrogen fixation and assimilation. Experimental work to illustrate and amplify the lectures utilizes radioactive isotopes and a number of newer techniques.

Biotechnology

Undergraduate Study

42.102A Biotechnology A S1 L2T4
Prerequisites: 41.101 and 41.101 or 44.101 (Pass Conceded (PC) or Terminating Pass (TP) awarded prior to Session 2, 1983, is not acceptable).

The basic principles involved in the operation of microbial processes on an industrial scale. Includes: the selection, maintenance and improvement of microorganisms; the influence of physical and chemical factors on the microbial environment; the control of environmental factors; the effects of operational patterns on batch and continuous flow cultivation; aeration and agitation; scale-up of microbial processes; air and media sterilization; the harvesting, purification and standardization of products; the principles involved in microbial processes for chemical, pharmaceutical and food production, microbial waste treatment and environmental control. The laboratory component includes manipulation of microorganisms, laboratory-scale fermentor operation, microbial enzyme isolation, visits to industrial fermentation plants and industrial seminars.

42.102B Biotechnology B S2 L2T4
Prerequisite: 42.102A (Pass Conceded (PC) or Terminating Pass (TP) awarded prior to Session 2, 1983, is not acceptable).

Application of principles of biotechnology to the analysis and design of microbial processes of industrial relevance (antibiotics, microbial enzymes, single cell protein from carbohydrates and hydrocarbons, fermented foods and beverages, amino acids and vitamins, microbial polysaccharides, activated sludge and photosynthetic processes for waste treatment, microbial leaching of low-grade minerals). Emphasis on quantitative approach: mass and heat balance calculations, kinetic and thermodynamic analysis, detailed equipment design and specification, process design and layout, process simulation, plant location, application of optimization techniques. The economics of microbial processes are considered and comparison made with alternative modes of production or treatment. The economics of agro-industry in Australia using microbial processes. Marketing of fermentation products, clinical trials required, legal constraints, patent rights. Technical and economic feasibility studies, and a design project.

Graduate Study

42.211G Principles of Biology SS L3
A study of the characteristics of living systems, including a functional treatment of cytology, metabolism, bioenergetics; structure, function and characteristics of single and multicellular systems; growth; cell division; reproduction; heredity and evolution.
42.212G Principles of Biochemistry

A condensed treatment of biochemistry comprising the following aspects: the elemental and molecular composition of living organisms; the chemistry and roles of the biological elements and molecules; the thermodynamics and enzymatic catalysis of metabolism; catabolic, anabolic, amphibolic and anaplerotic processes, with emphasis on hydrolysis and synthesis of polymers, glycolysis and gluconeogenesis of glucose, \( \beta \)-oxidation and synthesis of fatty acids, deamination and decarboxylation of amino acids, the tricarboxylic acid cycle, electron transport and oxidative phosphorylation; metabolic regulation and integration.

42.213G Biochemical Methods

A laboratory program in practical biochemistry. The basic instrumentation and methodology of the biochemist will be introduced by practical exercises and demonstrations. A comprehensive treatment of the relevance and applicability of biochemical techniques is covered in tutorials.

42.214G Biotechnology

The selection, maintenance and genetics of industrial organisms; metabolic control of microbial synthesis; fermentation kinetics and models of growth; batch and continuous culture; problems of scale-up and fermenter design; control of the microbial environment; computer/fermentor interactions. Industrial examples will be selected from: antibiotic and enzyme production, alcoholic beverages, single cell protein (SCP), microbial waste disposal and bacterial teaching. Tutorial/practical sessions include: problem solving, instrumentation, continuous culture techniques, and mathematical modelling and simulation of industrial processes.

### Botany

#### Undergraduate Study

**43.101 Introductory Genetics**

- Prerequisites: 17.031 and 17.041 (see Note).

*Note:* Students with percentile range 61-100 in HSC Examination 4 unit Science with Biology, or 2 unit Biology may apply to enrol in 43.101, 45.201 or 45.301 in lieu of 17.041 after completion of 17.031. Students are selected by the Head of School for enrolment in these units. If successful, students will have met the prerequisite requirement of 17.041 Biology B for all units.

Students should consult lecturers before purchasing textbooks.

Various aspects of molecular, organisational and population genetics, including: mechanisms of recombination and mapping in higher organisms; recombination and mapping in microorganisms; mutations, structural and gene mutations, molecular structure of the gene, biochemical genetics, control of gene expression, genetic interaction, gene pools and gene frequencies, genetics and disease, genetic engineering.

**43.111 Flowering Plants**

Prerequisites: 17.031 & 17.041.

Plant cell structure, structure and functions of the major organs in Angiosperms (flowers, roots, stems and leaves), secondary thickening and arborescence, transport systems in plants, seeds and germination. Variation in structure and function in relation to environment. Introduction to taxonomy and identification of major Australian plant families. A weekend field excursion is part of the subject.

**43.112 Taxonomy and Systematics**

Prerequisite: 43.111. Co-requisite: 43.101.

This unit alternates each year with 43.162 The Plant Kingdom. 43.112 is given in 1984. If both units are to be included in three-year pass degree program, one should be completed in Year 2.

This unit may be taken in either Year 2 or Year 3 of the Science and Mathematics Course provided that prerequisites have been completed.

The assessment, analysis and presentation of data for classifying organisms both at the specific and supra-specific level.

**43.122 Plant Physiology**

Prerequisites: 17.041, 12.031, 2.121 and 2.131, or 2.141.

This unit may be taken in either Year 2 or Year 3 of the Science and Mathematics Course provided that prerequisites have been completed.

The study of how plants work at all levels from the cell to the whole plant. Includes: photosynthesis, respiration, transport, inorganic nutrition, plant growth substances, germination, growth, development, and flowering. Important practical applications of plant physiology are also considered.

**43.142 Environmental Botany**

Prerequisites: 17.031 & 17.041.

This unit may be taken in either Year 2 or Year 3 of the Science and Mathematics Course provided that prerequisites have been completed.

The soil and atmospheric environments in which plants live and a study of the interaction of plants with their environment. Energy and mass transfer. Emphasis is placed on the role of environmental science in food production. Students are required to attend one week-day field excursion as part of the practical course.

**43.152 Plant Community Ecology**

Prerequisites: 43.111 and 17.041 or 27.111.

This unit may be taken in either Year 2 or Year 3 of the Science and Mathematics Course provided that prerequisites have been completed.

Recognition and delimitation of plant communities. Ecology of selected Australian vegetation types. Use of numerical methods and application of community concepts to palaeoecology. Field work an integral part of this course.
**Applied Science**

**43.162 The Plant Kingdom**

Prerequisite: 43.111.

This unit alternates each year with 43.112 Taxonomy and Systematics. 43.112 is given in 1984. If both units are to be included in a three-year pass degree program, one should be completed in Year 2.

This unit may be taken in either Year 2 or Year 3 of the Science and Mathematics Course provided that prerequisites have been completed.

The major taxa of the Plant Kingdom with emphasis on the green plants. The evolution of basic vegetative structures, reproductive structures and genetic systems are studied. Field work part of the course.

**43.172 Phycology and Marine Botany**

Prerequisite: 43.111.

This unit may be taken in either Year 2 or Year 3 of the Science and Mathematics Course provided that prerequisites have been completed.

The biology of freshwater, marine and soil algae with particular emphasis on the marine flora of SE Australia. Field work is part of the course.

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**Microbiology**

**Undergraduate Study**

**44.101 Introductory Microbiology**

Prerequisites: 17.031 & 17.041.

The general nature, occurrence and importance of microorganisms. A systematic review of the major groups of microorganisms; the eucaryotic protista (micro-algae, protozoa and fungi); procaryotic protista (blue-green algae, “higher” bacteria, typical unicellular bacteria and small bacteria-like forms); plant, animal and bacterial viruses. The relationship between microorganisms and their environment, ecological considerations. Interactions between microorganisms and higher organisms.

Students wishing to enrol in this subject must obtain the written approval of the Head of the School of Microbiology. Those who can provide evidence of previous satisfactory training in biological science will be permitted to enrol immediately. In the absence of such evidence, students will be required to attend a course of lectures in Basic Cellular Biology to be presented in the first three weeks of Session 1. This course introduces the concepts of cellular biology, cell theory and cellular diversity including structure and function of cells. It also briefly describes biologically important molecules (proteins, polysaccharides and nucleic acids), enzyme catalysis and biological dynamics.

**44.143 Microbiology AS**

Prerequisites: 17.031 and 17.041.

The history, general nature, occurrence and importance of microorganisms. General features of procaryotic and eucaryotic protista. Basic microbiological methodology; bacterial anatomy and cytology; cell walls, flagella, pili, nucleus, inclusions, capsules, endospores. Microbial growth; methods of measuring; growth curves; batch, continuous and synchronous cultures. Microbial nutrition and metabolism; autotrophs and heterotrophs; photosynthesis, fermentation and respiration; biosynthesis. Bacterial genetics: adaptation, mutation and mutagens; conjugation; plasmids and drug resistance factors; genetic engineering concepts. Bacterial virology; lytic phages, lysogeny, transduction, phage typing. Bacterial taxonomy, ecology and diversity, basic principles and view of the major bacterial genera and groups. Yeasts and fungi; general ecology, morphology and modes of reproduction; mycotoxins. Immunology and serology: antigens, antibodies and their interactions; applications to identification. Medical microbiology; microbes as pathogens. Applied microbiology. Microbiology of soils and waters, nitrogen fixation, industrial fermentations, alcoholic beverages, single cell protein, food microbiology.

For further information regarding the following subject see the Faculty of Medicine Handbook.

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**Zoology**

**Undergraduate Study**

**45.121 Evolutionary Theory**

Prerequisites: 17.031 & 17.041.

Current evolutionary theory, emphasizing the population level. Ecological genetics, evolutionary aspects of ecological niche theory, speciation, evolution of social behaviour, molecular evolution and general evolutionary genetics. Some background in genetics is desirable.

**45.122 Animal Behaviour**

Prerequisites: 45.101 and (45.201 or 45.301).

An introduction to Ethology, the biological study of behaviour. Physiological, ecological, developmental and evolutionary aspects of behaviour are examined as important elements in the analysis of behaviour, particularly social behaviour. Both field and laboratory work are included.
45.152 Population and Community Ecology  

Prerequisites: 17.041 & 10.001 or 10.011.

