How to use this Handbook

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

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

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

**Faculty Information.**

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

**Graduate Study** is about higher degrees.

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

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

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

**Staff list.**

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

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

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

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

UNIVERSITY OF NEW SOUTH WALES
Faculty of Applied Science
Handbook.
Annual. Kensington.
1963+

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

Information in this Handbook has been brought up to date as at
10 September 1979, but may be amended without notice by the
University Council

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| School of Chemical Engineering | 3110 Industrial Chemistry (BSc) Full-time 33 |
| Department of Chemical Engineering | 3040 Chemical Engineering (BE) Full-time 28 |
| School of Chemical Technology | 3040 Chemical Engineering (BE) Full-time/Part-time 31 |
| Department of Biological Process Engineering | 3040 Chemical Engineering (BE) Full-time Biological Process Engineering Electives 32 |
| Department of Fuel Technology | 3040 Chemical Engineering (BE) Full-time Fuel Electives 32 |
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| School of Chemical Engineering | 3020 Bioprocess Engineering (MAppSc) 56 |
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| School of Applied Geology | 8002 Engineering Geology-Hydrogeology-Environmental Geology Course (MAppSc) 55 |
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| School of Chemical Technology | 5010 Corrosion Technology (GradDip) 58 |

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Graduate Study

School of Marketing
Undergraduate Study

School of Surveying
Undergraduate Study

Department of Organizational Behaviour
Undergraduate Study

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Undergraduate Study

School of Food Technology
Undergraduate Study
Graduate Study

Graduate School of the Built Environment
Graduate Study

School of Biochemistry
Undergraduate Study

School of Biological Technology
Undergraduate Study
Graduate Study

School of Botany
Undergraduate Study

School of Microbiology
Undergraduate Study

School of Sociology
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Staff
Faculty of Applied Science
Broken Hill Division
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 the University and its activities you should consult the University Calendar.

Some people who can help you

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

The Deputy Registrar (Student Services), Mr Peter O'Brien, and his Administrative Assistant, Mrs Anne Beaumont, are located on the first floor of the Chancellery. They will help students who need advice and who have problems and are not sure whom they should see. As well as dealing with general enquiries they are especially concerned with the problems of physically handicapped and disabled students and those in need of financial assistance. The latter students should see Mrs Beaumont. Enquire at room 148E, phone 2482 (general enquiries) or 3164 (financial assistance).

The Assistant Registrar (Admissions and Higher Degrees), Mr Jack Hill, is located on the ground floor of the Chancellery. General enquiries should be directed to 3715.

The Assistant Registrar (Examinations and Student Records), Mr Peter Wildblood is located on the ground floor of the Chancellery. For particular enquiries regarding the Student Records Unit, including illness and other matters affecting

Note: All phone numbers below are University extension numbers. If you are outside the University, dial 663 0351 and ask for the extension or dial 662—and then the extension number. This prefix should only be used when you are certain of the extension that you require. Callers using 662 cannot be transferred to any other number.
performance in examinations, academic statements, graduation ceremonies, prizes, release of examination results and variations to enrolment programs, phone 3711. For information regarding examinations, including examination timetables and clash of examinations, contact the Administrative Officer, Mr John Grigg, phone 2143.

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

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

The Housing Officer, Mrs Judy Hay, is located in the Student Amenities and Recreation Section in the huts at the foot of Basser Steps. For assistance in obtaining suitable lodgings phone 3260.

The Student Health Unit is located in Hut E at the foot of Basser Steps. The Director is Dr Max Naphthali. For medical aid phone 2679 or 3275.

The Student Counselling and Research Unit is located at the foot of Basser Steps. For assistance with educational or vocational problems ring 3681, 3685 or 2696 for an appointment.

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

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

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

Calendar of Dates

The Academic Year

The academic year is divided into two sessions, each containing 14 weeks for teaching. There is a recess of five weeks between the two session and there are short recesses of one week within each of the sessions.

Session 1 commences on the first Monday of March.

1980

<table>
<thead>
<tr>
<th>Session 1</th>
<th>3 March to 11 May</th>
</tr>
</thead>
<tbody>
<tr>
<td>(14 weeks)</td>
<td>May Recess: 12 May to 18 May</td>
</tr>
<tr>
<td></td>
<td>19 May to 15 June</td>
</tr>
<tr>
<td>Tuesday</td>
<td>Midyear Recess: 16 June to 20 July</td>
</tr>
<tr>
<td>17 June</td>
<td>Examinations begin</td>
</tr>
<tr>
<td>Wednesday</td>
<td>Examinations end</td>
</tr>
<tr>
<td>2 July</td>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th>Session 2</th>
<th>21 July to 24 August</th>
</tr>
</thead>
<tbody>
<tr>
<td>(14 weeks)</td>
<td>August Recess: 25 August to 31 August</td>
</tr>
<tr>
<td></td>
<td>1 September to 2 November</td>
</tr>
<tr>
<td>Monday</td>
<td>Examinations begin</td>
</tr>
<tr>
<td>10 November</td>
<td></td>
</tr>
<tr>
<td>Friday</td>
<td>Examinations end</td>
</tr>
<tr>
<td>29 November</td>
<td></td>
</tr>
</tbody>
</table>

January

<table>
<thead>
<tr>
<th>Tuesday 1</th>
<th>New Year's Day — Public Holiday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friday 4</td>
<td>Last day for applications for review of annual examinations</td>
</tr>
<tr>
<td>Friday 11</td>
<td>Last day for acceptance of applications by Admissions Office for transfer to another undergraduate course within the University</td>
</tr>
<tr>
<td>Monday 28</td>
<td>Australia Day — Public Holiday</td>
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<th><strong>February</strong></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Monday 4</strong></td>
<td>Enrolment period begins for new undergraduate students and undergraduate students repeating first year</td>
</tr>
<tr>
<td><strong>Monday 18</strong></td>
<td>Enrolment period begins for second and later year undergraduate students and graduate students enrolled in formal courses</td>
</tr>
<tr>
<td></td>
<td>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 their degree for any other reason</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>March</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Monday 3</strong></td>
<td><em>Session 1 commences</em></td>
</tr>
<tr>
<td><strong>Tuesday 4</strong></td>
<td>List of graduands for April/May ceremonies and of 1979 prize-winners published in daily press</td>
</tr>
<tr>
<td><strong>Friday 14</strong></td>
<td>Last day for acceptance of enrolment by new undergraduate students (late fee payable)</td>
</tr>
<tr>
<td><strong>Friday 28</strong></td>
<td>Last day for acceptance of enrolment by undergraduate students re-enrolling in second and later years (late fee payable)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>April</strong></th>
<th></th>
</tr>
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<tbody>
<tr>
<td><strong>Thursday 3</strong></td>
<td><em>Confirmation of Enrolment</em> forms despatched to all students</td>
</tr>
<tr>
<td><strong>Friday 4 to Monday 7</strong></td>
<td>Easter</td>
</tr>
<tr>
<td><strong>Friday 18</strong></td>
<td>Last day for undergraduate students to discontinue without failure subjects which extend over Session 1 only</td>
</tr>
<tr>
<td><strong>Friday 25</strong></td>
<td>Anzac Day — Public Holiday</td>
</tr>
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<tr>
<th><strong>May</strong></th>
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<tbody>
<tr>
<td><strong>Monday 5</strong></td>
<td>Last day for undergraduate students completing requirements for degrees or diplomas at the end of Session 1 to submit <em>Application for Admission to Degree</em> form</td>
</tr>
<tr>
<td><strong>Monday 12</strong></td>
<td><em>May Recess begins</em></td>
</tr>
<tr>
<td><strong>Thursday 15</strong></td>
<td>Publication of provisional timetable for June/July examinations</td>
</tr>
<tr>
<td><strong>Sunday 18</strong></td>
<td><em>May Recess ends</em></td>
</tr>
<tr>
<td><strong>Friday 23</strong></td>
<td>Last day for students to advise of examination timetable clashes</td>
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<tr>
<th><strong>June</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tuesday 3</strong></td>
<td>Publication of timetable for June/July examinations</td>
</tr>
<tr>
<td><strong>Sunday 15</strong></td>
<td><em>Session 1</em> ends</td>
</tr>
<tr>
<td><strong>Monday 16</strong></td>
<td>Queen's Birthday — Public Holiday</td>
</tr>
<tr>
<td><strong>Tuesday 17</strong></td>
<td>Midyear Recess begins</td>
</tr>
<tr>
<td></td>
<td>Examinations begin</td>
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<tr>
<th><strong>July</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wednesday 2</strong></td>
<td>Examinations end</td>
</tr>
<tr>
<td><strong>Tuesday 15</strong></td>
<td>Examination results mailed to students</td>
</tr>
<tr>
<td><strong>Wednesday 16</strong></td>
<td>Examination results displayed on University noticeboards</td>
</tr>
<tr>
<td><strong>Tuesday 15 to Friday 18</strong></td>
<td>Students to amend enrolment programs following receipt of June examination results</td>
</tr>
<tr>
<td><strong>Sunday 20</strong></td>
<td>Midyear Recess ends</td>
</tr>
<tr>
<td><strong>Monday 21</strong></td>
<td><em>Session 2</em> begins</td>
</tr>
<tr>
<td><strong>Thursday 31</strong></td>
<td>Last day for application for review of June examination results</td>
</tr>
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<tr>
<th><strong>August</strong></th>
<th></th>
</tr>
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<tbody>
<tr>
<td><strong>Friday 1</strong></td>
<td>Midyear Recess ends</td>
</tr>
<tr>
<td><strong>Monday 25</strong></td>
<td>Last day for students to discontinue without failure subjects which extend over the whole academic year</td>
</tr>
<tr>
<td><strong>Sunday 31</strong></td>
<td><em>August Recess begins</em></td>
</tr>
<tr>
<td></td>
<td><em>August Recess ends</em></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th><strong>September</strong></th>
<th></th>
</tr>
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<tbody>
<tr>
<td><strong>Friday 5</strong></td>
<td>Last day for undergraduate students to discontinue without failure subjects which extend over Session 2 only</td>
</tr>
<tr>
<td><strong>Monday 8</strong></td>
<td>Last day for applications from undergraduate students completing requirements for degrees and diplomas at the end of Session 2 to submit <em>Application for Admission to Degree</em> forms</td>
</tr>
<tr>
<td><strong>Wednesday 10</strong></td>
<td>List of graduands for October graduation ceremonies published in daily press</td>
</tr>
<tr>
<td><strong>Friday 12</strong></td>
<td>Last day for students to discontinue without failure subjects which extend over Session 2 only</td>
</tr>
<tr>
<td></td>
<td>Confirmation of Enrolment form forwarded to all students</td>
</tr>
</tbody>
</table>
Monday 15 Last day to notify intention of attending October graduation ceremonies
Monday 22 Last day for applications from undergraduate students completing requirements for degrees and diplomas at the end of Session 2 to submit Application for Admission to Degree form
Friday 26 Last day for acceptance of corrected Confirmation of Enrolment forms

October
Wednesday 1 Last day to apply to UCAC for transfer to another university in New South Wales
Thursday 2 Publication of provisional examination timetable
Monday 6 Eight Hour Day — Public Holiday
Thursday 9 Graduation ceremonies
Friday 10 Last day for students to advise of examination timetable clashes
Thursday 21 Publication of timetable for examinations

November
Sunday 2 Session 2 ends
Monday 3 Study Recess begins
Sunday 9 Study Recess ends
Monday 10 Examinations begin
Saturday 29 Examinations end

December
Tuesday 16 Examination results mailed to students
Wednesday 17 Examination results displayed on University notice boards
Thursday 25 Christmas Day — Public Holiday
Friday 26 Boxing Day — Public Holiday

Arms of the University of New South Wales

The coat of arms of the University is reproduced on the front cover of this handbook. The arms were granted by the College of Heralds in London, on 3 March 1952, and its 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 in 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 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, and the Deputy Chancellor is Dr F.M. Mathews.

The Professorial Board

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

The Faculties/Boards of Study

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

Organization of the University

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

In 1979 the University had 18,466 students and over 3,700 staff who worked in more than eighty buildings. These figures include staff and students at Broken Hill (W.S. and L.B. Robinson University College), Duntroon (the Faculty of Military Studies) and Jervis Bay.
The 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 together with the Australian Graduate School of Management. In addition, the Board of Studies in General Education fulfils 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.

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/Board. Elections are for a one-year term of office.

Open Faculty/Board Meetings

If you wish you may attend a Faculty/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 on completion of their final year.

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 no longer published in the Faculty handbooks. Separate lists are issued early in the year and are available at key points on the campus.

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.

General Administration

The administration of general matters within the University comes mainly within the province of the Registrar, Mr Keith Jennings, the Bursar, Mr Tom Daly, and the Business Manager (Property), Mr R.K. Fletcher.

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

The Bursar’s Division is concerned with the financial details of the day-to-day administration and matters to do with staff appointments, promotions, etc.

The Property Division is 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).
International House

International House accommodates 154 students from Australia and up to twenty other countries. Preference is given to more senior undergraduates and graduate students. Apply in writing to the Warden, International House, PO Box 88, Kensington, NSW 2033.

New College

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

Shalom College

Shalom College provides accommodation for 86 men and women students. Non-resident membership is available to students who wish to avail themselves of the Kosher dining room and tutorial facilities. 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. A comprehensive tutorial program is offered along with a wide variety of activities and opportunities to meet informally with members of the University staff. Non-resident membership is available to male students who wish to participate in College activities and make use of its facilities. Warrane is directed by the Catholic lay association Opus Dei. Apply in writing to the Master, Warrane College, PO Box 123, Kensington, NSW 2033.

Creston Residence

Creston Residence offers accommodation for 25 full-time undergraduate and graduate women students without restriction of denomination or nationality. Non-resident membership provides students with the opportunity to participate in the activities of the Residence and to make use of its facilities. Creston is directed by the Women's Section of Opus Dei, a Catholic lay association. Enquiries should be addressed to the Principal, 36 High Street, Randwick, NSW 2031.

Other Accommodation

Off-campus Accommodation

Students requiring other than College accommodation may contact the Housing Officer in the Student Amenities and Recreation Section for assistance in obtaining suitable lodging in the way of full board, room 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.

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, list of estate agents and hints on house-hunting are available on request.

Location: The Student Accommodation Service is located in the huts at the foot of Basser Steps. Phone 663 0351, extension 3260.

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Student Employment and Scholarships

The Student Employment and Scholarships Section offers assistance with career employment for final year students and graduates of the University. This service includes the mailing of regular job vacancy notices to registered students, and a Careers Library containing information on various careers and employers.

Careers advice and assistance are also available to undergraduates. Students undertaking courses in Applied Science or Engineering which require course-related industrial or professional training experience are assisted to find such employment over the long vacation. Information and advice regarding cadetships and undergraduate and graduates scholarships is also available.

The service is located in the Chancellery.

Phone extension 3259 for employment and careers advice, extension 2525 for details of graduate awards and grants, and extension 2086 for undergraduate scholarship, cadetship and industrial training information.

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Student Health

A student health clinic and first aid centre is situated within the University. It is staffed by three qualified medical practitioners, assisted by two nursing sisters. The medical service, although therapeutic, is not intended to entirely 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 for specialist opinion and/or treatment. 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 as well as first aid service in the case of injury or illness on the campus are available.

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

Appointments may be made by calling at the centre or by telephoning extension 2679 or 3275 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. These clinics are open to staff and students and appointments may be made for the Student Health Unit clinic by telephoning 698 9499, or for The Prince of Wales Hospital clinics by telephoning 399 0111.

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Student Counselling and Research

The Student Counselling and Research Unit provides individual and group counselling for all students—prospective, established and graduate. Self-help programs are also available. Opportunities are provided for parents and others concerned with student progress to see members of the counselling staff.

The service which is free, informal and personal is designed to help students with planning and decision making, and a wide variety of concerns and worries which may be affecting personal, educational and vocational aspects of their lives.

The Unit pursues research into factors affecting student performance, and the published results of its research and experience are helpful in improving University and other counselling services, and the quality of student life.

Counselling appointments may be arranged during sessions and recesses between 9 am and 7 pm. Phone 663 0351, extension 3681, 3685 and 2696, or call at the Unit which is located at the foot of Basser Steps. Urgent interviews are possible on a walk-in basis between 9 am and 5 pm. Group counselling programs are offered both day and evening between 9 am and 9 pm by special arrangement. Self-help programs are arranged to suit the student's time and convenience.

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Student Amenities and Recreation

In general the Student Amenities and Recreation Section seeks ways to promote the physical, social and educational development of students through their leisure time activities and to provide some services essential to their day-to-day University life.

The Section provides, for example, a recreational program for students and staff at the Physical Education and Recreation Centre; negotiates with the Public Transport Commission of NSW on student travel concessions and supplies concession forms for bus, rail, ferries and planes; assists students with off-campus housing; makes bookings for use of sports facilities; and, in consultation with the Sports Association, assists various recognized clubs.

The Section is located in the huts at the foot of Basser Steps. The various services may be contacted by phone on the following extensions: Recreation Program 3271; Travel 2617; Accommodation 3260; Ground Bookings 2235; Sports Association 2673.
Physical Education and Recreation Centre

The Student Amenities and Recreation Section provides a recreational program for students and staff at the Physical Education and Recreation Centre. The Centre consists of eight recreational program includes intramurals, teaching/coaching, camping, and fitness testing. The Centre is located on the lower campus adjacent to High Street. The Supervisor at PERC may be contacted on extension 3271.

The Sports Association

The Sports Association caters for a variety of competitive sports for both men and women. Membership is compulsory at $11 per year for all registered students and is open to all members of staff and graduates of the University.

The Sports Association office is situated in the huts at the foot of Basser Steps, and the control of the Sports Association is vested in the General Committee. The Sports Association may be contacted on extension 2673.

Student Travel Concessions

The Student Amenities and Recreation Section arranges distribution of bus, rail and ferry concessions. For the peak period during the week preceding and the first week of Session 1 distribution is at a location to be decided. Students should watch for notices around the campus announcing the distribution centre.

For the rest of the year students seeking authorization for travel concessions, including planes, should enquire at the section (extension 2617) or the Enquiry Desk, Chancellery (extension 2251).

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 (Stage 2) and the Squarehouse (Stage 3). Membership of the Union is compulsory at $55 per year for all registered students and is open to all members of staff and graduates of the University.

The full range of facilities provided by the Union includes a cafeteria service and other dining facilities, a large shopping centre, cloak room, banking and hairdressing facilities, showers, a women's lounge, common, games, reading, meeting, music, practice, craft and dark rooms. Photocopying, sign printing, and stencil cutting services are also available. The Union also sponsors special concerts (including lunchtime concerts) and conducts courses in many facets of the arts including weaving, photography, creative dance and yoga. Exhibitions are held in the John Clark Gallery.

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.

The Students' Union

The Students' Union is run by students and represents them on and off campus. Presidential elections are by popular vote and all students who have completed one year at the University are eligible for election. The President directs the entire administration of the Students' Union and its activities.

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

Membership is compulsory at $17 per annum for full-time students and $13 for part-time students.

The activities of the Students' Union include:

1. Infakt: a student-run information referral service. If you want someone to talk to or need help of any kind see the people at Infakt located in the bus at the foot of Basser Steps.
2. A casual employment service.
3. Organization of Orientation Week.
4. Organization of Foundation Day.
6. Publication of the student paper Tharunka.
7. A free legal service run by a qualified lawyer employed by the Students' Union Council.
8. Students' Union Record Shop which sells discount records and tapes.
9. The Nuthouse which deals in bulk and health foods.
10. Secondhand Bookshop for cheap texts.

11. Clubs and societies which receive money from the Students' Union through CASOC (Clubs and Societies on Campus).

12. The sale of electronic calculators and accessories at discount rates.


The Students' Union is located on the second floor, Stage 3, the Union.

Chaplaincy Centre

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

Other Services and Activities

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

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

University Co-operative Bookshop Limited Membership is open to all students, on initial payment of a fee of $10, refundable when membership is terminated. Members receive an annual rebate on purchases of books.

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.

Australian Armed Forces Enquiries should be directed to:
Royal Australian Navy Royal Australian Navy Liaison Officer, Emeritus Professor J.S. Ratcliffe, Commander, RANR (Rtd), International House. Phone extension 3093 or 663 0473.

University of New South Wales Regiment The Adjutant, Regimental Depot, Day Avenue (just west of Anzac Parade). Phone 663 1212.

Royal Australian Air Force Undergraduates interested in the RAAF Undergraduate Scheme should contact The Recruiting Officer, Defence Forces Recruiting Centre, 323 Castlereagh Street, Sydney. Phone 212 1011.

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 income 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 diploma courses
- Approved combined bachelor degree courses
- Master's qualifying courses (one year)

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

1979 Higher School Certificate candidates and tertiary students receiving an allowance are sent forms in January 1980. Other students may obtain forms from the Admissions Section or Student Employment and Scholarships Section, or from the Commonwealth Department of Education, 59 Goulburn Street, Sydney, NSW 2000 (phone 218 8800).

Continuing students should submit applications as soon as examination results are available. New students should do so as soon as they are enrolled. All students should apply by 31 March 1980, otherwise benefits will not be paid for the earlier months of the year.

Scholarships, Cadetships, Prizes

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

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

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

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

Details of graduate awards are contained in the Calendar.

Other Financial Assistance

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

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

2. **Short Term Cash Loans**  
   Donations from the Students' Union, the University Union and other sources have made funds available for urgent cash loans not exceeding $100. These loans are normally repayable within one month.

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

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

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

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

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

Fund for Physically Handicapped and Disabled Students

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

Rules and Procedures

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

Admission

Where can I get information about admission?

The Admissions Office, located in the Chancellery on the upper campus, provides information for students on admission requirements, undergraduate and graduate courses and enrolment procedures. The Admissions Office is open from 9 am to 5 pm Monday to Friday (excluding the lunch hour 1 pm to 2 pm). During enrolment the office is also open for some part of the evening.

The Office provides information about special admission (including mature age entry), admission with advanced standing and admission on overseas qualifications. The Office also receives applications 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 lodgment of applications are adhered to. For further details see the sections below on Enrolment and Fees.

Applications for admission to undergraduate courses from students who do not satisfy the requirements for admission (see section on Admission Requirements in the Calendar), from
students seeking admission with advanced standing, or from students who have a record of failure at another university, are referred by the Admissions Office to the Admissions Committee of the Professorial Board.

Students seeking to register as higher degree candidates should first consult the Head of the School in which they wish to register. An application is then lodged on a standard form and the Admissions Office, 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 Admissions Office or the Universities and Colleges Admissions Centre.

How do I qualify admission?

In order to enter an undergraduate course you must qualify for matriculation to the University, and be selected for admission to the Faculty or course you wish to enter. Full details of matriculation and admission requirements are contained in the Calendar and in a pamphlet obtainable at the Admissions Office.

Enrolment Procedures 1980, a free booklet obtainable from the Admissions Office.

How do I enrol?

All students, except those enrolling as graduate research students (see below), must lodge an authorized enrolment form with the Cashier on the day the enrolling officer signs the form or on the day their General Studies electives are approved if the course requires this.

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

For details of the locations and hours for enrolment see Enrolment Procedures 1980, a free booklet obtainable from the Admissions Office or from your School or Faculty Office.

What happens if I am unable to pay fees at the time of enrolment?

If you are unable to pay fees by the due date you may apply to the Deputy Registrar (Student Services) for an extension of time, which may be granted in extenuating circumstances.

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 that time (see Fees below) unless the student has permission from the Deputy Registrar (Student Services). 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.

New Undergraduate Enrolments

Persons who are applying for entry in 1980 must lodge an application for selection with the Universities and Colleges Admissions Centre, PO Box 7049, GPO, Sydney 2001, by 1 October 1979.

Those who are selected will be required to complete enrolment at a specified time before the start of Session 1. Compulsory 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 Admissions Office.

Re-enrolment

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 Admissions Office 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. Persons who are applying for entry in 1980 must lodge an application for selection with the Universities and Colleges Admissions Centre, PO Box 7049, GPO, Sydney 2001, by 1 October 1979.

Restrictions Upon Re-enrolling

Students enrolled for the first time in any undergraduate course in the University who failed more than half their program in 1979; students who have failed more than once a subject prescribed as part of their course; and students required by the Re-enrolment Committee to show cause should not attempt to re-enrol but should follow the written instructions they will receive from the Registrar.

For the purpose of calculating a student's program, all subjects taken during the year, including repeat subjects, are counted.

Miscellaneous Enrolments

Students may be permitted to enrol as miscellaneous students in subjects not counted as part of (ie a degree or diploma) provided the Head of the School offering the subject considers it will be of benefit and there is accommodation available. Only in exceptional cases will subjects taken in this way count towards a degree or diploma. Students who are under exclusion may not be enrolled as miscellaneous students in subjects which may be counted towards courses from which they have been excluded.

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

**Final Dates for Completion of Enrolments**

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 (14 March 1980) 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 (28 March 1980) except with the express approval of the Deputy Registrar (Student Services) and the Heads of Schools concerned. No enrolments for courses in Session 2 only will be accepted after the end of the second week of Session 2 (1 August 1980) except with the express approval of the Deputy Registrar (Student Services) and the Heads of Schools concerned.