Examination of the dynamics of one, two or more interacting populations. Systems analysis and simulation in ecology. Theoretical and mathematical analysis of the dynamics and stability of ecosystems. Topics in the optimal management of renewable resources. Unifying concepts in ecology.

45.201 Invertebrate Zoology  

Prerequisites: 17.031 & 17.041.

A comparative study of the major invertebrate phyla with emphasis on morphology, systematics and phylogeny. Practical work to illustrate the lecture course. Obligatory field camp.

45.301 Vertebrate Zoology  

Prerequisites: 17.031 & 17.021 (or 17.041).

A comparative study of the Chordata, with particular reference to the vertebrates, including morphology, systematics, evolution and natural history, with reference to selected aspects of physiology and reproduction. Practical work to supplement the lecture course. Field excursions as arranged.

45.302 Vertebrate Zoogeography and Evolution  

Prerequisite: 45.301.

A geographic approach to the current distribution, abundance and types of vertebrate species in the Australian region. Particular emphasis is placed on the basic principles of speciation, the history of the Australian continent, vertebrate adaptations and changes in the distribution and abundance of the Australian vertebrate fauna under the influence of man. Field excursions as arranged.

45.422 Economic Zoology  

Prerequisite: 45.201 or 45.402.

A study of the biology, ecology and control of vertebrate and invertebrate animals which harm man and his possessions. Human and domestic animal parasitology, pests on plants, diseases caused or spread by animals, chemical, biological and physical control, and side effects.

Graduate Study

45.900G Ecological Studies in Arid Lands Management  

Prerequisite: Degree with background in bioscience of equivalent.

Techniques in ecological studies of animal communities. Adaptations to an arid environment — environmental and social determinants. Behaviour, diet and condition of native and feral animals. Competition between native and introduced herbivores. Strategies in the management of arid zone wildlife. Concurrent studies in relevant units in the School of Botany are prescribed to cover aspects of vegetation description and plant/environment interactions.

46.101G Project in Remote Sensing  

C9

A minor study of some aspects of remote sensing as it relates to investigations within a particular discipline or subject area offered by Schools within the Faculty of Applied Science.

46.102G Research Project in Remote Sensing  

C18

An investigation of a problem in remote sensing which involves an identifiable research-component. Such an investigation should be related to the research interests of particular Schools within the Faculty of Applied Science.

46.200G Project  

Maximum C20

Research investigation on an approved topic, conducted either individually or as part of a team.

46.201G Themes in Environmental Studies  

C3

Lectures and seminars on a set of themes: resource use and conservation, pollution abatement, hazard perception and adjustment.

46.203G Medical Aspects  

Aspects of medicine bearing upon physiological consequences of pollutants. Synergism and antagonisms, photosynthesis and phytotoxicity, metabolic mechanisms; morbidity and mortality surveys; exposure indices. Particular pollutants aldehydes, nitro-olefins, carbon monoxide, sulphur dioxide, oxides of nitrogen, hydrocarbons, ozone and oxidants, particulates, carcinogens.

46.204G Legislative Aspects  

Chemical Engineering and Industrial Chemistry

Undergraduate Study

General

Students are expected to possess a calculator having exponential capabilities (In x and exp x or 'x to the y'), and this will normally be allowed to be used in examinations. However, it should be noted that calculators with very much greater capabilities than the above might not be allowed in examinations, because they could give the user an unfair advantage over other candidates. Further information may be obtained from the Head of the School.

Students of Chemical Engineering are expected to have a copy of Perry J. H. ed. Chemical Engineers' Handbook 5th ed. McGraw-Hill. This book is used extensively for most subjects and units. Certain subjects and units do not have specified textbooks and in these cases reference books are used or printed notes supplied.

48.001 Introduction to Chemical Industry

Introduction to the processing industry. Application of material and simple energy balances in chemical process operations. Information retrieval.

48.021 Chemical Engineering IA

Unit 1 Flow of Fluids

Prerequisite: 10.001.


Unit 2 Material and Energy Balances

Prerequisite: 48.001.

A revision and extension of material and energy balance calculations with more complex examples, including those arising from stagewise operation of extraction equipment. Graphical solution of multi-stage calculations.

Students not having taken 48.001 will be required to complete a 14-hour bridging course offered by the School early in Session 1.

Unit 3 Dimensions and Dimensional Analysis

Prerequisites: 1.001 and 10.001

Units and measures. Conversions of units and equations. Dimensions and Dimensional Analysis. Basic principles of modelling.

48.022 Chemical Engineering IB

Prerequisite: 48.021.

Unit 1 Heat Transfer I

S2 L1T1

Introduction to steady state heat transfer including conduction, convection, radiation, boiling and condensation with an emphasis on problem solving. Resistance concept in heat transfer with series and parallel combinations.

Unit 2 Computations I

S1 T1 S2 T1

A review of the fundamentals of FORTRAN, with extension to formatting, dimensioned variables and sub-routines. Application to the solution of selected problems involving heat and mass balances, fluid flow and pumping. This course is intended to be complementary to other material in 48.021 and 48.022.

Unit 3 Pumps and Pumping

S2 L½T½

Prerequisite: 48.021.

Types of piping and fittings. Blow cases. Air lift pumps. Reciprocating pumps, centrifugal pumps and gear pumps. Blowers and compressors.

48.025 Chemical Engineering for Ceramic Engineers

Consists of Units 1 and 3 of 48.021 and Units 1 and 3 of 48.022.

48.031 Chemical Engineering IIA

Unit 1 Mass Transfer (Theory)

S1 L1T1

Prerequisites: 2.002A, 48.021.

Molecular diffusion in gases, liquids and solids and the measurement and calculation of diffusion coefficients. Diffusion at an interface — one component unidirectional diffusion and equimole counter-diffusion under steady state conditions. Mass transfer coefficients. Estimation and application of chemical and phase equilibria. Stage calculations applied to liquid/liquid, vapour/liquid and other mass transfer operations. The two film theory and the transfer unit concept in gas/liquid, vapour/liquid, and other operations.

Unit 2 Heat Transfer II (Theory)

S1 L1

Prerequisite: 48.022. Unit 1 Co-requisite: 10.032.

An extension of the work covered in 48.022, Unit 1, with an emphasis on the fundamentals of conduction, convection and unsteady state heat transfer.

Unit 3 Plant Layout

S1 T1

Factory Layout: Factors governing location of processing plant. Typical dispositions of process batteries, central utilities, laboratories, workshops, amenities, storage areas, effluent treatments. Distribution of electricity, steam, process and reticulated cooling water. Boiler plants and cooling towers, steam turbine versus electric motors, local versus central location of particular utilities. Provision for expansion. Piping and Fittings: Fabrication, standards, most used sizes.
Unit 4 Process Engineering I

S1 L1


Unit 5 Surface Separation Processes

S2 L1

Principles of membrane processes, reverse osmosis, ultrafiltration, dialysis and electrodialysis. Design calculations for batch and continuous operation of reverse osmosis and ultrafiltration equipment. Principles of sorption processes, such as adsorption ion exchange and molecular sieves. Design of fixed-bed sorption equipment. Principles and design of other surface separation processes such as foam and bubble fractionation.

Unit 6 Economics I

S1 L1


48.032 Chemical Engineering IIC

Unit 1 Solids Handling

S2 L1

Prerequisite: 48.021 Unit 1.

Classification of granular solids and powders according to properties which affect their storage and movement. Storage in and retrieval from stacked piles, silos and hoppers, rules for their design. Feeders and their suitability to various kinds of granular solids. Mechanical conveyors and elevators, distance limitations; hoist height limitations. Rules for design of mechanical conveyors and elevators. Fluid-particle conveyors. Introduction to hydraulic and pneumatic conveyors, feeders and fluid-particle separation systems. Rules for design of simple slurry transportation and dilute phase pneumatic transportation systems. Practical and economic considerations determining choice of system.

Unit 2 Computations II

S2 L1 T1

Prerequisites: 10.031, 48.022 Unit 2.


Unit 3 Process Vessels

S2 L1 T½

Prerequisite: 8.112.

Mechanical design and fabrication of pressure vessels. Code and legal requirements. Design of supports for vertical and horizontal cylindrical vessels. Visualisation, freehand sketching and presentation of formal drawings and specifications for pressure vessels and equipment components. Relief valves, bursting discs, venting and draining systems.
Unit 4 Fluid-particle Systems I

Prerequisite: 48.021 Unit 1.

Interaction between particles and fluids: drag, terminal velocity, sedimentation. Flow through porous media; pressure gradient, filtration, fluidization, dispersion; multiphase flow, irrigated packed columns.

48.036 Chemical Engineering Laboratory I

Unit 1 and 2

Prerequisites: 48.021, 48.022, 2.002A.

An integrated chemical engineering laboratory incorporating experiments in fluid flow, heat transfer, mass transfer, thermodynamics and kinetics, instrumentation, process dynamics and control. The objectives of this laboratory are: to demonstrate, reinforce and extend the principles of chemical engineering which are covered in Chemical Engineering IA & IB A-C, to introduce various laboratory techniques which are used in the experimental investigation of chemical engineering problems; to develop an interest in experimentation, and to develop a proficiency in technical report writing.

48.039 Chemical Engineering IIJ


48.040 Chemical Engineering Project

The design of plant for the production of chemicals and the estimation of product costs or an experimental investigation of some aspect of chemical engineering.

48.041 Chemical Engineering IIIA

Prerequisite: 48.031.

Unit 1 Convective Mass Transfer

Models for convective mass transfer are fixed and free interfaces. Calculation of mass transfer rates at surfaces with simple geometry. Mass transfer in dispersions and in systems involving chemical reaction.

Unit 2 Simultaneous Heat & Mass Transfer

Psychometry, principles of design calculations for cooling towers and for humidification-dehumidification operations. Topics selected from: drying of solids, crystallization, sublimation, molecular distillation, gaseous and thermal diffusion.

Unit 3 Multicomponent Separation

Prerequisites: 48.031 Unit 1, 48.135.


Unit 4 Transport Phenomena

A generalized treatment of the continuum approach to momentum, energy and mass transport. Application of the conservation equations to chemical engineering problems. Discussion of the advantages and limitations of the transport approach.

48.042 Chemical Engineering IIIIB

Prerequisites: 10.032, 48.163.