**How do assisted students (eg scholarship holders) enrol?**

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

**What special rules apply**

If I wish to be considered for admission with advanced standing?

If you make application to register as a candidate for any degree or other award granted by the University you may be admitted to the course of study with such standing on the basis of previous attainments as may be determined by the Professorial Board. For complete details regarding 'Admission with Advanced Standing' consult the Calendar.

**Can I transfer from one course to another?**

To transfer from one course to another you must apply on an application form obtainable from the Admissions Office by Friday 11 January 1980. If your application is successful you are required to comply with the enrolment procedures for the year/ stage of the new course and, unless otherwise instructed, you should present the letter granting transfer to the enrolling officer. If you intend to transfer, you should also inform the enrolling officer of the School in which you were enrolled in 1979.

**Can I change my course program?**

If you wish to seek approval to substitute one subject for another, or add one or more subjects to your program or discontinue part or all of your program, you must make application to the Registrar through the office controlling your course, from which application forms are available. The Registrar will inform you of the decision. Application to enrol in additional subjects must be submitted by 28 March 1980 for Session 1 only and Whole Year subjects and by 15 August 1980 for Session 2 only subjects.

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 Registrar.

**Withdrawal from courses and subjects**

Courses

1. Students withdrawing from courses (see also Subjects, below) are required to notify the Registrar in writing. In some cases students will be entitled to fee refunds.

For details see the Calendar.

Subjects

2. 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 subject concerned, except in exceptional circumstances.

(1) for one session subjects, the end of the seventh week of that session (18 April or 5 September)
(2) for whole year subjects the end of the second week of Session 2 (1 August)

**How do I enrol after an absence of twelve months or more?**

If you have had an approved leave of absence for twelve months or more and wish to resume your course you should follow the instructions about re-enrolling given in the letter granting your leave of absence. If you do not fully understand or have lost these instructions, then you should contact the Admissions Office before November in the year preceding the one in which you wish to resume your course.
If you have not obtained a leave of absence from your course and have not been enrolled in the course over the past twelve months of more, then you should apply for admission to the course through the Universities and Colleges Admissions Centre before 1 October in the year preceding that in which you wish to resume studies.

Are there any restrictions upon students re-enrolling?

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

First-year Rule

1. A student enrolled in the first year of any undergraduate course of study in the University as set out in the relevant faculty handbook shall be required to show cause why he/she should be allowed to continue the course if he/she fails more than half the program in which he/she is enrolled. In order that students may calculate half their program, the weighting of subjects in each course is defined in Schedule A, which may be varied from time to time by the Professorial Board.

Repeated-failure Rule

2. A student shall be required to show cause why he/she should be allowed to repeat a subject which that student has failed more than once. Where the subject is prescribed as part of the student’s course he/she shall also be required to show cause why he/she should be allowed to continue that course.

General Rule

3. A student shall be required to show cause if, in the opinion of the faculty or board of studies, his/her academic record is such as to demonstrate the student’s lack of fitness to pursue a subject or subjects and/or course or courses.

The Session-unit System

4. (1) A student who infringes the provision of Rules 1, or 2, at the end of Session 1 of any year will not be required to show cause at that time but will be allowed to repeat the subject(s) (if offered) and/or continue the course in Session 2 of that year, subject to the rules of progression in that course.

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

Exemption from Rules by Faculties

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

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

'Showing Cause'

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

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

Appeal

7. (1) Any student who is excluded by the Re-enrolment Committee from a course and/or subject(s) under the provisions of the Rules may appeal to an Appeal Committee constituted by Council for this purpose with the following membership:

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

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

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

The decision of the Committee shall be final.

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

*For details of Schedule A see Restrictions upon Re-enrolling in the Calendar.
The Appeal Committee shall determine the appeal after consideration of the student's academic record, his/her application for special permission to re-enrol, and the stated grounds of appeal. In exceptional circumstances, the Appeal Committee may require the student to appear in person.

Exclusion

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

(2) A student who is required to show cause under the provisions of Rule 2, and either does not attempt to show cause or does not receive special permission to re-enrol from the Re-enrolment Committee (or the Appeal Committee on appeal) shall be excluded from re-enrolling in any subject he/she has failed twice. Where the subject failed is prescribed as part of the student's course he/she shall also be excluded from that course. Where the subject failed is prescribed as part of any other course (or courses) he/she shall not be allowed to enrol in any such course(s).

(3) A student excluded from a course or courses under the provisions of Rule 1, or 2, may not enrol as a miscellaneous student in subjects which may be counted towards any such course.

Re-admission after Exclusion

9. (1) An excluded student 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 which re-admission is sought. Such applications will be considered by the Admissions Committee of the relevant Faculty or Board.

(b) An application for re-admission to a subject should be made to the Registrar before 30 November in the year prior to which re-admission is sought. Such applications will be considered by the relevant Head of School.

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

(4) Applications for re-admission to a course or subject that are unsuccessful (see 9. (2) (a), (b) respectively) will be reconsidered automatically by the Re-enrolment Committee of the Professorial Board. The decision of the Committee will be final.

10. If students fail a subject at the examinations in any year or session and re-enrol in the same course in the following year or session they must include in their program 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.

How do I apply for admission to degree or diploma?

If your current program will enable you to complete all requirements for a degree or diploma, including industrial training where necessary, you should complete the form Application for Admission to a Degree by the dates shown in the Calendar of Dates (see page 2) and on the Notification of Examination Results. The forms are available from the Enquiry Counter in the north wing of the Chancellery and will be mailed to all potential graduates.

The completion and submission of the form ensures that:

1. The correct spelling and sequence of names is recorded on the degree certificate. 2. Any previous academic qualifications are shown in the graduation ceremony program. 3. All correspondence relating to the ceremony is forwarded to the correct address. Note: If notifying change of address after the form has been submitted an additional form Final Year Students' Graduation: Change of Address should be submitted.

If you meet all the requirements, the degree or diploma will be conferred without the necessity for further action by you. Students should advise the Registrar, in writing, if they do not wish to have the degree or diploma conferred for any reason, including the decision to proceed to an honours degree. To ensure that the degree is not conferred advice should reach the Registrar no later than 24 July 1980 for students completing at the end of Session 1, and 1 March 1981 for those completing at the end of Session 2.

Fees

Fees and penalties quoted are current at the time of publication but may be amended by the University Council without notice.
Do I have to pay for tuition?
No tuition fees are charged.

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

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

University Union Entrance Fee
Payable on first enrolment $25

Student Activities Fees
University Union, annual subscription $55
Sports Association, annual subscription $11
Students' Union $5
Students enrolling in full-time courses, annual subscription $17
Students enrolling in part-time courses and miscellaneous subjects, annual subscription $13
Miscellaneous annual fee $25
This fee is used to finance expenses generally of a capital nature relating to student activities and amenities. Funds are allocated to the various student bodies for projects recommended by the Student Affairs Committee and approved by the University Council.

Are fees charged for examinations?
Generally, there are no charges associated with examinations; however two special examination fees are applied:
Examinations conducted under special circumstances—for each subject $11
Review of examination result—for each subject $11

What penalties exist for late payment of fees?
The following additional charges will be made in 1980 when fees are paid late:
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.

Locations and Hours of Cashier
Cashier’s Offices are open during the enrolment periods. Details of locations and hours are listed in Enrolment Procedures 1980, a free booklet obtainable from your School or Faculty Office or from the Admissions Office.

Who is exempt from payment of fees?
1. Life members of University Union, Sports Association, and Students' Union are exempt from the relevant fee or fees.
2. Students enrolled in courses classified as External are exempt from all 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 fees mentioned 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 in a miscellaneous subject or subjects to be credited towards the degree or diplomas for which they are enrolled elsewhere are exempt from all Student Activities Fees and the University Union entrance fee.
6. Undergraduate students of a recognized university outside Australia who attend the University of New South Wales with the permission of the Dean of the appropriate faculty and of the Head of the appropriate school or department to take part as miscellaneous students in an academic program relevant to their regular studies and approved by the authorities of their own institution are exempt from all Student Activities Fees and the University Union entrance fee.
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 graduate 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 1, 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.

Is exemption from membership possible?

The Registrar is empowered to grant exemption from membership 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.

How much will textbooks and special equipment (if any) cost?

You must 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.

Will I receive any refund if I withdraw from a course?

Yes. The following rules apply:

1. If you withdraw from courses you are required to notify the Registrar in writing.
2. Where notice of withdrawal from a course is received by the Registrar before the first day of Session 1, a refund of all fees paid will be made. After that time only a partial refund will be made. See the Calendar for details.

What happens if I fail to pay the prescribed fees or charges?

If you fail to pay prescribed fees or charges or become otherwise indebted to the University and you fail to make a satisfactory settlement of your indebtedness upon receipt of due notice then you cease to be entitled to the use of University facilities. You will not be permitted to register for a further session, to attend classes or examinations, or be granted any official credentials. In the case of a student enrolled for Session 1 only or for Sessions 1 and 2 this disbarment applies if any portion of fees is outstanding after the end of the eighth week of Session 1 (25 April 1980). In the case of a student enrolled for Session 2 only, this disbarment applies if any portion of fees is outstanding after the end of the sixth week of Session 2 (29 August 1980).

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

Can I get an extension of time to pay?

If you apply before the due date and extenuating circumstances exist, an extension of time may be granted. Apply to the Deputy Registrar (Student Services).

Examinations

When are examinations held?

Examinations for Session 2 and for Whole Year subjects are held in November/December. Examinations for Session 1 subjects are held during the Midyear Recess. Provisional timetables indicating the dates and times of examinations and notices of the location of examinations are posted on the University notice boards on the campus, including the Western Grounds Area. Final timetables indicating the dates, times, locations and authorized aids are available for students two weeks before the end of each session. You must advise the Examinations Unit (the Chancellery) of any clash in examinations. Details of dates are published in the Calendar of Dates (see pages 2-4 for May/June and October/November).

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

In the assessment of your progress in courses, 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.

How are examination passes graded?

Passes are graded: High Distinction, Distinction, Credit and Pass. Satisfactory indicates the satisfactory completion of a subject for which graded passes are not available. A Pass Conceded may be granted to a student whose mark in a subject is slightly below the standard required for a pass but whose overall satisfactory performance warrants this concession.
A Pass Conceded in a subject will normally allow progression to another subject for which the former subject is a prerequisite. In a particular subject, however, a subject authority may specify that a pass conceded is insufficient to meet a particular subject prerequisite.

When are examination results available?

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

Can examinations results be reviewed?

Examination results may be reviewed for a fee of $11 a subject, which is refundable in the event of an error being discovered. This review consists mainly of ensuring that all questions attempted have been marked and of checking the total of the marks awarded. Applications for review must be submitted on the appropriate form to the Examinations and Student Records Section together with the necessary fee not later than fifteen working days after the issue of the Notification of Results form.

A review of a result is not a detailed assessment of a student's standard of knowledge and understanding of, and skills in, the subject.

Are allowances made if students are sick before or during an examination?

A student who through serious illness or other cause outside his control is unable to attend an examination is required to bring the circumstances (supported by a medical certificate or other evidence) to the notice of the Registrar not later than seven days after the date of the examination, unless there are exceptional circumstances.

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

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

When submitting a request for consideration candidates are required to give details of their registration number, address, course, specialization, year or stage, full or part-time and subject number, title and date of the examination affected.

A student suffering from a physical disability which puts him at a disadvantage in written examinations should apply to the Assistant Registrar, Examinations and Student Records Section (Ground Floor, the Chancellery) immediately the disability is known. If necessary, special arrangements will be made to meet the student's requirements.

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.

Compulsory Industrial Training

Examinations including deferred 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 Unit, immediately the location of the industrial training is known. Special forms for this purpose are available at the Enquiry Desk, in the north wing of the Chancellery.

Arrival at Examinations

Examination rooms will be open to students 25 minutes before the commencement of the examination. Candidates are requested to be in their places at least 15 minutes before the commencement to hear announcements. The examination paper will be available for reading 10 minutes before commencement.

Use of Linguistic Dictionaries

All answers must be in English unless otherwise directed. Foreign students who have the written approval of the Assistant Registrar, Examinations and Student Records Section, may use standard linguistic dictionaries. Dictionaries should be presented for approval not later than 14 days before the commencement of the examination period.

How are examinations conducted?

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

1. Candidates are required to obey any instruction given by an examination supervisor for the proper conduct of the examination.
2. Candidates are required to be in their places in the examination room not less than 15 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 30 minutes from the time of commencement of the examination.

5. Candidates shall not be permitted to leave the examination room before the expiry of 30 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 an 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.

Abolition of Deferred Examinations

The system of formal deferred examinations administered by the Registrar's Division was abolished from 1 March 1978. Schools and Faculties may carry out whatever additional assessment may be considered appropriate, including assessment or additional assessment on medical or compassionate grounds.

Can I buy copies of previous examination papers?

Yes—for 5 each from the University Union's Upper Campus Shop in the Commerce Building.

Essays

Should I list my sources?

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

Student Conduct on Campus

Is there a detailed code of rules related to the general conduct of students?

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

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

What are the rules related to attendance at classes?

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

In the case of illness or of absence for some other unavoidable cause you may be excused by the Registrar for non-attendance at classes for a period not more than one month or, on the recommendation of the Dean of the appropriate Faculty, for a longer period. Applications should be addressed to the Registrar and, where applicable, should be accompanied by a medical certificate. If assessment procedures have been missed, this should be stated in the application.

If you attend less than 80 per cent of possible classes, you may be refused final assessment in that subject.

Why is my University and Union card important?

All students enrolled for courses leading to degrees and/or diplomas, except those exempt from fees, are issued with a University and Union membership card. Your card must be carried during attendance at the University and shown on request.

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

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

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

New students will be issued with cards on enrolment.
Why should I inform the University if I change my address?

If you change your address you should notify the Student Records Section of the Registrar’s Division as soon as possible. Failure to do this could lead to important correspondence (including examination results) not reaching you. The University cannot accept responsibility if official communications fail to reach students who have not notified their change of address. Change of Address Advice forms are available at Faculty and School offices and at the Enquiry Desk in the north wing of the Chancellery.

All communications from the University, including examination results, will be sent to the session address. Change of address advice will be accepted up to 30 November, except for final-year students wishing to change their Submissions of Details Associated with Graduation form. Changes to this form will be accepted up to a date four weeks before the student’s graduation ceremony.

Will the University release information to third parties without my permission?

In general, no. The University treats examination results and information it receives from a student as confidential and will not reveal such information to third parties without the permission of the student except at the discretion of senior officers in circumstances considered of benefit to the student and when it is either impossible or impracticable to gain the student’s prior permission. This happens rarely. This policy is considered so important that it often involves officers of the University in very difficult situations, for example, when they must refuse to reveal the address of a student to parents or other relatives.

In spite of the policy, there are sometimes accusations made that the University has revealed information, including addresses (especially to insurance companies).

All students should be aware that students’ addresses are eagerly sought by various commercial agents and that sometimes tricks are used to obtain them. For example, from time to time people claiming to be from the University telephone students or their families and ask for information (usually another student’s address) which is often given, unsuspiciously. There is evidence that this is a technique used by commercial agents.

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

How are student records kept up to date?

Enrolment details forms will be sent to all students on 24 April and 12 September. It is not necessary to return these forms unless any information recorded thereon is incorrect. Amended forms must be returned to the Examinations and Student Records Section within fourteen days. Amendments notified after the closing date will not be accepted unless exceptional circumstances exist and approval is obtained from the Registrar. Amended forms returned to the Registrar will be acknowledged in writing within 14 days.

Is there any rule related to the ownership of students’ work?

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

Can I get a permit to park on campus?

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

Lost property?

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

Further Information

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

General

Any student who requires information on the application of these rules or any service which the University offers, may make enquiries in the Chancellery and in case of difficulties should visit the office of the Deputy Registrar (Student Services).

Notices

Official University notices are displayed on the noticeboards and students are expected to be acquainted with the notices which concern them. These boards are in the Biological Sciences Building, the Mathews Building, the Chancellery (lower ground floor), Central Lecture Block, Dalton Building (Chemistry), Electrical Engineering Building, Main Building (Physics and Mining Engineering) and in the Western Grounds Area.
Notices are placed on the University noticeboards each month detailing forthcoming important dates. Any change to the Calendar of Dates is included in these notices.

Appeals

Section 5(c) of chapter III of the By-laws provides: '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'.

The Calendar

Please consult the Calendar if you want a more detailed account of the information contained in this section.

Vice-Chancellor's Official Welcome to New Students

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

Full-Time Students
In the Faculties of Architecture, Arts, Biological Sciences, Commerce, Law:
Thursday 28 February 1980
11 am in the Clancy Auditorium

In the Faculties of Applied Science, Engineering, Medicine, Professional Studies, Science, and the Board of Studies in Science and Mathematics:
Friday 29 February 1980
11 am in the Clancy Auditorium

Part-time Students
Thursday 28 February 1980
6.30 pm in the Clancy Auditorium

Meeting for Parents of New Students
Friday 29 February 1980
7.30 pm in the Clancy Auditorium
Foreword

The importance of the Applied Sciences 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, Biogeography and Bioclimatology, Geomorphology and Pedology), Applied Geology, Chemical Engineering (including Biological Process Engineering and Fuel Engineering), Chemical Technology (including Industrial Chemistry and Ceramic Engineering), Food Technology, Metallurgy (including 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:
Dr J. Collins, Executive Officer, Faculty of Applied Science.
Room 122, Sir Robert Webster Building, Tel. 662 2162.

For information and advice of a specific nature, contact the appropriate school representative below:
Mr G. Baldwin, Administrative Officer, School of Applied Geology.
Room 810, Applied Science Building, Tel. 662 2336.
Mr R. Starr, Senior Administrative Officer, School of Chemical Engineering.
Room 322, Applied Science Building, Tel. 662 2976.
Mr J. Gatenby, Senior Administrative Officer, School of Chemical Technology.
Room 510, Applied Science Building, Tel. 662 2404.
Mr R. Greenwood, Administrative Assistant, School of Food Technology.
Room 411, Applied Science Building, Tel. 662 3816.
Mr B. McClenaghan, Administrative Assistant, School of Geography.
Room G10, Geography and Surveying, Tel. 662 2084.
Mr R. Ball, Senior Administrative Officer, School of Metallurgy.
Room 110B, Metallurgy Building, Tel. 662 2351.
Mr W. Huisman, Administrative Assistant, School of Mining Engineering.
Room 51B, Main Building, Tel. 662 2912.
Dr T. Hickie, Senior Lecturer, School of Textile Technology.
Room 121, Sir Robert Webster Building, Tel. 662 2323.

Mr J. Lawrence, Administrative Assistant, School of Wool and Pastoral Sciences.
Room 102, Wool and Pastoral Sciences Building, Tel. 662 2268.

Faculty of Applied Science
Enrolment Procedures

All students re-enrolling in 1980 should obtain a copy of the free booklet Enrolment Procedures 1980 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.

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 serves the information needs of senior undergraduate students, graduate students and members of the academic staff. It contains books, a large collection of journals, and guides to the literature in the form of abstracting and indexing journals in the subject areas of pure and applied science, technology, engineering and architecture. The library also houses a growing map collection and some microform material. All material housed in the library bears the prefix "P" and is indexed in the central catalogue on Level 2. There is also a catalogue in the Physical Sciences Library. There is seating for approximately 300 people, and a number of room carrels and seminar rooms are available for use. Photocopying facilities are provided. Journals may not be borrowed from the collection. Staff on Level 7 are ready to assist readers with their enquiries.

Physical Sciences Librarian Marian Bate

The Undergraduate Library

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

The Undergraduate Library provides a reader education program and reader assistance service aimed at teaching students the basic principles of finding information.

Services of particular interest to undergraduates and academic staff are:

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

Undergraduate Librarian Pat Howard

The Bachelor of Social Science Degree Course (3420)

The Bachelor of Social Science (BSocSc) is a new 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 stage of the course if their performance in at least two of the above disciplines is of a sufficiently high standard (credit level 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 normally 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 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 degree.

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

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.

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 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 in the pass grade 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.
The Faculty of Applied Science consists of the Schools of Applied Geology, Chemical Engineering, Chemical Technology, Food Technology, Geography, 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, Ceramic Engineering, 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 Chemical Engineering, Metallurgical Process Engineering and Mining Engineering.

Honours: Candidates for honours 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 Ceramics and Industrial Chemistry by the School of Chemical Technology; in Metallurgy by the School of Metallurgy; and in Mineral Processing by the School of Mining Engineering (at Broken Hill only). The part-time Mining Engineering course leading to the award of the degree of Bachelor of Science (Engineering) is available at Broken Hill.

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) 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 the second and third years 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.

3000

Applied Geology — Full-time (New Course)

Bachelor of Science

BSc

Year 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.001</td>
<td>Physics I or Higher Physics</td>
<td>S1: 6, S2: 6</td>
</tr>
<tr>
<td>1.011</td>
<td>Chemistry IA and IB</td>
<td>S1: 6, S2: 6</td>
</tr>
<tr>
<td>10.001</td>
<td>Mathematics I or Higher Math</td>
<td>S1: 6, S2: 6</td>
</tr>
<tr>
<td>25.110</td>
<td>Earth Materials and Processes*</td>
<td>S1: 6, S2: 0</td>
</tr>
<tr>
<td>25.120</td>
<td>Earth Environments and Dynamics*</td>
<td>S1: 0, S2: 6</td>
</tr>
</tbody>
</table>

Total: 24

*Up to 1½ days of field tutorials in 25.110 Earth Materials and Processes and up to 3½ days in 25.120 Earth Environments and Dynamics are essential parts of these subjects. Attendance is compulsory.

Year 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.211</td>
<td>Earth Materials I</td>
<td>6</td>
</tr>
<tr>
<td>25.212</td>
<td>Earth Environments I*</td>
<td>6</td>
</tr>
<tr>
<td>25.221</td>
<td>Earth Materials II†</td>
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</tr>
<tr>
<td>25.223</td>
<td>Earth Physics</td>
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<tr>
<td></td>
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</tr>
</tbody>
</table>

Total: 13½

Students take Ancilliary Subjects for a total of not less than 10 hpw. Subjects are selected preferably from the following list. Other subjects, however, may be taken conditional on approval of the Head of School.

Ancilliary Subjects

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.002A</td>
<td>Physical Chemistry</td>
<td>6 or 6</td>
</tr>
<tr>
<td>2.002C</td>
<td>Inorganic Chemistry</td>
<td>6 or 6</td>
</tr>
<tr>
<td>5.010</td>
<td>Engineering A</td>
<td>6 or 6</td>
</tr>
<tr>
<td>5.020</td>
<td>Engineering B</td>
<td>6 or 6</td>
</tr>
<tr>
<td>10.031</td>
<td>Mathematics</td>
<td>2</td>
</tr>
<tr>
<td>10.301</td>
<td>Statistics SA or 10.331</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Statistics SS</td>
<td>2</td>
</tr>
<tr>
<td>15.001</td>
<td>Microeconomics I</td>
<td>3½ or 3½</td>
</tr>
<tr>
<td>15.011</td>
<td>Macroeconomics I</td>
<td>3½ or 3½</td>
</tr>
<tr>
<td>17.031</td>
<td>Cell Biology</td>
<td>6</td>
</tr>
<tr>
<td>17.021</td>
<td>Biology of Higher Organisms</td>
<td>0</td>
</tr>
</tbody>
</table>

*Field work of up to 3 days, equivalent to 7 tutorial hours is an essential part of the subject.
†Field work of up to 10 days, equivalent to 28 tutorial hours is an essential part of the subject.

School of Applied Geology

Head of School
Professor G. J. S. Govett

Administrative Officer
Mr G. J. Baldwin

The structure and syllabus of the BSc degree course in Applied 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 students receive instruction in standard fundamental geological subjects. As the course progresses, emphasis is increasingly placed on practical applications in engineering and environmental geology, mineral and energy deposits, and mineral exploration techniques including geological, geochemical and geophysical methods.

Attendance at the University for students taking the full-time professional course in Applied Geology is for twenty-eight weeks per year on the basis of two sessions of fourteen weeks each for four years. At least one session of the fourth year is devoted essentially to field and laboratory work on a specialized research project.

A three-year full-time course is available to students in the Faculty of Science, and provision is made for party-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, Applied Geophysics and in Mineral Exploration are offered by the School. These courses are designed to provide specialist training in these areas of Applied Geology.
Undergraduate Study: Course Outlines

Year 3* (Offered 1981)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hpw</th>
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</thead>
<tbody>
<tr>
<td>25.311</td>
<td>Earth Materials III</td>
<td>S1</td>
</tr>
<tr>
<td>25.321</td>
<td>Earth Materials IV**</td>
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<tr>
<td>25.312</td>
<td>Earth Environments II</td>
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<tr>
<td>25.313</td>
<td>Exploration and Data Processing§</td>
<td>6</td>
</tr>
<tr>
<td>25.314</td>
<td>Mineral and Energy Resources I</td>
<td>6</td>
</tr>
<tr>
<td>25.324</td>
<td>Mineral and Energy Resources II</td>
<td>0</td>
</tr>
<tr>
<td>25.325</td>
<td>Engineering and Environmental Geology</td>
<td>0</td>
</tr>
<tr>
<td>25.326</td>
<td>Geological Techniques</td>
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<tr>
<td></td>
<td>General Studies Electives</td>
<td>3</td>
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</tbody>
</table>

Total: 27 27

*Students taking Year 3 in 1980 should refer to the old course below.