Unit 1 Process Dynamics and Control I

Analysis of dynamic systems: derivation of equations for lumped parameter systems, linearization, reduction to transfer functions, numerical solutions. Control hardware: basic measuring instruments, control valves, analog controllers, digital computer-based controllers. Process control: analysis and synthesis of single feedback loops, using root-locus techniques, stability criteria, and criteria for satisfactory control.

Unit 2 Optimization

An introduction to some of the techniques of optimization and their application to problems from the process industries. The methods covered will include single and multiple dimensional search, linear programming and dynamic programming.

48.043 Chemical Engineering IIIC

Prerequisites: 48.031, 48.032.

Unit 1 Design Workshop

Consideration of the ways and means of attempting a design project, emphasizes to students the need 1. to study the history and alternatives to the design project, and 2. to use proper design techniques for the assigned process and equipment. Students are each given a design project or some aspect of it and are expected to produce an appropriate report on their assignments.

Unit 2 Industrial Pollution Control

48.044 Chemical Engineering Laboratory II  

An integrated chemical engineering laboratory at a more advanced level than the 48.036 laboratory and with an emphasis on open-ended experiments.

48.047 Chemical Engineering IIIID  
Prerequisites: 48.031, 48.032, 48.033, 48.163, 48.042.

Unit 1 Management  
A workshop comprising exercises and case studies to introduce the human and organizational aspects of managing process or engineering enterprises. Includes discussion of typical organization structures and reasons for choosing them; problems of managing people in organizations, industrial relations questions.

Unit 2 Process Engineering II  

Unit 3 Process Dynamics and Control II  
Frequency response analysis and synthesis techniques. Control of dead time and distributed systems. Cascade feedforward and other multiloop systems. Introduction to analysis of multivariable systems. Identification and estimation techniques. Digital implementation of control algorithms.

48.048 Advanced Chemical Engineering  

Unit 1 Petroleum and Reservoir Engineering  

Unit 2 Mineral Chemistry  
This subject includes 4.121 Principles of Metal Extraction (F L1T1) plus a sub-unit entitled Stabilities of Inorganic Aqueous Systems containing: sources of equilibrium stability data, methods of presenting stability data for application to interpreting the chemical reactions and mechanisms of aqueous processes.

48.049 Automation and Optimization for Ceramic Engineers  
Prerequisites: 48.165 Laboratory Automation Science and Unit 2 — Optimization of 48.042 Chemical Engineering IIIB.

48.090 Industrial Experience  
Students are expected to accumulate, by the end of the four year course, twelve weeks of industrial experience gained during recesses.

48.113 Chemistry of Industrial Processes  
Prerequisite: 2.002A. Co- or prerequisites: 2.002B, 2.042C.

The production of inorganic industrial chemicals from the standpoint of the application of the basic principles of inorganic and physical chemistry (acid industries, alkali industries, industrial gases, electric furnace products, superphosphates, aluminium and glass); a study of some sections of the organic industrial chemical industry — cellulose, industrial alcohols, formaldehyde, phenol, urea, phenolic and urea resins, acetic acid, polymers based on ethylene and acetylene, elastomers. Laboratory: students are required to attend lectures on Report Writing, carry out laboratory assignments and attend factory inspections at local and country centres as required.

48.115 Industrial Electrochemistry  
Prerequisites: 48.113, 48.138.

Fundamentals of electrodes, the Butler-Volmer equation, current/potential laws in relationship to reaction mechanism. Electro catalysis, gas evolution and co-deposition. Technological aspects of electrochemistry; energy conversion systems, storage systems and plating. Industrial processes — cell design and side reactions, gas bubble effect, current distribution and mass transfer effects. Developments in electrode technology, diaphragms and cell construction.

48.116 Water Chemistry  

48.121 Corrosion in the Chemical Industry  
Chemical and electrical aspects of corrosion and their application to corrosion problems encountered in the chemical process industries. Selection of materials for chemical plant. Design factors for corrosion prevention. Methods of corrosion prevention.

48.122 Instrumental Analysis  
Prerequisites: 1.001, 2.121, 2.131.

Basic principles of volumetric and gravimetric analysis and the application of spectrometric and selected techniques to the analysis of process streams and quality control.

48.124 Applied Kinetics  
Prerequisites: 48.138, 48.136.

Adsorption theory, kinetics of catalytic and non-catalytic fluid-solid reactions, rates of surface reaction, kinetics of heterogeneous reactions affected by diffusion, catalyst characterization.
48.125 Industrial Chemistry IA  
S1 L2T3  
Comprises 48.021 Units 1 and 2.

48.126 Industrial Chemistry IB  
S1 L1 and S2 L3  
Comprises 48.022 Units 1 and 2.

48.134 Applied Thermodynamics  
S1 L1T1  
Prerequisites: 48.135, 48.171.
Calculation of thermodynamic properties for non-ideal liquid and solid solutions. Development of statistical models for real solutions of industrial importance. Thermodynamics of interfaces. Phase equilibria in binary and ternary systems. A study of chemical equilibria in multicomponents, polyphase systems including appropriate computational methods.

48.135 Thermodynamics  
S1 L2T1  
Review of first law of thermodynamics; thermochemistry; second law of thermodynamics. Auxiliary functions and conditions of equilibrium. Thermodynamic properties of fluids; thermodynamic properties of homogeneous mixtures. Chemical reaction equilibria; calculation of equilibrium compositions for single reactions. Phase equilibria; the phase rule, equilibrium.

48.136 Reactor Design I  
S1 L1 S2 L2  
Introduction to reactor design: ideal batch, steady state mixed flow; steady state plug flow, size comparisons of ideal reactors optimization of operating conditions. Multiple reactor systems; reactors in series and parallel, mixes flow reactors of different sizes in series, recycle reactor, autocatalytic reactions. Multiple reactions; reactor design for reaction in parallel and reactions in series, series-parallel reactions. Temperature effects; heat of reaction, equilibrium constants, optimum temperature progression, adiabatic and non-adiabatic operation, product distribution and temperature. Kinetics of rate processes. Significance of the rate laws and models for distributed and lumped parameter systems. Experimental measurement and correlation of process rates.

48.137 Industrial Chemistry IIA  
S1 L2T1  
Selected aspects of unit operations for industrial chemistry students such as distillation, liquid-liquid extraction, gas absorption, filtration evaporation and crystallization.

48.138 Industrial Chemistry IIB  
S2 L2T1  
Consists of Computations II, normally given to chemical engineering students in 48.032, and a course on chemical kinetics to complement material given in 48.139.

48.139 Experimental Design  
S2 L1T1  
Design of experiments, correlation and regression, quality control. Use of graphical methods, fitting empirical equations to experimental data. Preparation of nomograms using constructional determinants.

48.143 Introduction to Analog Computation  
S2 L2T1  
Eight two-hour periods devoted to lectures, demonstrations and laboratory exercises. Analog computation, theory and application of analog computing elements, analog computer programming, solution of linear differential equations with constant coefficients, equation ordering and the elementary principles of modelling. Illustration by examples.

48.163 Instrumentation and Process Control I  
S2 L2T1  
Prerequisites: 10.031, 48.122 or 2.002D. Co-requisite: 48.113.
Analog Computation: theory and application of basic analog computing elements; magnitude and time scaling; solution of linear differential equations. Integration: theory and application of transducers and transmitters for measurement of process variables. Process Dynamics: behaviour of linear, lumped parameter dynamics systems; first, second and higher order and integrating systems. Process Control: closed loop, block diagrams, controllers and controller tuning.

48.165 Laboratory Automation Science  
S1 L1½T1½  
Prerequisite: 48.163.
The application of computers, eg microcomputers, to real-time data acquisition and process control in chemical laboratories and selected processes of interest to industrial chemists. Introduction to real-time digital operations and data manipulation. Organization of a process control computer. Hardware considerations. The process/computer interface. Sequential and programmable logic control of batch processes. Data acquisition and process monitoring techniques. Digital process control PID controller tuning. Graphics in process monitoring and control. Direct Digital Control.

48.166 Microprocessors in Analytical Instrumentation  
S1 or S2 L1T1  
Prerequisite: 19222. Co-requisite: 48.165.
Computer interfacing to analytical instrumentation at a more fundamental level than that encountered in 48.165. Laboratory Automation Science and is suited to students who envisage working in a research and development environment, where greater flexibility and a more innovative approach are needed in data acquisition and control operations. Transducers Instrumentation amplifiers. Signal filtering, conditioning, and processing. Data conversion systems. Principles of instrument interfacing. Interface hardware. Typical analytical instrumentation interfaces.

48.171 Chemistry of High Temperature Materials  
S2 L2  
Chemical aspects of high temperature materials; thermodynamics and kinetics of reactions in the solid state; phase equilibria in condensed systems; gas-solid and liquid-solid reactions.

48.172 Instrumental Analysis II  
S1 L1T2  
48.174 Seminars

Co- or prerequisite: 48.184.

Students are required to deliver two lecture on selected topics, one related to some aspect of chemical technology, and the other to their research project. The intention is to develop skill in oral expression, as well as ability in critical evaluation and logical presentation. Opportunity is taken, where appropriate, to arrange for guest lecturers.

48.194 Project (Industrial Chemistry) S1 T8 S2 T16

An experimental or technical investigation related to some aspect of industrial chemistry. Prerequisites and/or co-requisites will be determined depending on the nature of the project.

Servicing Subjects

These are subjects taught within courses offered by other schools or departments in a different faculty.

For further information regarding the following subjects see the Combined Sciences Handbook.

48.023 Chemical Engineering Science I S1 L3T2 S2 L2½T2½

Prerequisites: 1.001, 10.001.


48.024 Chemical Engineering Principles I S1 L2T1 S2 L1T1

Prerequisites: 1.001, 10.001.

The following topics, from 48.023: Flow of Fluids, Heat Transfer I, Dimensions.

48.037 Chemical Engineering Science II F L5T2

Prerequisites: 2.002A, 48.023.