**Field work of up to 7 days is an essential part of the subject.
§Field work of up to 5 days is an essential part of the subject.
†Field work of up to 6 days is an essential part of the subject.

Year 4* (Offered 1982)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hpw</th>
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</thead>
<tbody>
<tr>
<td>25.411</td>
<td>Resource Geology**</td>
<td>8½</td>
</tr>
<tr>
<td></td>
<td>and either</td>
<td></td>
</tr>
<tr>
<td>25.412</td>
<td>Mineral and Energy Resources†</td>
<td>12½</td>
</tr>
<tr>
<td></td>
<td>or</td>
<td></td>
</tr>
<tr>
<td>25.413</td>
<td>Engineering and Environmental Geology</td>
<td>12½</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
<td>3</td>
</tr>
</tbody>
</table>

Total: 24 24

*Students taking Year 4 in 1980 should refer to the old course below.

**Field work of up to seven days duration is a compulsory part of this subject.
†May include all or some combination of the following subjects as determined by the Head of School:
7.013 Principles of Mining
7.023 Mineral Process Engineering
7.014 Geology IV: Advanced Applied Geology**
7.024 Geology IV: Project
One General Studies Elective

Plus one of the following subjects:
25.034 Geology IV: Engineering Geology
25.044 Geology IV: Mineral Exploration
25.054 Geology IV: Sedimentary Basins
25.064 Geology IV: Applied Geophysics

Total: 24 24

School of Chemical Engineering

3000
Applied Geology — Full-time (Old Course)
Bachelor of Science
BSc

Year 3*

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hpw</th>
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</thead>
<tbody>
<tr>
<td>25.013</td>
<td>Geology IIIA†</td>
<td>6</td>
</tr>
<tr>
<td>25.023</td>
<td>Geology IIIB**</td>
<td>6</td>
</tr>
<tr>
<td>25.033</td>
<td>Geology IIIIC§</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Two General Studies Electives</td>
<td>3</td>
</tr>
</tbody>
</table>

Total: 27

*Not available after 1980.
†Field work of up to 6 days is a compulsory part of this subject.
‡A geological survey camp of 10 days' duration is a compulsory part of this subject.
§Field tutorials constitute an essential part of this subject.

The School of Chemical Engineering consists of the Departments of Biological Process Engineering, Chemical Engineering and Fuel Technology. The courses in Chemical Engineering contain a number of electives in technical areas, including biological process engineering and fuel engineering.

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.

Head of School
Professor R. T. Fowler
Senior Administrative Officer
Mr R. F. Starr
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.

For the award of honours, 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 courses obtain a minimum of twelve weeks' professionally oriented, or industrial experience. Students in the part-time courses must complete three years of industrial training concurrently with their University work.

Department of Chemical Engineering

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 Council of Engineering Institutions, UK, the Institution of Engineers, Australia, and the Royal Australian Chemical Institute as sufficient qualification for corporate membership.

Year 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Description</th>
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<tr>
<td>1.001</td>
<td>Physics I or Higher-Physics I</td>
<td>6 6</td>
</tr>
<tr>
<td>1.011</td>
<td>Higher-Physics I</td>
<td>6 6</td>
</tr>
<tr>
<td>2.121</td>
<td>Chemistry I A and</td>
<td>6 6</td>
</tr>
<tr>
<td>2.131</td>
<td>Chemistry IB</td>
<td>6 6</td>
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<tr>
<td>5.010</td>
<td>Engineering A</td>
<td>6 0</td>
</tr>
<tr>
<td>5.030</td>
<td>Engineering C (includes 3.011 Introduction to Chemical Engineering)</td>
<td>0 6</td>
</tr>
<tr>
<td>10.001</td>
<td>Mathematics I or</td>
<td>6 6</td>
</tr>
<tr>
<td>10.011</td>
<td>Higher Mathematics I</td>
<td>6 6</td>
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<table>
<thead>
<tr>
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<th>Hpw</th>
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<tbody>
<tr>
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<tr>
<td>2.002A</td>
<td>Physical Chemistry</td>
</tr>
<tr>
<td>2.002C</td>
<td>Inorganic Chemistry</td>
</tr>
<tr>
<td>3.021</td>
<td>Chemical Engineering I A</td>
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<tr>
<td>3.022</td>
<td>Chemical Engineering I B</td>
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<tr>
<td>3.311</td>
<td>Fuel Engineering I*</td>
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<tr>
<td>4.961</td>
<td>Materials and Corrosion</td>
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<tr>
<td>6.832</td>
<td>Electrical Machines</td>
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<tr>
<td>8.112</td>
<td>Structures</td>
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<tr>
<td>10.031</td>
<td>Mathematics</td>
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<tr>
<td>10.331</td>
<td>Statistics SS</td>
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<table>
<thead>
<tr>
<th>Year 3</th>
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</thead>
<tbody>
<tr>
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<td>S1</td>
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<tr>
<td>2.002B</td>
<td>Organic Chemistry</td>
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<tr>
<td>3.031</td>
<td>Chemical Engineering I IA</td>
</tr>
<tr>
<td>3.032</td>
<td>Chemical Engineering I IB</td>
</tr>
<tr>
<td>3.033</td>
<td>Chemical Engineering I IC</td>
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<tr>
<td>3.034</td>
<td>Chemical Engineering I ID</td>
</tr>
<tr>
<td>3.035</td>
<td>Chemical Engineering I IE</td>
</tr>
<tr>
<td>3.036</td>
<td>Chemical Engineering Laboratory I</td>
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<tr>
<td>10.032</td>
<td>Mathematics</td>
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<table>
<thead>
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<th>Year 4</th>
<th>Hpw</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
</tr>
<tr>
<td>3.041</td>
<td>Chemical Engineering IIIA</td>
</tr>
<tr>
<td>3.042</td>
<td>Chemical Engineering IIIB</td>
</tr>
<tr>
<td>3.043</td>
<td>Chemical Engineering IIIC</td>
</tr>
<tr>
<td>3.044</td>
<td>Chemical Engineering Laboratory II</td>
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<tr>
<td></td>
<td>Advanced Chemical Engineering Electives</td>
</tr>
<tr>
<td></td>
<td>Project*</td>
</tr>
<tr>
<td></td>
<td>General Study Elective</td>
</tr>
</tbody>
</table>

*In certain cases this subject may be replaced by another elective with approval of the Head of School.
Undergraduate Study: Course Outlines

Plus one or more of the following to a total of 6 hrs/week for 28 weeks:

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
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</thead>
<tbody>
<tr>
<td>Advanced Chemical Engineering Electives</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>3.040 Chemical Engineering Projects</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>3.0461 Introductory Reservoir Engineering</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>3.0462 Advanced Reservoir Engineering</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>3.211 Biological Process Engineering</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>3.331 Fuel Engineering III</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>4.121 Principles of Metal Extraction</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>7.314 Mineral Process Technology</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>18.551 Operations Research</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>23.051 Nuclear Power Technology</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

Any other elective approved by Head of School

*The project is to be selected from:
- 3.040 Chemical Engineering Projects
- 3.240 Biological Process Engineering Project
- 3.340 Fuel Engineering Project

---

Chemical Engineering — Subjects and Units

<table>
<thead>
<tr>
<th>Hpw</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.011 Introduction to Chemical Engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.021 Chemical Engineering IA Unit 1 Flow of Fluids</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>2 Dimensions</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>3 Material Balances</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>3.022 Chemical Engineering IB Unit 1 Heat Transfer I</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>2 Pumps and Pumping</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3 Thermodynamics I</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>4 Computations I</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>3.023 Chemical Engineering Science I (Applicable to Science programs) Consists of: 3.021 and Units 1,2 and 4 of 3.022</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>3.024 Chemical Engineering Principles I (Applicable to Mathematics programs)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

Consists of:
- Unit 1 of 3.021 and Units 1 and 2 of 3.022

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>2</th>
<th>3</th>
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</thead>
</table>

3.025 Chemical Engineering for Chemical Technologists

Consists of:
- Units 1 and 2 of 3.021 and Units 1 and 2 of 3.022

| 3 | 3 |

3.031 Chemical Engineering IIA

Unit 1 Mass Transfer (theory) 2 0
2 Heat Transfer II (theory) 1 0
3 Thermodynamics II 2 0

| 5 | 0 |

3.032 Chemical Engineering IIB

Unit 1 Reaction Engineering I 1 0
2 Plant Layout I 1 0
3 Process Engineering I 1 0
4 Economics I 1 0
5 Process Report 1 0

| 5 | 0 |

3.033 Chemical Engineering IIC

Unit 1 Fluid-Particle Systems I 0 2
2 Multicomponent Separation 0 1
3 Thermodynamics III 0 1
4 Solids Handling 0 1

| 0 | 5 |

3.034 Chemical Engineering IID

Unit 1 Reaction Engineering II 0 2
2 Process Dynamics I 0 1
3 Instrumentation 0 1
4 Computations II 0 1

| 0 | 5 |

3.035 Chemical Engineering IIE

Unit 1 Mass Transfer Design 0 1½
2 Heat Transfer II (Design) 0 1
3 Process Vessels 0 1½
4 Design Report 0 1

| 0 | 5 |

---

29
### Applied Science

**Chemical Engineering Laboratory I**
- **Unit 1**
  - Hours per week: 2, 0

**Chemical Engineering Science II**
- (Applicable to Science programs)
- Consists of 3.031, Unit 1 of 3.032, Units 1, 2 and 3 of 3.033 and Units 1 and 4 of 3.034
- Hours per week: 6, 7

**Chemical Engineering Principles II**
- (Applicable to Mathematics programs)
- Consists of: Units 1 and 2 of 3.031 and Units 1 and 2 of 3.033
- Hours per week: 6, 7

**Chemical Engineering IIIA**
- Unit 1 Convective Mass Transfer
  - Hours per week: 1, 0
- 2 Simultaneous Heat and Mass Transfer
  - Hours per week: 1, 0
- 3 Surface Separation Processes
  - Hours per week: 1, 0
- 4 Transport Phenomena
  - Hours per week: 1, 0
- Total: 4, 0

**Chemical Engineering IIIB**
- Unit 1 Process Dynamics
  - Hours per week: 1, 0
- 2 Control
  - Hours per week: 2, 0
- 3 Optimization
  - Hours per week: 1, 0
- Total: 4, 0

**Chemical Engineering IIIC**
- Unit 1 Safety and Failure Engineering
  - Hours per week: 1, 0
- 2 Economics II
  - Hours per week: 2, 0
- 3 Atmospheric Pollution Control
  - Hours per week: 1, 0
- 4 Water Pollution Control
  - Hours per week: 1, 0
- Total: 5, 0

**Chemical Engineering Laboratory II**
- Hours per week: 3, 0

### Advanced Chemical Engineering Electives
- **Plant Layout II**
  - Hours per week: 0, 2
- **Chemical and Phase Equilibria**
  - Hours per week: 0, 2
- **Control II**
  - Hours per week: 0, 2
- **Reactor Engineering**
  - Hours per week: 0, 2
- **Fluid-Particle Systems II**
  - Hours per week: 0, 2
- **Process Engineering II**
  - Hours per week: 0, 2
- **Oil and Gas Processing**
  - Hours per week: 2, 0

Students are to select 6 session hours only. It is hoped that some of the above electives will be offered in Session 1.

**Chemical Engineering Projects**
- Hours per week: 1, 11

**Introductory Reservoir Engineering**
- Hours per week: 2, 0

**Advanced Reservoir Engineering**
- Hours per week: 0, 2

**Biological Process Engineering**
- Hours per week: 6, 6

**Biological Process Engineering Project**
- Hours per week: 1, 11

### Fuel Engineering — Subjects and Units

**Fuel Engineering I**
- Unit 1 Fuels and Energy — Sources and Properties
  - Hours per week: 1, 0
- 2 Energy Conversion
  - Hours per week: 0, 1
- 3 Fuel Processing
  - Hours per week: 1, 0
- 4 Fuel Plant Technology
  - Hours per week: 0, 1
  - Total: 2, 2

**Fuel Engineering II**
- Unit 1 Combustion — Fundamentals and Science
  - Hours per week: 0, 1
- 2 Principles of Gasification
  - Hours per week: 0, 1
- 3 Radiation Heat Transfer and Application
  - Hours per week: 1, 0
- 4 Measurements in Flames and Furnaces
  - Hours per week: 1, 0
- 5 Laboratory — Fuel Testing
  - Hours per week: 1, 1
  - Total: 3, 3

NB Two units each session, but are interchangeable.