Mass Transfer (Theory): Molecular diffusion in gases, liquids and solids and the measurement and calculation of diffusion coefficients. Diffusion at an interface — one component unidirectional diffusion and equimolecular counterdiffusion under steady state conditions. Mass transfer coefficients. Estimation and application of chemical and phase equilibria. Stage calculations applied to liquid/liquid, vapour/liquid and other mass transfer operations. The two film theory and the transfer unit concept in gas/liquid, vapour/liquid, and other operations. Heat Transfer II (Theory): An extension of the work covered in Heat Transfer I, with an emphasis on the fundamentals of convection and condensation, unsteady state conduction; introduction to heat exchanger design. Surface Separation Processes: Principles of membrane processes, reverse osmosis ultrafiltration dialysis and electrodialysis. Design calculations for batch and continuous operation of reverse osmosis and ultrafiltration equipment. Principles of sorption processes such as adsorption on exchange and molecular sieves. Design of fixed bed sorption equipment. Principles and design of the surface separation processes such as foam and bubble fractionation.

48.038 Chemical Engineering Principles II S1 L3T1 S2 L1T1

Prerequisite: 48.024.

The following topics, from 48.037: Mass Transfer (Theory), Heat Transfer II (Theory), Fluid-particle Systems, Surface Separation Processes.

48.101 Computation and Modelling in Applied Chemistry

For further information regarding the following subject see the Faculty of Engineering Handbook.

48.412 Polymer Materials
48.211 Biological Process Engineering  
F L2T4  
Prerequisite: 44.101.


48.240 Biological Process Engineering Project  
S1 T1 S2 T11

Project in Biological Process Engineering for students in Chemical Engineering.

48.301 Fuel Engineering (for Mining Engineers)  
F L2T1

An elective introductory subject in fuels and energy for Mining Engineering students based on the subject 48.311 Fuel Engineering I, supplemented by appropriate laboratory experiments (consisting of 28 lectures and 14 hours of laboratory classes per session, taught over two sessions).

48.303 Fuel Science for Industrial Chemists  
S1 or S2 L2


48.311 Fuel Engineering I  
Prerequisites: 1.001 or 1.011, 2.121, 2.131, or 2.141, 5.010, 5.030, 10.001 or 10.011.

Unit 1 Fuels and Energy Sources and Properties  
S1 or S2 L1

Fossil Fuels: coal, oil, gas; origin, occurrence in Australia; storage, sampling and analysis; properties and their significance; classification. Other energy sources; nuclear, solar, wind, water, etc.

Unit 2 Energy Conversion  
S1 or S2 L1

Principles of combustion of solid, liquid and gaseous fuels. Limits of inflammability. Burning velocity, ignition temperature. Design principles of burners, combustion efficiency, excess air, air supply.

Unit 3 Fuel Processing  
S1 or S2 L1


Unit 4 Fuel Plant Technology  
S1 or S2 L1

Design principles of boilers. Boiler water conditioning. Introduction to furnaces, ovens, kilns, etc.

48.321 Fuel Engineering II  
S1 or S2 L1

Unit 1 Combustion — Fundamentals and Science


Unit 2 Principles of Gasification  
S1 or S2 L1

Thermodynamics of basic reactions and calculation of equilibrium compositions. The production of fuel and synthesis gases, controlled furnace atmospheres; gas purification.

Unit 3 Radiation Heat Transfer and Engineering Applications  
S1 or S2 L1

### Department of Polymer Science

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Offered By</th>
<th>Prerequisites/Comments</th>
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<tbody>
<tr>
<td>48.404</td>
<td>Advanced Polymer Science</td>
<td>S1 or S2 L2</td>
<td>Prerequisite: 48.403. Selected topics from basic texts and the original literature covering; physics of glassy polymers, viscoelasticity, polymer rheology, polymer morphology fracture and environmental stress cracking, rubber elasticity, anionic, cationic and Ziegler-Natta catalysts in polymer chemistry, emulsion polymerization, silicon polymers and polymers for high temperature service.</td>
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### Graduate Study

#### General

**48.063G Industrial Water and Wastewater Engineering**

Environmental consequences of water pollution. Water quality criteria and regulations related to industrial use and disposal. Water sources and requirements of industry. Theoretical and practical aspects of treatment methods, including screening, sedimentation, oil separation, coagulation and flocculation, filtration, biological treatment, adsorption, ion exchange, membrane processes. Strategies for industry including waste surveys, prevention at source, correction before discharge, water reuse. Economic aspects. Seminars. Factory visits/laboratory.

**48.070G Process Principles**


**48.071G Corrosion Technology I**


48.072G Corrosion Laboratory
Laboratory assignments to illustrate and measure the mechanism of corrosion. Electroplating/anodising experiments.

48.073G Corrosion Materials
Metallic — types available, properties and applications for each of the following: cast irons, alloy cast irons, carbon steels, low alloy steels, stainless steel, special alloys. The following metals and their alloys: aluminium, copper, nickel, titanium, lead, zinc, magnesium, tin, cadmium, chromium, cobalt. Refractory metals — molybdenum, tantalum, tungsten, zirconium. Noble metals — gold, platinum, silver.

48.074G Corrosion Technology II

48.075G Corrosion Seminar
Joint University/Industry colloquia on theory and practice of corrosion technology. Students present material arising from literature and laboratory assignments and industrialists are invited to contribute papers and/or participate in the colloquia.

48.076G Corrosion Literature Review
Students are expected to consult and read the wide literature on corrosion and to produce a comprehensive and detailed report on a selected topic, eg aspects of corrosion in the acid industry; marine corrosion; corrosion problems in the food industry; underground corrosion of pipelines.

48.077G Testing Laboratory
Candidates undertake a project involving the design/evaluation of corrosion testing equipment/techniques. A comprehensive report is submitted.

48.081G Advanced Process Dynamics

48.082G Process Optimization
Multivariable analytical and numerical optimization in free and constrained parameter space. Optimization of functions of a continuous variable. Dynamic programming. Applications of these techniques to specific chemical engineering problems.

48.083G Equilibrium Concepts in Water Systems
The application and limitations of chemical thermodynamics in water systems. Aqueous inorganic process systems including water treatment and minerals processing. The effects and control of pollution. Thermodynamic diagrams such as H/P, potential/pH, temperature/pH and concentration/pH are developed as an aid to assessing system energetics.

Sources and estimation of thermodynamic data. Kinetics and mechanism in relation to aqueous system energetics. Analysis of kinetic data.

48.084G System Simulation and Control
This is a participatory course in which case studies, discussions of recent papers, development of digital simulation programs and analog computer laboratory work play an important part.

Topics are selected from the following areas:

Unit 1 System Simulation
Numerical methods for digital simulation; programming languages and packages for system modelling of distributed parameter systems; use of analog computers in system simulation.

Application of these techniques to the study of process plant and equipment, environmental systems, and similar areas.

Unit 2 Advanced Process Control
System identification and parameter estimation; control of multi-loop systems; non-linear systems; digital control and data-logging, sequencing control.

48.085G Interphase Mass Transfer
Advanced theories of mass transfer. The effect of interfacial instability and methods for predicting its presence. Theoretical prediction of mass transfer in dispersed systems. Multicomponent mass transfer.
48.086G Fluid Particle Interactions


48.089G Graduate Colloquia

Colloquia on research developments in the School of Chemical Engineering and Industrial Chemistry. Students are required to participate actively in the colloquia and give at least one dissertation based on their own investigations.

48.090G Specialist Lectures

48.091G Advanced Thermodynamics


48.092G Computer-aided Design

A workshop type of course with considerable time devoted to discussion, seminars, writing and running of programs. Programming: methods, conventions, and standards; program design, flow-charting, co-ordination and documentation. Design: individual plant units and components, flowsheets, optimization and economic analysis. Physical property estimation. Simulation: continuous change and discrete change systems.

48.131G Catalysts and Applied Reaction Kinetics

Methods of catalyst preparation and characterization; adsorption theories; general mechanisms for gas-phase reactions catalyzed by solids; poisoning and catalyst decay; effectiveness factors; techniques in catalytic research; special topics in reaction kinetics including gas-solid non-catalytic reactions, polymer kinetics, electro-chemical reaction kinetics and electrocatalysis; industrial catalytic processes; application of statistical methods to the solution of complex chemical data.

48.161G Electrochemical Techniques for Control and Analysis

In-depth study of selected electroanalytical methods with respect to theoretical principles, instrumentation and practical utilization. The importance of adsorption and reaction mechanism on accuracies and application. Steady state and rapid scan voltammetry, stripping voltammetry, chronopotentiometry, chronocoulometry, classical coulometry and potentiometry. Instrument design and modification for specific needs.

Department of Biological Process Engineering

General

Units are offered separately subject to specified prerequisites as well as the restrictions on those units designed as bridging materials.

48.281G Design of Microbial Reactors

Unit 1 Rate Processes

Bridging unit designed to provide the background in rate processes in heterogenous systems required for Unit 3. This unit could not be offered to a graduate with background in advanced rates processes, the equivalent of 48.0454 Reactor Engineering.

Process rates and rates of change; generalized definition of a process rate. Material balances with reaction — integral balances and balanced differential with respect to time, space, and both time and space. Measurement, interpretation and correlation of process rates. Heterogeneous systems, the influence of diffusional processes, linear and non-linear systems, lumped and distributed systems.

Unit 2 Fundamentals of Microbial Stoichiometry

This is a bridging unit offered to students with little or no background in the life sciences. A prerequisite or co-requisite would be 44.101 Introductory Microbiology or its equivalent. The unit is designed to provide an understanding of the structure of metabolism to allow the student to carry out the overall metabolic balances necessary for quantification of living systems.

Growth of an undifferentiated organism as a physico-chemical process leading to quantification of the growth processes. Overall structure of metabolic processes. Material, energy and redox balances under anaerobic and aerobic conditions. Specific metabolic rates and their quantification.

Unit 3 Design of Microbial Reactors

This unit would normally follow rate processes or fundamentals of microbial stoichiometry and is divided into two strands.

and its application to the description of two-phase reacting systems — gas-liquid, oil-aqueous and solid-fluid systems will be examined with examples relevant to the biological process industries. Microbial Reactor Calculations: The collection, quantification and interpretation of rate data, and the design of reactors for freely suspended microorganisms; batch, semi-batch and continuous reactors; gas exchange balances. Rate processes in microbial flocs and microbial films. Design for microbial floc and film reactors.

48.282G Microbial Kinetics and Energetics

Unit 1 Microbial Kinetics

Prerequisite or co-requisite: 48.281G Unit 2 or equivalent.


Unit 2 Microbial Energetics

Prerequisite or co-requisite: 48.281G Unit 2 or equivalent.

Significance of entropy and free energy changes in microbial growth. Driven reactions, group transfer potentials, driven reaction sequences and the significance of actual and standard free energy changes in open systems. Application to metabolism, energy requiring pathways, energy producing pathways. Thermodynamic efficiency of growth. Mass, heat and entropy balances in growing cultures, prediction of yield.

48.283G Bioprocess Unit Operations and Equipment Design

Prerequisite or co-requisite: 48.284G or equivalent.

Engineering design and operating characteristics of plant and processes normally used, eg sterilization and air purification, dehydration drying at reduced pressure, reduced temperature preservation, radiation, product isolation, sedimentation, filtration, centrifugation, extraction, absorption, chromatography and ion exchange, absorption with reaction, electrophoresis and dialysis, aseptic design, materials of construction, effluent disposal.

48.284G Heat, Mass and Momentum Transport

A bridging subject designed to provide an introductory understanding of the mechanisms of transport processes. This subject could not be offered to a graduate with a background in chemical engineering principles. Mechanisms of molecular and turbulent transport: Heat, mass and momentum transport as rate processes. Boundary layer theory: Lift and drag coefficients. Introduction to non-Newtonian flow.

48.285G Bioprocess Laboratory

Practical experience in the industrial processing of biological and microbial systems. Small projects in areas of interest to the student.

Department of Fuel Technology

Note: One Session Unit (SU) is equal to 1 hour per week for session of 14 weeks.

48.380G Fuel Seminar

1 (SU) to be given in Session 2, compulsory in MAppSc degree course in Fuel Engineering. Content bias to choice of G subjects.

48.382G Fuel Constitution

Unit 1 (1 SU) Coal constitution and pyrolytic behaviour
Unit 2 (1 SU) Constitution and classification of oils
Unit 3 (2 SU) Advanced fuel constitution

48.383G Fuel Processing

Unit 1 (2 SU) Carbonization and gasification processes
Unit 2 (1 SU) Liquid fuels from coals
Unit 3 (1 SU) Chemicals from coals

48.384G Fuel Plant Engineering

Unit 1 (1 SU) Furnace design and heat recovery
Unit 2 (1 SU) Process heat transfer and efficient use of steam
Unit 3 (2 SU) Furnaces and boiler control system
Unit 4 (2 SU) Fuel plant heat transfer

48.385G Combustion and Energy Systems

Unit 1 (1 SU) Combustion technology
Unit 2 (1 SU) Fuel impurities removal of and deposits from
Unit 3 (1 SU) Efficiency in energy utilization
Unit 4 (1 SU) Combined cycles and integrated systems

48.386G Unit Operations in Waste Management

Unit 1 (3 SU) The unit operations and processes associated with modern waste management practices; ie the origin, nature, characterization, handling, transportation, size reduction and storage of various waste materials; reduction at source and disposal by composting, landfill, incineration and chemical processing; recovery and re-use of marketable products. Legal aspects: case histories.

48.387G Fuel Technology Practice

Compulsory in MAppSc (Fuel) (4 SU). Content bias towards choice of G subjects.

48.391G Atmospheric Pollution and Control (Theory)

Courses, properties, dispersion, measurement and monitoring control and legislation of air pollution in ambient and industrial environments.
48.329G Atmospheric Pollution and Control (Political Aspects)  
S1 or S2 T3

Prerequisite: 48.391G.

Laboratory and tutorial programs in the measurement and analysis of ambient and industrial air pollutants. Computational tutorials in advanced dispersion models, aerosol dynamics and control equipment design parameters.

48.440G Polymer Physics  
S1 or S2 L4T2


48.900G Major Project

A substantial project on some aspects of chemical engineering, industrial chemistry, polymer science, fuel technology or biological process engineering.

48.901G Minor Project

A minor investigation on some aspect of chemical engineering, industrial chemistry, polymer science, fuel technology or biological process engineering.

48.410G Analytical Characterization of Polymers  
S1 or S2 L3T3

Composition of formulated polymeric material. Group reactions, specific and colour reactions. Instrumental characterization of polymers, and co-polymers and associated additives, eg plasticizers, antioxidants, etc by UV and IR spectrophotometry and pyrolysis gas chromatography. Analysis of films by transmission and reflectance spectrophotometric methods. Thermal analysis.

48.430G Polymer Engineering  
S1 or S2 L4T2


Sociology

48.430G Polymer Engineering  
S1 or S2 L4T2


53.001 Introduction to Sociology  
F L2T1

An introduction to major issues in Sociology. There are two main themes: culture, society and institutions; and social inequality. Topics: social control, power, sexism, work and leisure, class distinctions. These are treated both factually and theoretically and are considered as they relate to the situation in Australia and in the developing countries.

Assessment: On the basis of performance in essays, written assignments, and tutorial classes.
**Political Science**

**Undergraduate Study**

54.1002 Power and Democracy in Australia  
*Prerequisite: 54.1001 (or equivalent) or 12 credit points from Political Science Level I subjects including 54.1002 or 54.1003; or 51.542; or 53.033; or 54.2013.*
Who has power in Australia? The formal political institutions (parliament, government, elections, the political parties) and also the trade unions, the media, business, pressure groups and the bureaucracy as sources of political power. The capitalist nature of Australian society and ideas about democracy, freedom and equality in Australia and at the structure of Australian society. Sources of inequality such as education, sex, law and race.

54.1003 Australian Political Institutions  
*Excluded: 54.1001 and 54.1002.*
The nature and history of Australian political institutions in depth. The Australian constitution and federal structure and the role of the High Court in helping determine the nature of the power relationships in Australian politics. The political parties, their history, successes and failures, strengths and weaknesses both in and out of government. The formal institutions of government: parliament, Cabinet, the bureaucracy and both Labor and Liberal prime ministers. Elections and voting in Australia and pressure groups.

54.1004 Government in the Modern World  
*Excluded: 54.1001.*
An examination of the development, nature and forms of government in the modern world. Particular attention is paid to the major conceptual tools of political analysis with emphasis on a comparative approach to the study of government and case studies drawn from both the industrialized and developing areas. An underlying theme is the management of conflict and the establishment of order in the various systems examined.

54.1005 A History of Political Thought  
*Excluded: 54.1001.*

*S1 has evening lectures. Repeated in S2 during the day.
**S1 has daytime lectures. Repeated in S2 during evenings.*

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**Australian Graduate School of Management**

**Graduate Study**

54.2008 Public Policy Making  
*S2 3CCH*
Prerequisite: 54.1001 (or equivalent) or 12 credit points from Political Science Level I subjects including 54.1002 or 54.1003; or 51.542; or 53.033; or 54.2013.
The problems of administering government and the problems of decision making. Models of decision-making are discussed, as are problems in implementation. Areas of public policy in Australia, such as poverty and education.

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85.716G Public Policy  
*Half unit. Prerequisite: 85.131G or its equivalent.*
The processes by which public policies evolve and their outcomes in society. The role of the policy analyst in conceptualizing problems and developing strategies. Topics include: techniques of analysing the decision-making process; specific methods of policy analysis; the relevance of political skill and bargaining in determining outcomes; and problems of policy implementation.

85.721G Economics of Natural Resources  
*Hall unit. Prerequisite: 85.131G or its equivalent.*
An examination of the stock and flow conditions necessary for the efficient allocation of natural resources (including environmental amenities) through time. Application to actual resource markets to examine relative scarcity and price fluctuations. Policies for resource management.
Financial Assistance to Students

The scholarships and prizes listed below are available to students whose courses are listed in this handbook. Each faculty handbook contains in its Financial Assistance to Students section the scholarships and prizes available within that faculty. The General Information section of the Calendar contains a comprehensive list of scholarships and prizes offered throughout the University.

Scholarships

Undergraduate Scholarships

As well as the assistance mentioned, there are a number of scholarships available to students. What follows is an outline only. Full information may be obtained from Room G20, located on the Ground Floor of the Chancellery. Unless otherwise indicated in footnotes, applications for the following scholarships should be made to the Registrar by 14 January each year. Please note that not all of these awards are available every year.

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year's of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bursary Endowment Board*</td>
<td>$180 pa</td>
<td>Minimum period of approved degree/combined degree course</td>
<td>Merit in HSC and total family income not exceeding $6000</td>
</tr>
<tr>
<td>Sam Cracknell Memorial</td>
<td>Up to $3000 pa payable in fortnightly instalments</td>
<td>1 year</td>
<td>Prior completion of at least 2 years of a degree or diploma course and enrolment in a full-time course during the year of application; academic merit; participation in sport both directly and administratively; and financial need</td>
</tr>
<tr>
<td>Girls Realm Guild</td>
<td>Up to $1500 pa</td>
<td>1 year renewable for the duration of the course subject to satisfactory progress and continued demonstration of need</td>
<td>Available only to female students under 35 years of age enrolling in any year of a full-time undergraduate course on the basis of academic merit and financial need</td>
</tr>
</tbody>
</table>

*Apply to The Secretary, Bursary Endowment Board, PO Box 460, North Sydney 2060 immediately after sitting for HSC.
### Undergraduate Scholarships (continued)

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Years of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General (continued)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Universities Credit Union</td>
<td>$500 pa</td>
<td>1 year with the possibility of renewal</td>
<td>Prior completion of at least 1 year of any undergraduate degree course. Eligibility limited to members of the Universities Credit Union Ltd or members of the family of such members.</td>
</tr>
</tbody>
</table>

| **Ceramic Engineering** | | | |
| Australian Ceramic Society | Up to $600 pa | 1 year renewable for the duration of the course subject to satisfactory progress | Permanent residence in Australia and eligibility for admission to Year 1 or Year 2 of the full-time degree course in Ceramic Engineering |
| Australian Consolidated Industries Ltd | Up to $600 pa | | |
| Monier Limited | Up to $1000 pa | | |
| North Sydney Brick and Tile Co Ltd | Up to $1000 pa | | |
| The Brick Manufacturers' Association of New South Wales | Up to $900 pa | | |
| The State Brickworks | Up to $900 pa | | |
| The Thomson Family | Up to $1000 pa | | |
| Wunderlich Limited | Up to $1000 pa | | |
| Zacuba Pty Ltd | Up to $750 pa | | |
| Ferro Corporation | Up to $600 pa | | |
| Plessey Australia Pty Ltd | Up to $1000 pa | 1 year renewable for the duration of the course subject to satisfactory progress | Permanent residence in Australia and eligibility for admission to Year 2 of the full-time degree course in Ceramic Engineering |
| Fowlerware | Up to $500 pa | | |