NB Laboratory programmed as 9 x 3 hour periods. Two lecture units each session are interchangeable.
3.331 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

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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3.340 Fuel Engineering Project

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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

<table>
<thead>
<tr>
<th>Hours per week</th>
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<th>S2</th>
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<tbody>
<tr>
<td>1.001 Physics I or Higher Physics I</td>
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Stage 2

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<th>Hours per week</th>
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Stage 3

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<td>2.002C Inorganic Chemistry</td>
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<td>6</td>
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<td>10.331 Statistics SS General Studies Elective</td>
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Stage 4

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<td>3.022 Chemical Engineering IB</td>
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<td>3.311 Fuel Engineering I*</td>
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<td>4.961 Materials and Corrosion</td>
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<td>6.832 Electrical Machines</td>
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*In certain cases this subject may be replaced by another elective with approval of Head of School.

Stage 5

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<td>3.032 Chemical Engineering IIB</td>
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<td>0</td>
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<td>3.033 Chemical Engineering IIC</td>
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<td>5</td>
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<td>3.034 Chemical Engineering IID</td>
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Stage 6

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<tr>
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</table>
Department of Biological Process Engineering

Biological Process Engineering at the undergraduate level is a course in Chemical Engineering with electives in the areas of microbiology and biological process engineering.

3040 Chemical Engineering with Biological Process Engineering Electives — Full-time Course

Bachelor of Engineering BE

Year 1 is the same as for the Chemical Engineering course; Years 2, 3 and 4 are also the same as for the corresponding years in Chemical Engineering, but in Year 3 the appropriate elective is 44.111 Microbiology; and in Year 4, 3.211 Biological Process Engineering, plus 3.240 Biological Process Engineering Project.

Successful completion of this degree course is sufficient qualification for corporate membership of the institution of Engineers, Australia, the Royal Australian Chemical Institute, and the Institution of Chemical Engineers, UK.

Department of Fuel Technology

This department, the first of its kind to be established in Australia, offers a course designed to meet the need of Australian industrial and research establishments for graduates trained in the science and technology of fuels and their utilization.

One constant problem of industries is that of developing and improving methods of processing and using solid, liquid and gaseous fuels to suit the continuously shifting patterns of demand. It is in this field of activity that the university-trained fuel technologist has a most important part to play.

In Australia, there is a growing need for people trained in the technology of fuels, and opportunities for employment and advancement of fuel engineers are therefore good.

Many exciting and revolutionary possibilities are apparent in the fuel and energy conversion industries, and there is a wide and varied field of activity which offers opportunity and challenge in the application of science and engineering to the problems of fuel and energy conversion, combustion engineering and environmental pollution control. Opportunities for graduate studies and research for higher degrees in these areas are wide-ranged and interesting.

The institute of Fuel (UK) has accepted the degree courses in Chemical Engineering with the Fuel Electives as providing exemption from the examination required for admission to corporate membership of the Institute.

Successful completion of the BE degree course in Chemical Engineering with Fuel Electives is accepted by the Australian Institute of Energy, the Council of Engineering Institutions, UK, the Royal Australian Chemical Institute, and the Institution of Engineers, Australia, as sufficient academic qualification for corporate membership.
Chemical technology 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 chemical technology. There are two major specializations: Ceramic Engineering (full-time course) and Ceramics (part-time course) and Industrial Chemistry (full-time and part-time).

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

3100
Industrial Chemistry — Full-time Course
Bachelor of Science
BSc

Year 1

<table>
<thead>
<tr>
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<th>Course Name</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>1.001</td>
<td>Physics I</td>
<td>6</td>
</tr>
<tr>
<td>2.121</td>
<td>Chemistry IA and IB</td>
<td>6</td>
</tr>
<tr>
<td>2.131</td>
<td>Chemistry IB</td>
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<tr>
<td>10.001</td>
<td>Mathematics I</td>
<td>6</td>
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<tr>
<td>Plus:</td>
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<tr>
<td>25.011</td>
<td>Geology I</td>
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</tr>
<tr>
<td>or any two of:</td>
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</tr>
<tr>
<td>5.010</td>
<td>Engineering A* and C*†</td>
<td>6</td>
</tr>
<tr>
<td>5.030</td>
<td>Cell Biology* and Biology of Higher Organisms*</td>
<td>6</td>
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</table>

With the approval of the Head of School, students may substitute either 22.314 Polymer Chemistry and 22.324 Physical Chemistry of Polymers II or 22.334 Polymer Physics II for 22.114 Processes.
### 3110
**Industrial Chemistry — Part-time Course**  
**Bachelor of Science (Technology)**  
**BSc(Tech)**

#### Stages 1 and 2*

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<tr>
<th>Course Code</th>
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<td>6</td>
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**Plus:**

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* or any two of

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<th>Course Title</th>
<th>Hours per week</th>
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<td>5.030</td>
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<td>17.021</td>
<td>Biology of Higher Organisms†</td>
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*Physics and Mathematics are usually taken in Stage 1 and the other subjects in Stage 2.

†One session only.

§Chemical Technology students take 22.101 Introduction to Chemical Technology in 5.030.

#### Stage 3

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<td>6.851</td>
<td>Electronics and Instrumentation</td>
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</tr>
<tr>
<td>10.031</td>
<td>Mathematics</td>
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<tr>
<td>10.301</td>
<td>Statistics SA</td>
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<tr>
<td>22.112</td>
<td>Chemical Process Equipment</td>
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*Laboratories operate for 3 hour periods in alternate weeks.

#### Stage 4

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<td>Inorganic Chemistry</td>
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<td>22.122</td>
<td>Instrumental Analysis</td>
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<td>22.132</td>
<td>Industrial Chemistry</td>
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<td>Calculations</td>
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#### Stage 5

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<td></td>
</tr>
<tr>
<td></td>
<td>Chemical Technologists</td>
<td></td>
</tr>
<tr>
<td>22.113</td>
<td>Industrial Chemistry Processes</td>
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</tr>
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*Laboratories operate for 4 hour periods in alternate weeks.

### 3020
**Ceramic Engineering — Full-time Course**  
**Bachelor of Science**  
**BSc**

#### Year 1

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<td>Chemistry IA and</td>
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<td>2.131</td>
<td>Chemistry IB</td>
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</tr>
<tr>
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<td>Engineering A</td>
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<td>Engineering C†</td>
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#### Year 2

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<tr>
<td>2.002A</td>
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#### Year 3

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<td></td>
<td>Chemical Technologists</td>
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<tr>
<td>3.311</td>
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Undergraduate Study: Course Outlines

Stage 4

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<td>Material and Energy Balances</td>
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<tr>
<td>22.163</td>
<td>Instrumentation and Process Theory Control</td>
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<td>3†</td>
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<td>Chemical Ceramics</td>
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<td>Ceramic Process Principles</td>
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Total: 25 22

†Laboratories operate for 3 hour periods in alternate weeks.

Stage 5

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<th>Course Title</th>
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<td>Material and Energy Balances</td>
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<td>22.163</td>
<td>Instrumentation and Process Theory Control</td>
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Total: 13 11

†Laboratories operate for 3 hour periods in alternate weeks.

Stage 6

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<th>S2</th>
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<tbody>
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<td>Fuel Engineering I</td>
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<td>2</td>
</tr>
<tr>
<td>22.123A</td>
<td>Chemical Thermodynamics</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>22.213</td>
<td>Chemical Ceramics</td>
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<tr>
<td>25.201</td>
<td>Mineralogy</td>
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Total: 13½ 12½

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

Stages 1 and 2*

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</tr>
<tr>
<td>2.121</td>
<td>Chemistry IA and I</td>
<td></td>
</tr>
<tr>
<td>2.131</td>
<td>Chemistry IB</td>
<td>6</td>
</tr>
<tr>
<td>5.010</td>
<td>Engineering A**</td>
<td>6</td>
</tr>
<tr>
<td>5.030</td>
<td>Engineering C**§</td>
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<td>Mathematics I or II</td>
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</tr>
<tr>
<td>10.011</td>
<td>Higher Mathematics I†</td>
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</tbody>
</table>
|             | **Physics and Mathematics are usually taken in Stage 1 and the other subjects in Stage 2.**
|             | **One session only.**                    |                |
|             | §There are no evening lectures in this subject. |                |

Stage 3

<table>
<thead>
<tr>
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<th>Course Title</th>
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<tr>
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</table>

Total: 13 7

School of Food Technology

Head of School
Professor R. A. Edwards

Administrative Assistant
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.

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. Graduates are able to pursue more advanced studies in any of these sciences.

### Year 1

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
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<tbody>
<tr>
<td>1.001</td>
<td>Mathematics I or</td>
<td>S1 S2</td>
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<tr>
<td>10.011</td>
<td>Higher Mathematics I or</td>
<td>6 6</td>
</tr>
<tr>
<td>10.021B</td>
<td>General Mathematics IB and</td>
<td>6 0</td>
</tr>
<tr>
<td>10.021C</td>
<td>General Mathematics IC</td>
<td>6 0</td>
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<tr>
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<td>Biology of Higher Organisms</td>
<td>6 0</td>
</tr>
<tr>
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<td>6 0</td>
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| Total | 24 | 24 |

### Year 2

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<td>2.002B</td>
<td>Organic Chemistry</td>
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<td>2.002D</td>
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<td>Food and Man</td>
<td>0 6</td>
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<td>41.101</td>
<td>Introductory Biochemistry</td>
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<td>44.143</td>
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| General Studies Elective | 0 3 |

| Total | 25 | 24 |

### Year 3

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<td>10.301</td>
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</tr>
<tr>
<td>38.131</td>
<td>Principles of Food Preservation</td>
<td>4 0</td>
</tr>
<tr>
<td>38.132</td>
<td>Plant Food Science</td>
<td>3 0</td>
</tr>
<tr>
<td>38.133</td>
<td>Animal Food Science</td>
<td>0 2</td>
</tr>
<tr>
<td>38.134</td>
<td>Food Science Laboratory</td>
<td>6 6</td>
</tr>
<tr>
<td>38.331</td>
<td>Food Microbiology I</td>
<td>2 0</td>
</tr>
<tr>
<td>38.431</td>
<td>Food Engineering I</td>
<td>3 3</td>
</tr>
<tr>
<td>38.531</td>
<td>Nutrition</td>
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| General Studies Elective | 0 3 |

| Total | 26 | 23 |

### Year 4

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<td>Inspections</td>
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<td>38.147</td>
<td>Food Quality Assessment</td>
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| General Studies Elective | 1½ 1½ |
| General Studies Advanced Elective | 1½ 1½ |

| Total | 15 | 16 |

Plus two or more of the following electives to a total of not less than 8½ hrs/week.

<table>
<thead>
<tr>
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<th>Hours per week</th>
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<tbody>
<tr>
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<td>18.551</td>
<td>Operations Research</td>
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<td>28.012</td>
<td>Marketing Systems</td>
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<tr>
<td>28.022</td>
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</table>
of Bachelor of Science by attending for one full-time year and completing the subjects listed in fourth year 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 of completed.

### Stages 1 and 2*

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<tr>
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<td>Chemistry IB</td>
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<td>6</td>
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<tr>
<td>10.001</td>
<td>Mathematics I or</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>10.011</td>
<td>Higher Mathematics I or</td>
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<td>General Mathematics IB and</td>
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<tr>
<td>17.021</td>
<td>Biology of Higher Organisms</td>
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<tr>
<td>17.031</td>
<td>Cell Biology</td>
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</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>
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### Stage 4

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<tr>
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### Stage 5

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General Studies Elective

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37
Stages 6

<table>
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<td>38.132</td>
<td>Plant Food Science</td>
<td>3</td>
</tr>
<tr>
<td>38.133</td>
<td>Animal Food Science</td>
<td>0</td>
</tr>
<tr>
<td>38.134</td>
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<td>0</td>
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<tr>
<td>38.531</td>
<td>Nutrition</td>
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<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
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<td>9</td>
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There are elective specializations in biogeography and bioclimatology, geomorphology and pedology, or economic geography (with emphasis on urban geography). First year courses involve systematic studies of the physical or economic bases of geography. There is progressive specialization in the following years, but all courses in physical geography have common training in fundamental observation and data handling. For the award of honours, 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 et cetera.

Several units in Geography include laboratory and project work involving the use of quantitative techniques. Students need a battery-operated calculator; advice on appropriate machines may be obtained from the School Office. 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.