### Chemical Engineering and Industrial Chemistry

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Years of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shell Refining (Australia) Pty Ltd</td>
<td>Up to $800 pa</td>
<td>1 year renewable for the duration of the course subject to satisfactory progress</td>
<td>Eligibility for admission to Year 2 of the full-time degree course in Chemical Engineering</td>
</tr>
<tr>
<td>Dow Chemical (Australia)</td>
<td>Up to $1000 pa</td>
<td></td>
<td>Permanent residence in Australia and eligibility for admission to Year 2 of the full-time degree course in Chemical Engineering</td>
</tr>
<tr>
<td>Australian Waste Disposal Conference Committee</td>
<td>Up to $300 pa</td>
<td></td>
<td>Permanent residence in Australia and eligibility for admission to any year of the full-time degree course in Chemical Engineering (with Fuel Engineering electives)</td>
</tr>
<tr>
<td>ICI Australia Operations Ltd</td>
<td>Up to $1000 pa</td>
<td></td>
<td>Permanent residence in Australia and eligibility for admission to Year 4 of the full-time degree course in Chemical Engineering</td>
</tr>
</tbody>
</table>
### Undergraduate Scholarships (continued)

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Years of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Food Technology</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coca-Cola Export Corporation</td>
<td>Up to $1000 pa</td>
<td></td>
<td>Permanent residence in Australia. Not more than 22 years of age on 1 December preceding the year in which the award commences and eligibility for admission to Year 1 of the full-time degree course in Food Technology.</td>
</tr>
<tr>
<td>Fielder Gillespie-White Wings</td>
<td>Up to $1000 pa</td>
<td>1 year renewable for the duration of the course subject to satisfactory progress</td>
<td></td>
</tr>
<tr>
<td>Food Technology Association</td>
<td>Up to $1000 pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>George Weston Foods Ltd</td>
<td>Up to $4000 over 4 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fuel Engineering</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian Waste Disposal Conference Committee</td>
<td>Up to $300 pa</td>
<td>1 year with possibility of further extension subject to satisfactory progress</td>
<td>Permanent residence in Australia and eligibility for admission to any year of the full-time degree course in Chemical Engineering (with Fuel Engineering electives)</td>
</tr>
<tr>
<td><strong>Metallurgy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LNC Industrial Products Pty Ltd</td>
<td>Up to $1000 pa</td>
<td>1 year renewable for the duration of the course, subject to satisfactory progress</td>
<td>Permanent residence in Australia and eligibility for admission to Year 1 or Year 2 of the full-time degree course in Metallurgy or Metallurgical Process Engineering</td>
</tr>
<tr>
<td>Sandvik Australia Pty Ltd</td>
<td>Up to $1250 pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sir Rupert Myers</td>
<td>Up to $1500 pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School of Metallurgy</td>
<td>Up to $1000 pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mining Engineering</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stan Sawyer Memorial Scholarship to Coal Mining Students</td>
<td>Up to $200 pa</td>
<td>1 year renewable for the duration of the course, subject to satisfactory progress</td>
<td>Eligibility for admission to Year 3 or Year 4 of the full-time degree course in Mining Engineering</td>
</tr>
</tbody>
</table>
### Undergraduate Scholarships (continued)

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Years of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Textile Technology</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bonds Industries Ltd</td>
<td>Up to $1600 pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bradmill Industries Ltd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bruck (Australia) Limited</td>
<td>$3100 or $2010 pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fibremakers Division of ICI</td>
<td>$2750 or $1850 pa</td>
<td>1 year renewable for the duration of the course, subject to satisfactory progress</td>
<td>Permanent residence in Australia and eligibility for admission to the full-time degree course in Textile Technology</td>
</tr>
<tr>
<td>Australia Operations Pty Ltd</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Council of Wool Selling Brokers of Australia</td>
<td>Up to $1500 pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private Treaty Wool Merchants</td>
<td>Up to $1500 pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reckitt's Toiletries International</td>
<td>Up to $1500 pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Textile Council of Australia</td>
<td>$3100 or $2010 pa</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Wool and Pastoral Sciences

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Years of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Australia Bank</td>
<td>Up to $1000 pa</td>
<td>1 year renewable for the duration of the course, subject to satisfactory progress</td>
<td>Permanent residence in Australia and eligibility for admission to the full-time degree course in Wool and Pastoral Sciences</td>
</tr>
<tr>
<td>Merck, Sharp and Dohme</td>
<td>Up to $1000 pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Council of Wool Selling Brokers of Australia</td>
<td>Up to $2500 pa</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Graduate Scholarships

Application forms and further information are available from the Student Enquiry Counter, located on the Ground Floor of the Chancellery. Information is also available on additional scholarships which may become available from time to time, mainly from funds provided by organizations sponsoring research projects.


Where possible, the scholarships are listed in order of faculty.

*Available for reference in the University Library.*
Graduate Scholarships (continued)

<table>
<thead>
<tr>
<th>Donor and Description</th>
<th>Value</th>
<th>Years of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University of New South Wales Postgraduate Scholarships</td>
<td>Living allowance of $5750 pa. Other allowances may also be paid</td>
<td>1-2 years for a Masters and 3-4 years for a PhD degree</td>
<td>Applicants must be honours graduates (or equivalent). Applications to Dean of relevant Faculty.</td>
</tr>
<tr>
<td>Commonwealth Postgraduate Research Awards</td>
<td>Living allowance of $6850 pa. Other allowances may also be paid.</td>
<td>1-2 years; minimum duration of course</td>
<td>Preference is given to applicants with employment experience. Applicants must be graduates or scholars who will graduate in current academic year, and who have not previously held a Commonwealth Postgraduate Award. Applications to Registrar by 30 September.</td>
</tr>
<tr>
<td>Commonwealth Postgraduate Course Awards</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian American Educational Foundation Travel Grant (Fulbright)*</td>
<td>Amount varies, depending on award</td>
<td>Up to 1 year</td>
<td>Applicants must be female graduates who are members of the Australian Federation of University Women</td>
</tr>
<tr>
<td>Australian Federation of University Women</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Caltex Woman Graduate of the Year</td>
<td>$16000 over 2 years for further studies in USA, UK, Northern Europe or in special cases Australia. There are no special allowances for travel or accommodation for married graduates.</td>
<td>2 years</td>
<td>Applicants must be female graduates who will have completed a University degree or diploma this year and who are Australian citizens or have resided in Australia for at least seven years. Selection is based on scholastic and literary achievements, demonstrable qualities of character and accomplishments in cultural and/or sporting/recreational activities. Applications close 30 September.</td>
</tr>
<tr>
<td>Commonwealth Scholarship and Fellowship Plan</td>
<td>Varies for each country. Generally covers travel, living, tuition fees, books and equipment, approved medical expenses. Marriage allowance may be payable.</td>
<td>Usually 2 years, sometimes 3</td>
<td>Applicants must be graduates who are Commonwealth citizens or British Protected Persons, and who are not older than 35 years of age. Applications close with Registrar by 15 September.</td>
</tr>
<tr>
<td>Sam Cracknell Memorial</td>
<td>Up to $3000 pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The English-Speaking Union (NSW Branch)</td>
<td>$5000</td>
<td></td>
<td>Applicants must be residents of NSW or ACT. Awarded to young graduates to further their studies outside Australia.</td>
</tr>
</tbody>
</table>

*Application forms are available from The Secretary, Department of Education, AAEF Travel Grants, PO Box 826, Woden, ACT 2606.
## Graduate Scholarships (continued)

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Years of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General (continued)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gowrie Scholarship Trust Fund</td>
<td>$3500 pa. Under special circumstances this may be increased.</td>
<td>2 years</td>
<td>Applicants must be members of the Forces or children of members of the Forces who were on active service during the 1939-45 War. Applications close with Registrar by 15 November.</td>
</tr>
<tr>
<td>Harkness Fellowships of the Commonwealth Fund of New York**</td>
<td>Living and travel allowances, tuition and research expenses, health insurance, book and equipment and other allowances for travel and study in the USA</td>
<td>12 to 21 months</td>
<td>Candidates must be: 1. Either members of the Commonwealth or a State Public Service or semi-government Authority. 2. Either staff or graduate students at an Australian university. 3. Individuals recommended for nomination by the Local Correspondents. The candidate will usually have an honours degree or equivalent, or an outstanding record of achievement, and be not more than 36 years of age. Applications close early August.</td>
</tr>
<tr>
<td>Frank Knox Memorial Fellowships at Harvard University</td>
<td>Stipend of $5600 pa plus tuition fees</td>
<td>1, sometimes 2 years</td>
<td>Applicants must be British subjects and Australian citizens, who are graduates or near graduates of an Australian university</td>
</tr>
<tr>
<td>The Rhodes Scholarship*</td>
<td>Approximately £3000 stg pa</td>
<td>2 years, may be extended for a third year</td>
<td>Unmarried male and female Australian citizens aged between 19 and 25 who have been domiciled in Australia at least 5 years and have completed at least 2 years of an approved university course. Applications close in early September each year.</td>
</tr>
<tr>
<td>Rothmans Fellowships Award‡</td>
<td>$16500 pa</td>
<td>1 year, renewable up to 3 years</td>
<td>The field of study is unrestricted. Applicants must have at least 3 years graduate experience in research. Applications close in July.</td>
</tr>
</tbody>
</table>

## Applied Science

- **Australian Pig Industry Research Committee Postgraduate Awards**
  - 1 year subject to satisfactory progress. Renewable annually; maximum tenure of 2 years for a Masters candidate or 3 to 4 years for a PhD degree. Applications close 15 September.
  - Applicants must be graduates in textile physics, textile chemistry, or textile engineering.
  - Applicants must be graduates in applied science, agricultural science or veterinary science.
  - Awarded for research into the beef and cattle industry leading to the award of the Masters or PhD degree. Applications close 31 July.
  - **Application forms must be obtained from the Australian representative of the Fund, Mr L. T. Hinde, Reserve Bank of Australia, GPO Box 3947, Sydney, NSW 2001. These must be submitted to the Registrar by early August.**

- **Australian Wool Corporation Research Scholarship in Textile Technology**
  - $6850 pa plus allowances
  - Minimum 2 years. Maximum 3 to 4 years.

- **Australian Wool Corporation Research Scholarship in Wool and Pastoral Sciences**

- **Australian Meat Research Committee Award†**

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**Applications to the Secretary, Rothmans University Endowment Fund, University of Sydney, NSW 2006.**

**Applications to the Secretary, Rothmans University Endowment Fund, University of Sydney, NSW 2006.**

**Application forms from Executive Officer, Australian Meat Research Committee, GPO Box 4129, Sydney 2001.**

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**Application forms must be obtained from the Australian representative of the Fund, Mr L. T. Hinde, Reserve Bank of Australia, GPO Box 3947, Sydney, NSW 2001. These must be submitted to the Registrar by early August.**
Prizes

Undergraduate University Prizes

The following table summarizes the undergraduate prizes awarded by the University. Prizes which are not specific to any School are listed under General. All other prizes are listed under the Faculty or Schools in which they are awarded. Information regarding the establishment of new prizes may be obtained from the Examinations Section located on the Ground Floor of the Chancellery.

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sydney Technical College Union Award</td>
<td>150.00 and medal</td>
<td>Leadership in the development of student affairs, and academic proficiency throughout the course</td>
</tr>
<tr>
<td>University of New South Wales Alumni Association</td>
<td>Statuette</td>
<td>Achievement for community benefit – students in their final or graduating year</td>
</tr>
<tr>
<td><strong>Faculties of Applied Science and Engineering</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institution of Engineers, Australia</td>
<td>Medal and 100.00</td>
<td>The most proficient final year (or last 2 years part-time) student in the Bachelor of Engineering (or Bachelor of Science (Engineering)) degree courses offered by the following Schools:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Civil Engineering</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrical Engineering and Computer Science</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mechanical and Industrial Engineering</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chemical Engineering and Industrial Chemistry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mining Engineering</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Textile Technology (Engineering option only)</td>
</tr>
<tr>
<td>Abbott Laboratories Pty Ltd</td>
<td>100.00</td>
<td>Bachelor of Engineering degree course in Chemical Engineering – Year 4</td>
</tr>
<tr>
<td>The Australian Gas Light Company's in Chemical Engineering</td>
<td>50.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>Australian Paper Manufacturers Ltd</td>
<td>100.00</td>
<td>Best result in 48.163 Instrumentation and Process Control in Industrial Chemistry</td>
</tr>
<tr>
<td></td>
<td>100.00</td>
<td>48.163 Instrumentation and Process Control 1 – in Chemical Engineering</td>
</tr>
<tr>
<td>Chamber of Manufactures of New South Wales</td>
<td>50.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>Chemical Technology Society</td>
<td>25.00</td>
<td>Bachelor of Science in Industrial Chemistry</td>
</tr>
<tr>
<td></td>
<td>25.00</td>
<td>Bachelor of Science degree course in Industrial Chemistry, Years 1 and 2 or Stages 1 to 4</td>
</tr>
</tbody>
</table>
# Undergraduate University Prizes (continued)

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School of Chemical Engineering and Industrial Chemistry (continued)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSR Limited</td>
<td>50.00</td>
<td>Subject within the discipline of Industrial Chemistry, selected by Head of School</td>
</tr>
<tr>
<td>Esso Australia Ltd</td>
<td>200.00</td>
<td>Best performance in Year 2 Chemical Engineering</td>
</tr>
<tr>
<td>Institution of Chemical Engineers and medal</td>
<td>100.00</td>
<td>Best result for the thesis in the final year, or equivalent part time stage, of the Bachelor of Engineering degree course</td>
</tr>
<tr>
<td>Shell</td>
<td>100.00</td>
<td>General proficiency in the second year or its part-time equivalent in either the Chemical Engineering course or the Industrial Chemistry course</td>
</tr>
<tr>
<td></td>
<td>100.00</td>
<td>General proficiency in the third year or its part-time equivalent in either the Chemical Engineering course or the Industrial Chemistry course</td>
</tr>
<tr>
<td></td>
<td>100.00</td>
<td>General proficiency in the fourth year or its part-time equivalent in either the Chemical Engineering course or the industrial Chemistry course</td>
</tr>
<tr>
<td></td>
<td>100.00</td>
<td>For a student who, in the opinion of the Head of School, has performed some meritorious activity of note either inside or outside the University</td>
</tr>
<tr>
<td>Simon-Carves Australia</td>
<td>21.00</td>
<td>Best performance in 48.135 Thermodynamics</td>
</tr>
<tr>
<td>Stauffer Australia Limited</td>
<td>50.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>Western Mining Corporation Ltd</td>
<td>150.00</td>
<td>Best overall performance in 48.036 Chemical Engineering Laboratory I</td>
</tr>
<tr>
<td></td>
<td>150.00</td>
<td>Best overall performance in 48.044 Chemical Engineering Laboratory II</td>
</tr>
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<table>
<thead>
<tr>
<th>Department of Fuel Technology</th>
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<tbody>
<tr>
<td>Australian Institute of Energy</td>
<td>50.00</td>
<td>For a fuel subject or allied subject project</td>
</tr>
<tr>
<td>Shell</td>
<td>100.00</td>
<td>Subject selected by Head of School</td>
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<table>
<thead>
<tr>
<th>School of Food Technology</th>
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<tr>
<td>Wilfred B. S. Bishop</td>
<td>20.00</td>
<td>General proficiency throughout Bachelor of Science degree course in Food Technology</td>
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<tr>
<td>Cottees General Foods</td>
<td>120.00</td>
<td>38.141 Food Regulation and Control</td>
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## Undergraduate University Prizes (continued)

<table>
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<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
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<tr>
<td><strong>School of Metallurgy</strong></td>
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<tr>
<td>Alcan Australia Ltd</td>
<td>100.00</td>
<td>Awarded for School of Metallurgy</td>
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<tr>
<td>Austral Crane</td>
<td>150.00</td>
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</tr>
<tr>
<td>Australian Institute of Metals</td>
<td>50.00</td>
<td>and one year's membership of the Institute</td>
</tr>
<tr>
<td>Australian Welding Institute</td>
<td>30.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>Chamber of Manufactures of New South Wales</td>
<td>50.00</td>
<td></td>
</tr>
<tr>
<td>The Broken Hill Proprietary Co Ltd</td>
<td>100.00</td>
<td></td>
</tr>
<tr>
<td>The Electrolytic Refining and Smelting Co of Australia Ltd</td>
<td>40.00</td>
<td></td>
</tr>
<tr>
<td>Western Mining Corporation Ltd</td>
<td>150.00</td>
<td>Best overall performance in Year 3 full-time (or its equivalent part-time) in Bachelor of Engineering (or Bachelor of Science (Technology)) degree course</td>
</tr>
<tr>
<td></td>
<td>150.00</td>
<td>Best overall performance in Year 4 full-time (or its equivalent part-time) in the Bachelor of Engineering (or Bachelor of Science (Technology)) degree course</td>
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<tr>
<td>Zinc Corp Ltd</td>
<td>80.00</td>
<td>Subject selected by Head of School</td>
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| **School of Mining Engineering** | | |
| Joint Coal Board | 125.00 | Bachelor of Engineering degree course in Mining Engineering, Year 2 |
| | 125.00 | Bachelor of Engineering degree course in Mining Engineering, Year 3 |
| | 250.00 | Bachelor of Engineering degree course in Mining Engineering — general proficiency throughout course |
| Western Mining Corporation Ltd | 150.00 | Best overall performance in final year of Bachelor of Engineering degree course |
| | 150.00 | General proficiency throughout the Bachelor of Engineering degree course |
| | 150.00 | Best overall performance in penultimate year of Bachelor of Engineering degree course |
Undergraduate University Prizes (continued)

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
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<tbody>
<tr>
<td>School of Textile Technology</td>
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<tr>
<td>J. B. Speakman</td>
<td>20.00</td>
<td>Undergraduate thesis</td>
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<tr>
<td>R. J. Webster</td>
<td>100.00</td>
<td>General proficiency throughout the Bachelor of Science degree course in Textile Technology</td>
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<tr>
<td>School of Wool and Pastoral Sciences</td>
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<tr>
<td>Bayer Animal Health</td>
<td>1000.00</td>
<td>General proficiency – Wool and Pastoral Sciences degree course, Year 2 and Year 3</td>
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<tr>
<td>C. R. Lucock</td>
<td></td>
<td>Meat Science</td>
</tr>
<tr>
<td>P. R. McMahon Memorial</td>
<td>100.00</td>
<td>Excellence in Wool Science</td>
</tr>
<tr>
<td>Parkes Wool Promotion Committee</td>
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<td>Bachelor of Science degree course in Wool and Pastoral Sciences, Year 3</td>
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Graduate University Prizes

The following table summarizes the graduate prizes awarded by the University.

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
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</thead>
<tbody>
<tr>
<td>School of Chemical Engineering and Industrial Chemistry</td>
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<td></td>
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<tr>
<td>The Clean Air Society of Australia and New Zealand</td>
<td>100.00</td>
<td>48.381G Atmospheric Pollution and Control, or a subject of an equivalent nature, taken by students in graduate courses in the School of Chemical Engineering</td>
</tr>
</tbody>
</table>
Staff Comprises Schools of Applied Geology, Chemical Engineering and Industrial Chemistry, Food Technology, Geography, Metallurgy, Mining Engineering, Textile Technology, and Wool and Pastoral Sciences.

Dean
Professor M. Chaikin

Chairman
Professor R. T. Fowler

Executive Officer
John David Collins, BSc PhD N.S.W., AT1

Senior Administrative Officer
Robert Frederick Starr, ASTC

Senior Project Officer
Desmond Roktalussy, BE Bud.

Professional Officers
Badan-Singh Deol, MSc Punj’i., PhD Syd.
Endel Nomm, BA Macq., MSc N.S.W.

Electron Microscopist
Vivian Noel Edward Robinson, BSc PhD W. Aust.

Officer-in-charge, Drawing Office
Max Renner

School of Applied Geology

Professor of Geology and Head of School
Gerald James Spurgeon Govett, CEng, DSc Wales, PhD DIC Lond., FIMM

Professor of Engineering Geology
Francis Clifford Beavis, MA Cant., BSc PhD Melb.