School of Geography

Head of School
Professor J. A. Mabbutt
Administrative Assistant
Mr B. McClanaghan

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.

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.

Biogeography and Bioclimatology

Year 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>2.121</td>
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</tr>
<tr>
<td>2.111</td>
<td>Introductory Chemistry</td>
<td>6</td>
</tr>
<tr>
<td>2.131</td>
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</tr>
<tr>
<td>10.021B</td>
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</tr>
<tr>
<td>10.021C</td>
<td>General Mathematics IC or</td>
<td>6</td>
</tr>
<tr>
<td>10.001</td>
<td>Mathematics I or</td>
<td>6</td>
</tr>
<tr>
<td>10.011</td>
<td>Higher Mathematics I</td>
<td>6</td>
</tr>
<tr>
<td>17.031</td>
<td>Cell Biology</td>
<td>6</td>
</tr>
<tr>
<td>17.021</td>
<td>Biology of Higher Organisms</td>
<td>6</td>
</tr>
<tr>
<td>27.111</td>
<td>Applied Physical Geography I*</td>
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</table>

<table>
<thead>
<tr>
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<th>S1</th>
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<tbody>
<tr>
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*Up to 3 days' field work, equivalent to 24 tutorial hours, is an essential part of the subject.
### Year 2

<table>
<thead>
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<tr>
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<tr>
<td>27.631 Geographic Data Analysis I</td>
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<tr>
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<tr>
<td>43.101 Genetics or</td>
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<tr>
<td>43.121 Plant Physiology</td>
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**Up to 5 days' field work, equivalent to 40 tutorial hours, is an essential part of the subject.

### Year 3

<table>
<thead>
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</thead>
<tbody>
<tr>
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<tr>
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<tr>
<td>27.153 Climatology**</td>
<td>0  5</td>
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<tr>
<td>27.163 Methods in Physical Geography</td>
<td>1  1 1/2</td>
</tr>
<tr>
<td>27.173 Remote Sensing Applications†</td>
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<tr>
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<tr>
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<td>43.152 Plant Community Ecology or</td>
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<tr>
<td>43.162 Plant Kingdom</td>
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**Up to 5 days' field work, equivalent to 40 tutorial hours, is an essential part of the subject.

### Year 4

<table>
<thead>
<tr>
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</thead>
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<tr>
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<tr>
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<tr>
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</tr>
<tr>
<td>20 20/2 22 22/2</td>
<td>21 21/2 25 25/2</td>
</tr>
</tbody>
</table>

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

### Geomorphology and Pedology

**Hours per week**

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
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<td>6  0</td>
</tr>
<tr>
<td>2.111 Introductory Chemistry</td>
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<tr>
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<td>6  0</td>
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<tr>
<td>10.021B General Mathematics IB and</td>
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<tr>
<td>10.021C General Mathematics IC or</td>
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<tr>
<td>10.001 Mathematics I or</td>
<td>6  6</td>
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<tr>
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<tr>
<td>25.110 Earth Materials &amp; Processes*</td>
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<tr>
<td>25.120 Earth Environments &amp; Dynamics*</td>
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<tr>
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</tr>
</tbody>
</table>

*Up to 1/6 days of field tutorials in 25.110 and up to 3/5 days in 25.120 are essential parts of these subjects. Attendance is compulsory.

**Up to 3 days' field work, equivalent to 24 tutorial hours, is an essential part of the subject.

### Year 2

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.001 Physics I or</td>
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<td>1.021 Introductory Physics I</td>
<td>5  5</td>
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<tr>
<td>27.211 Earth Materials I</td>
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<td>27.222 Earth Materials II*</td>
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</tr>
<tr>
<td>27.112 Applied Physical Geography II**</td>
<td>5  5</td>
</tr>
<tr>
<td>27.172 Environmental Measurements</td>
<td>0  3</td>
</tr>
<tr>
<td>27.631 Geographic Data Analysis I</td>
<td>4  0</td>
</tr>
<tr>
<td>20 20/2 22 22/2</td>
<td>21 21/2 25 25/2</td>
</tr>
</tbody>
</table>

**Field work of up to 3 days, equivalent to 7 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.

### Year 3

<table>
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<td>27.143 Biogeography**</td>
<td>5  0</td>
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<td>6  0</td>
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<tr>
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<td>1  1 1/2</td>
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<tr>
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<td>3  0</td>
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<tr>
<td>27.183 Geomorphology**</td>
<td>5  0</td>
</tr>
<tr>
<td>20 20/2 22 22/2</td>
<td>21 21/2 25 25/2</td>
</tr>
</tbody>
</table>

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

**Field work of up to 3 days, equivalent to 7 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.

†Offered subject to availability of staff.

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

†Offered subject to availability of staff.
### Year 4

<table>
<thead>
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### Year 3

<table>
<thead>
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<tr>
<td>27.633 Geographic Data Analysis III</td>
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</tr>
<tr>
<td>27.613 Applied Economic Geography III*</td>
<td></td>
</tr>
<tr>
<td><strong>Plus six of the following, at least two subjects from economics and</strong></td>
<td></td>
</tr>
<tr>
<td>and at least two subjects from geography:</td>
<td></td>
</tr>
<tr>
<td>15.003 Macroeconomics III</td>
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</tr>
<tr>
<td>15.143 Microeconomics III</td>
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<tr>
<td>15.053 Economic Development</td>
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<tr>
<td>15.073 Natural and Environmental Resources Economics</td>
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<tr>
<td>15.082 Labour Economics</td>
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<td>15.093 Public Sector Economics</td>
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<td>15.163 Industrial Organisation and Policy</td>
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<tr>
<td>27.713 Marketing Geography†</td>
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<td>27.723 Transport Geography†</td>
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<tr>
<td>27.733 Regional Policy and Planning†</td>
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<tr>
<td>27.743 Regional Population Analysis†</td>
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<td>27.753 Social Welfare and Urban Development†</td>
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<tr>
<td>27.763 Rural Resource Problems†</td>
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<tr>
<td>27.773 Spatial Aspects of the Housing Market†</td>
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### Applied Economic Geography

#### Year 1

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<td>15.001 Microeconomics I</td>
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<td>15.011 Macroeconomics I</td>
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<tr>
<td>54.904 Political Science I</td>
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#### Year 2

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<td>15.042 Macroeconomics II</td>
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<tr>
<td>54.213 Public Policy Making</td>
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<td>27.612 Applied Economic Geography IIA</td>
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<tr>
<td>27.622 Applied Economic Geography IIB*</td>
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<tr>
<td>27.632 Geographic Data Analysis II</td>
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<tr>
<td>27.642 Mathematical Methods for Spatial Analysis</td>
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<tr>
<td>27.652 Geographic Information Systems</td>
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<td>27.662 Urban Systems</td>
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<td><strong>Total</strong></td>
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#### Year 4

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<tr>
<td>27.504 Project</td>
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</tr>
<tr>
<td>27.624 Geographic Thought and Perspectives</td>
<td></td>
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<tr>
<td>27.644 Seminars in Applied Geography</td>
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<td>27.514 Practical Applications in Geography</td>
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### Geography In Other Faculties

Courses in Geography are available on a full-time basis in the Faculties of Arts, Commerce and Science.
School of Metallurgy

Head of School
Professor H. Muir
Senior Administrative Officer
Mr R. A. Ball

The metallurgical profession is developing rapidly in importance in Australia, in keeping with the recent spectacular growth of our metal and mineral industry. In terms of value of production this industry has become recognized as one of Australia’s most important, especially in terms of export earnings. Expansion of the industry has greatly enhanced the need for metallurgists.

Industrial development in metallurgy has been accompanied by, and is based on, the development of metallurgical research. This is being carried on in a number of laboratories run by industry, government, and the universities.

Graduate metallurgists have a wide choice of type of employment and location. They may work in production, technical control or development, either in the ore treatment or metal extraction plants in locations such as Newcastle, Port Kembla, Broken Hill, Mt. Isa, Townsville, Gladstone, Port Pirie, Whyalla, Kwinana, Kalgoorlie or Pibara; or in the metal manufacturing plants, including the automobile, aircraft, construction and other industries, of the main centres and capital cities. In the metal industry in general the opportunities for a career in management are excellent, since it is a tradition in this industry that management should be in the hands of technical people. If the graduates are inclined towards research and development, they will find considerable scope in various government, university, and industrial research laboratories.

The undergraduate courses in metallurgy have been designed to prepare students for employment in metallurgical industries and research institutions, and involve a general training in basic sciences and engineering. These fundamental principles are then extended to cover studies of the extraction, refining, working, fabrication and use of metals. There are three undergraduate courses, two full-time in Metallurgy and in Metallurgical Process Engineering, leading to the award of the BSc and the BE degree respectively; and one part-time in Metallurgy, leading to the award of the BSc(Tech) degree. The aim of the BE degree course is to prepare graduates for employment in the mineral, metallurgical and manufacturing industries as metallurgical process engineers.

The first year of the full-time Bachelor of Science degree course consists of physics, chemistry, mathematics, and either engineering or geology. The structure of this Year 1 course is similar to that of many other science, applied science and engineering courses. Consequently, students may delay their final choice of a professional course until the end of Year 1.

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.

Candidates for the honours degree are required to undertake special reading and other assignments as directed by the Head of the School. In considering the award of honours special attention is paid to the performance of a candidate in the final year research project for which a thesis describing a theoretical or experimental study is required.

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 of 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 second and third years. During the second, third, and fourth years of the course, visits are made to various metallurgical works, and students are required to submit reports on some of these.

Year 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>1.001</td>
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<tr>
<td>2.121</td>
<td>Chemistry IA (Session 1)</td>
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<td>2.131</td>
<td>Chemistry IB (Session 2)</td>
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<tr>
<td>10.011</td>
<td>Higher Mathematics I</td>
<td>6</td>
</tr>
<tr>
<td>Plus one of</td>
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<td></td>
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<td>Engineering A or Engineering B</td>
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<tr>
<td>5.030</td>
<td>Geology</td>
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| Total       |                                   | 24             |

Year 2

<table>
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<th>S2</th>
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<tr>
<td>4.302</td>
<td>Chemical and Extraction</td>
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<td></td>
</tr>
<tr>
<td>4.402</td>
<td>Physical Metallurgy</td>
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<td></td>
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<tr>
<td>4.502</td>
<td>Mechanical Properties of Solids</td>
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<td>4.602</td>
<td>Metallurgical Engineering I</td>
<td></td>
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<td>4.802</td>
<td>Metallurgical Physics</td>
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<td>Mathematics</td>
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### Year 1

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<td>Engineering C† or Physical Metallurgy II</td>
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<td>1½</td>
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<td><strong>21½</strong></td>
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<td>Chemistry IA and Metallurgical Engineering IIA</td>
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</tr>
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<td>2.131</td>
<td>Chemistry IB Metallurgical Engineering IIB</td>
<td>6</td>
</tr>
<tr>
<td>5.010</td>
<td>Engineering A and Metallurgical Engineering IIA</td>
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<td>5.030</td>
<td>Engineering C Metallurgical Engineering IIB</td>
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<tr>
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<td>Mathematics I or Metallurgical Engineering IIA</td>
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<td>10.011</td>
<td>Higher Mathematics I Metallurgical Engineering IIB</td>
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<td><strong>Total</strong></td>
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†Part only.

### Year 2

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### Year 3

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<td>4.703</td>
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<td>4.813</td>
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<td>6.851</td>
<td>Electronics and Instrumentation and Mineral Process Engineering</td>
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<tr>
<td>6.852</td>
<td>Electrical Machinery and Supply</td>
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<td>4.024</td>
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<td>4.504</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>24½</strong></td>
<td><strong>24½</strong></td>
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*Project includes three weeks' laboratory work during Midyear Recess.

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### 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.
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.

Stages 1 and 2*

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>1.001 Physics I</td>
<td>6</td>
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<tr>
<td>2.121 Chemistry IA and IB</td>
<td>6</td>
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<tr>
<td>5.010 Engineering A and B</td>
<td>6</td>
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<td>10.001 Mathematics I or II</td>
<td>6</td>
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<tr>
<td>10.011 Higher Mathematics I†</td>
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*The Physics and Mathematics subjects are taken in Stage 1, and the other subjects in Stage 2.
†There are no evening lectures in this subject.