Associate Professors
Philip Richard Evans, BA Oxf., PhD Brist., FGS
Laric Villier Hawkins, MSc Syd., FGS
John Roberts, BSc N.E., PhD W. Aust.
Bryce Leslie Wood, MSc DSc Otago, MAusIMM

Senior Lecturers
Alberto Albani, DrGeoSc Florence, MSc PhD N.S.W.
Alan Norval Carter, BSc PhD Melb., MSc Adel.
Bastiaan Jan Hensen, MSc Ley., PhD A.N.U.
Michael Barry Katz, BS Mich.TU., MSc McG., PhD Tor.
Michael John Knight, BSc PhD Melb.
Gerrit Neef, BSc Lond., PhD Well., FGS
Ifitikhar Rasul Qureshi, MSc Panj., PhD Glas., FGS
Peter Cyril Rickwood, BSc Lond., PhD Cape T., CChem, FGS, MRIC
Geoffrey Robert Taylor, MSc Birm., PhD N.E., FGS, MIMM, AMAusIMM
Lecturers
Chin Yoon Chork, BSc Car., PhD New Br.
Alistair Chisholm Dunlop, BSc N.E., PhD Lond., DIC, MIMM
Robert James Whiteley, MSc Syd.

Tutor
Leonie Ann Campbell, BSc W'gong., DipT Kuring-gai C.A.E.

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Frederick Ivor Roberts, BSc N.S.W., PhD W'gong., AMAusIMM
Stephen James Clifford Smith, BAppSc N.S.W.I.T.

School of Chemical Engineering and Industrial Chemistry

Professor of Chemical Technology and Head of School
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Professor of Chemical Engineering and Director of Undergraduate Studies
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Professor of Chemical Engineering and Director of Graduate Studies
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Geoffrey David Sergeant, BSc PhD Wales, CEng, FInstF, FAIE
Mark Sebastian Wainwright, MAppSc Adel., PhD McM, MAmeriChE, ARACI

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Kenneth Spencer Basden, BSc PhD N.S.W., ASTC, CEng, FInstF, FAIE, MIEAust, ARACI, AMAusIMM

Department of Biological Process Engineering

Head
Dr R. J. Hall

Department of Fuel Technology

Head
Associate Professor G. D. Sergeant

Department of Industrial Chemistry

Head
Dr R. P. Chaplin
Department of Polymer Science

Head
Associate Professor J. K. Haken

School of Food Technology

Professor of Food Technology and Head of School
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Ronald Baden Howe Wills, BSc N.S.W., PhD Macq., ASTC, AAIFST

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Graham Harold Fleet, MSc Qld., PhD Calif., AAIFST
Heather Greenfield, BSc PhD Lond., AAIFST
Michael Wootton, BSc PhD N.S.W., AAIFST, ARACI, MAGI

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John James Miller, MSc N.S.W.
Frances Maud Scriven, BSc PhD N.S.W.

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Administrative Officer
Richard John Greenwood, BA N.S.W.

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Annesley Jean Watson, BSc N.S.W., AAIFST
Choi Ted Wong, BSc N.S.W.

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Professor of Geography
Jack Alan Mabbutt, MA Camb.

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Michael Dick Melville, BScAgr PhD Syd.
Morgan Eugene Cyril Sant, BA Keele, MSc PhD Lond.
Hans Joachim Schneider, Geog Chil. State, DU Bordeaux
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Colin Frederick Pain, MA Auck., PhD A.N.U.

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Tutors
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Alan Kenneth York, BSc N.S.W.

Administrative Assistant
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Head of School
Vacant

Professor of Metallurgy
Vacant

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Lecturer
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Department of Chemical and Process Metallurgy

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Department of Materials

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Lecturer
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Greig Richard Wallwork, PhD DSc N.S.W., ASTC, CEng, FIM

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Roy Thomas Southin, PhD Camb., CEng, FIM, MIBF

School of Mining Engineering

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Administrative Assistant
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Edward George Thomas, BE PhD Qld., MAusIMM, MAIME, MCIMM
Venkata Satyanarayana Vutukuri, BSc(Eng) Ban., MS Wis., MMGI, AIME, AMAusIMM

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Gour Chand Sen, MSc Wales, PhD Durh., CEng, FIMetE, MIMinE

Department of Mineral Processing

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School of Textile Technology

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Ronald Posile, BSc N.S.W., PhD Leeds, FTI, FAIP

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Thomas Stanislaus Hickie, BSc PhD N.S.W., ASTC
Mstislav Stephen Nossar, Dipling Harbin, PhD N.S.W., FIEAust
Michael Thomas Pailthorpe, BSc PhD N.S.W.

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Michael David Young, BSc PhD N.S.W., ATI
Oto Zubzanda, Dipling T.U. Bratislava, PhD N.S.W.

School of Wool and Pastoral Sciences

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John Patrick Kennedy, MSc N.S.W., BSc Oxf., MAIAS

Professor of Pastoral Sciences
Haydn Lloyd Davies, PhD W.Aust., BSc Wales, MAIAS

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Walter Raghnall McManus, BScAgr Syd., PhD N.S.W.
Euan Maurice Roberts, M AgrSc N.Z., PhD N.S.W.

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John Douglas McFarlane, BScAgr DipEd Syd., MSc N.S.W., MAIAS
Douglas McPherson Murray, B AgrSc PhD Melb., MRurSc N.E.
Archibald Niven Sinclair, MVSc Syd., FRCVS, FACBS, FACVS

Lecturer
Dennis Charles Teasdale, BSc MBA N.S.W.
The University of New South Wales Kensington Campus 1984

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<tr>
<th>Theatres</th>
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<tbody>
<tr>
<td>Biomedical Theatres E27</td>
</tr>
<tr>
<td>Central Lecture Block E19</td>
</tr>
<tr>
<td>Classroom Block (Western Grounds) H3</td>
</tr>
<tr>
<td>Rex Voxels Theatre F17</td>
</tr>
<tr>
<td>Keith Burrows Theatre J14</td>
</tr>
<tr>
<td>Main Building Theatre K14</td>
</tr>
<tr>
<td>Mathews Theatres D23</td>
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<tr>
<td>Parade Theatre E3</td>
</tr>
<tr>
<td>Science Theatre F13</td>
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<tr>
<td>Sir John Clancy Auditorium C24</td>
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<tr>
<th>Buildings</th>
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<tr>
<td>Affiliated Residential Colleges</td>
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<tr>
<td>New (Anglican) L6</td>
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<tr>
<td>Shalom (jewish) N9</td>
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<tr>
<td>Warrane M7</td>
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<tr>
<td>Applied Science F10</td>
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<tr>
<td>Arts (Morwen Brown) C20</td>
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<td>Banks F22</td>
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<tr>
<td>Barker Street Gatehouse N11</td>
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<tr>
<td>Bassert College C18</td>
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<td>Biological Sciences D26</td>
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<td>Dalton F12</td>
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<tr>
<td>Robert Heffron E12</td>
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<tr>
<td>Civil Engineering H20</td>
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<tr>
<td>Commerce (John Goodsell) F20</td>
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<tr>
<td>Dalton (Chemistry) F12</td>
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<tr>
<td>Electrical Engineering G17</td>
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<td>Geography and Surveying K17</td>
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<td>Goldstein College D16</td>
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<tr>
<td>Golf House A27</td>
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<td>Gymnasium B5</td>
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<tr>
<td>House at Pooh Corner N8</td>
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<tr>
<td>International House C6</td>
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<tr>
<td>Io Myers Studio D9</td>
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<tr>
<td>John Goodsell (Commerce) F20</td>
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<tr>
<td>Kangas House O14</td>
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<tr>
<td>Kensington Colleges C17</td>
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<td>Bassert C18</td>
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<tr>
<td>Goldstein D16</td>
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<tr>
<td>Philip Baxter D14</td>
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<tr>
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<td>Maintenance Workshop B13</td>
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<tr>
<td>Accountancy F20</td>
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<td>Admissions C22</td>
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<td>Adviser for Prospective Students C22</td>
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<td>Alumni and Ceremonials C22</td>
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<td>Anatomy C27</td>
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<tr>
<td>Applied Geology F10</td>
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<td>Applied Science (Faculty Office) F10</td>
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<td>Architecture (including Faculty Office) H14</td>
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<td>Arts (Faculty Office) C20</td>
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<td>School of Management G27</td>
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<td>Biochemistry D26</td>
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<td>Biomedical Library F23</td>
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<td>Menzies Library E21</td>
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<td>Metallurgy E9</td>
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<td>Morwen Brown (Arts) C20</td>
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<td>New College (Anglican) L6</td>
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<tr>
<td>Newton J12</td>
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<td>Parking Station H25</td>
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<tr>
<td>Philip Baxter College D14</td>
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<tr>
<td>Robert Heffron (Chemistry) E12</td>
</tr>
<tr>
<td>Sam Cracknell Pavilion H8</td>
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<tr>
<td>Shalom College (Jewish) N9</td>
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<tr>
<td>Sir Robert Webster (Textile Technology) G14</td>
</tr>
<tr>
<td>Squash Courts B7</td>
</tr>
<tr>
<td>Swimming Pool B4</td>
</tr>
<tr>
<td>Unsearch House L5</td>
</tr>
<tr>
<td>University Regiment J2</td>
</tr>
<tr>
<td>University Union (Roundhouse) — Stage I E6</td>
</tr>
<tr>
<td>University Union (Blockhouse) — Stage II G6</td>
</tr>
<tr>
<td>University Union (Squarehouse) — Stage III E4</td>
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<tr>
<td>Wallace Wurth School of Medicine C27</td>
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<tr>
<td>Warrane College M7</td>
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<tr>
<td>Wool and Pastoral Sciences B8</td>
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<tr>
<td>Building H14</td>
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<td>Careers and Employment C22</td>
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<td>Cashier’s Office C22</td>
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<td>Centre for Biomedical Engineering A28</td>
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<td>Centre for Medical Education Research and Development C27</td>
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<td>Centre for Remote Sensing K17</td>
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<tr>
<td>Chaplains E15</td>
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<tr>
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<td>Child Care Centres N8, O14</td>
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<tr>
<td>Civil Engineering H20</td>
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<tr>
<td>Closed Circuit Television Centre F20</td>
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