Stage 3

<table>
<thead>
<tr>
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<th>Hours per week</th>
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<td>4.312 Chemical and Extraction</td>
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<td>Metallurgy IA</td>
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<td>4.802 Metallurgical Physics</td>
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<tr>
<td>10.031 Mathematics</td>
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Stage 4

<table>
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<tbody>
<tr>
<td>4.402 Physical Metallurgy I</td>
<td>6</td>
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<tr>
<td>4.502 Mechanical Properties of Solids</td>
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<td>4.602 Metallurgical Engineering I</td>
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<td>25.201 Mineralogy</td>
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Undergraduate Study: Course Outlines

Stage 5

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<td>4.433 Physical Metallurgy IIC</td>
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<tr>
<td>6.851 Electronics and Instrumentation</td>
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Stage 6

<table>
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<td>4.034 Industrial Metallurgy Project</td>
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<td>4.054 Metallurgy Seminar</td>
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<tr>
<td>4.514 Industrial Metallurgy</td>
<td>3</td>
</tr>
<tr>
<td>4.613 Metallurgical Engineering IIA</td>
<td>0</td>
</tr>
<tr>
<td>4.813 Mathematical Methods</td>
<td>3</td>
</tr>
<tr>
<td>6.852 Electrical Machinery and Supply</td>
<td>3</td>
</tr>
</tbody>
</table>

School of Mining Engineering

Head of School
Professor F. F. Roxborough

Administrative Assistant
Mr W. C. Huisman

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 front-line 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, mineral 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 (pass or honours) 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 Minerals Engineering.

Part-time courses are conducted at the W. S. & L. B. Robinson University College, Broken Hill — in Mining Engineering leading to the award of the BSc(Eng) or BE degree and in Mineral Processing leading to the award of the BSc(Tech) degree. It is also possible to take the BE degree course at Broken Hill as a full-time student.

After graduation, the mining engineers are equipped to enter any sector of the mining industry such as coal mining, metalliferous mining, petrochemical 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 Department 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 University of Newcastle and the University of Wollongong 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.

3140 Mining Engineering — Full-time Course

Bachelor of Engineering BE

The first year of the course is essentially the same as that for several other Engineering courses and second year includes those subjects of common relevance to the Engineering disciplines. The third year is largely devoted to basic mining subjects and the fourth year 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 recesses. 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

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
<th>Hours per week</th>
</tr>
</thead>
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<tr>
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<tr>
<td>2.951</td>
<td>Chemistry I (ME)</td>
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</tr>
<tr>
<td>5.010</td>
<td>Engineering A</td>
<td>6</td>
</tr>
<tr>
<td>5.020</td>
<td>Engineering B</td>
<td>0</td>
</tr>
<tr>
<td>5.030</td>
<td>Engineering C†</td>
<td>0</td>
</tr>
<tr>
<td>10.001</td>
<td>Mathematics I or</td>
<td>0</td>
</tr>
<tr>
<td>10.011</td>
<td>Higher Mathematics I</td>
<td>0</td>
</tr>
</tbody>
</table>

**Total:** 24 hours

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

### Year 2

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.972</td>
<td>Materials for Mining Engineers</td>
<td>1½</td>
</tr>
<tr>
<td>5.611</td>
<td>Fluid Mechanics and Thermodynamics</td>
<td>4</td>
</tr>
<tr>
<td>6.851</td>
<td>Electronics and Instrumentation</td>
<td>3</td>
</tr>
<tr>
<td>6.852</td>
<td>Electrical Machinery and Supply</td>
<td>0</td>
</tr>
<tr>
<td>7.112</td>
<td>Mineral Resources</td>
<td>1</td>
</tr>
<tr>
<td>7.122</td>
<td>Mine Development†</td>
<td>0</td>
</tr>
<tr>
<td>8.172</td>
<td>Mechanics of Solids II</td>
<td>4</td>
</tr>
<tr>
<td>8.250</td>
<td>Properties of Materials</td>
<td>2</td>
</tr>
<tr>
<td>10.022</td>
<td>Engineering Mathematics II</td>
<td>4</td>
</tr>
<tr>
<td>25.520</td>
<td>Geology for Mining Engineers‡</td>
<td>2</td>
</tr>
<tr>
<td>10.301</td>
<td>Statistics SA</td>
<td>1½</td>
</tr>
<tr>
<td>29.441</td>
<td>Surveying for Engineers</td>
<td>0</td>
</tr>
<tr>
<td>29.491</td>
<td>General Studies Elective</td>
<td>1½</td>
</tr>
</tbody>
</table>

**Total:** 24½ hours

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

†Includes two compulsory field tutorials.
Year 3

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.113 Mining Methods†</td>
<td>S1 2, S2 2</td>
</tr>
<tr>
<td>7.123 Geomechanics</td>
<td>S1 3, S2 3</td>
</tr>
<tr>
<td>7.133 Mine Transport</td>
<td>S1 0, S2 2½</td>
</tr>
<tr>
<td>7.143 Mine Environment and Safety</td>
<td></td>
</tr>
<tr>
<td>Engineering†</td>
<td>S1 2½, S2 2½</td>
</tr>
<tr>
<td>7.153 Power Supply in Mines</td>
<td>S1 0, S2 2½</td>
</tr>
<tr>
<td>7.163 Excavation Engineering</td>
<td>S1 2</td>
</tr>
<tr>
<td>7.173 Computer Applications in Mining</td>
<td>S1 2</td>
</tr>
<tr>
<td>7.213 Mine Surveying</td>
<td>S1 2</td>
</tr>
<tr>
<td>7.313 Minerals Engineering Processes</td>
<td>S1 3</td>
</tr>
<tr>
<td>25.521 Geology for Mining Engineers II</td>
<td>S1 4, S2 4</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>S1 1½, S2 1½</td>
</tr>
</tbody>
</table>

22 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.

Year 4

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.974 Mining Materials</td>
<td>S1 1, S2 0</td>
</tr>
<tr>
<td>7.114 Geotechnical Engineering</td>
<td>S1 3, S2 3</td>
</tr>
<tr>
<td>7.214 Mine Economics and Planning</td>
<td>S1 4, S2 4</td>
</tr>
<tr>
<td>7.224 Operational Management</td>
<td>S1 2, S2 2</td>
</tr>
<tr>
<td>7.414 Minerals Industry Project</td>
<td>S1 4, S2 4</td>
</tr>
<tr>
<td>7.424 Industrial and Research Seminars</td>
<td>S1 1, S2 1</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>S1 3, S2 3</td>
</tr>
</tbody>
</table>

27 27

together with an approved grouping† of 3 subjects selected from the following:

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.301 Fuel Engineering</td>
<td>S1 3, S2 3</td>
</tr>
<tr>
<td>4.374 Metal Extraction Processes</td>
<td>S1 3, S2 3</td>
</tr>
<tr>
<td>7.124 Coal Face Mechanization*</td>
<td>S1 3, S2 3</td>
</tr>
<tr>
<td>7.134 Metalliferous Mining Systems*</td>
<td>S1 3, S2 3</td>
</tr>
<tr>
<td>7.314 Mineral Process Technology</td>
<td>S1 3, S2 3</td>
</tr>
<tr>
<td>7.144 Surface and Offshore Mining</td>
<td>S1 3, S2 3</td>
</tr>
<tr>
<td>7.154 Petroleum Engineering</td>
<td>S1 3, S2 3</td>
</tr>
<tr>
<td>7.164 Tunnel Engineering</td>
<td>S1 3, S2 3</td>
</tr>
</tbody>
</table>

4200 and 4210

Mining Engineering — Part-time Courses

W. S. and L. B. Robinson University College, Broken Hill

The School of Mining Engineering offers two part-time courses in Mining Engineering at Broken Hill. One course is presented as a seven-stage enrolment and there is provision for acceleration by a combination of full and part-time study. Exceptional students may be given permission to increase their part-time enrolment to fifteen hours per week and may finish their course in six stages.

The second course is based on a selection of appropriate subjects from the seven-stage course and may be completed in six stages.

A minimum of three years' concurrent industrial training in approved industries is required before graduation for both courses 4200 and 4210.

### 4200

Mining Engineering — Seven Stage Part-time Course

Bachelor of Engineering

BE

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
</tr>
<tr>
<td>2.121 Chemistry IA</td>
<td>6</td>
</tr>
<tr>
<td>5.030 Engineering C</td>
<td>0</td>
</tr>
<tr>
<td>10.001 Mathematics I or</td>
<td>6</td>
</tr>
<tr>
<td>10.011 Higher Mathematics I</td>
<td>1</td>
</tr>
<tr>
<td>7.112R Mineral Resources</td>
<td>12</td>
</tr>
</tbody>
</table>

13 12

Note: Not all options are offered in Engineering A, B and C. Subject enrolments in any one year may be necessary to teach 2.121 Chemistry IA and 2.131 Chemistry IB and substitute 5.031R for 5.010 and 5.020 in Stage 2.

<table>
<thead>
<tr>
<th>Stage 2</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
</tr>
<tr>
<td>1.001 Physics I</td>
<td>6</td>
</tr>
<tr>
<td>5.010 Engineering A</td>
<td>6</td>
</tr>
<tr>
<td>5.020 Engineering B</td>
<td>0</td>
</tr>
<tr>
<td>7.122R Mine Development</td>
<td>0</td>
</tr>
</tbody>
</table>

12 13

<table>
<thead>
<tr>
<th>Stage 3</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
</tr>
<tr>
<td>7.113R Mining Methods</td>
<td>3</td>
</tr>
<tr>
<td>8.172 Mechanics of Solids</td>
<td>2</td>
</tr>
<tr>
<td>8.250 Properties of Materials</td>
<td>2</td>
</tr>
<tr>
<td>10.022 Engineering Maths II</td>
<td>4</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>1½</td>
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</tbody>
</table>

12½ 12½
### Stage 4

<table>
<thead>
<tr>
<th>Code</th>
<th>Course</th>
<th>Hours per week</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.851</td>
<td>Electronics and Instrumentation</td>
<td>S1: 3</td>
<td>S2: 0</td>
</tr>
<tr>
<td>6.852</td>
<td>Electrical Machinery and Supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.611</td>
<td>Fluid Mechanics/Thermodynamics</td>
<td>S1: 4</td>
<td>S2: 4</td>
</tr>
<tr>
<td>10.351</td>
<td>Statistics SM</td>
<td>S1: 1½</td>
<td>S2: 1½</td>
</tr>
<tr>
<td>25.520</td>
<td>Geology for Mining Engineers I*</td>
<td>S1: 2</td>
<td>S2: 2</td>
</tr>
<tr>
<td>29.441</td>
<td>Surveying for Engineers</td>
<td>S1: 3</td>
<td>S2: 3</td>
</tr>
<tr>
<td>29.491</td>
<td>Survey Camp†</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(40 class</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>contact hours)</td>
<td></td>
</tr>
</tbody>
</table>

Note: Not all options are offered in Engineering A, B and C. Subject to enrolments in any one year it may be necessary to teach 2.121 and 2.131 Chemistry IA and IB, and to substitute 5.031R for 5.010 and 5.020 in Stage 2.

*Excursions will be necessary.
†Candidates with sufficient practical experience in a mine survey office may be excused from the camp.

### Stage 5

<table>
<thead>
<tr>
<th>Code</th>
<th>Course</th>
<th>Hours per week</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.123R</td>
<td>Geomechanics</td>
<td>S1: 3</td>
<td>S2: 3</td>
</tr>
<tr>
<td>7.133R</td>
<td>Mine Transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.153R</td>
<td>Power Supply in Mines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.163R</td>
<td>Excavation Engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.213R</td>
<td>Mine Surveying</td>
<td>S1: 1</td>
<td>S2: 1</td>
</tr>
<tr>
<td>7.224R</td>
<td>Operational Management</td>
<td>S1: 1½</td>
<td>S2: 1½</td>
</tr>
<tr>
<td>25.112R</td>
<td>Geology for Mining Engineers II</td>
<td>S1: 2</td>
<td>S2: 2</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
<td>S1: 1½</td>
<td>S2: 1½</td>
</tr>
</tbody>
</table>

Note: A mining excursion of one week is necessary in either Stage 5 or 6.

### Stage 6

<table>
<thead>
<tr>
<th>Code</th>
<th>Course</th>
<th>Hours per week</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.114R</td>
<td>Geotechnical Engineering</td>
<td>S1: 2</td>
<td>S2: 2</td>
</tr>
<tr>
<td>7.143R</td>
<td>Mine Environment and Safety Engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.313R</td>
<td>Mineral Processing</td>
<td>S1: 5</td>
<td>S2: 5</td>
</tr>
<tr>
<td>25.122R</td>
<td>Geology for Mining Engineers II</td>
<td>S1: 2</td>
<td>S2: 2</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
<td>S1: 1½</td>
<td>S2: 1½</td>
</tr>
</tbody>
</table>

### Stage 7

<table>
<thead>
<tr>
<th>Code</th>
<th>Course</th>
<th>Hours per week</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.972R</td>
<td>Materials for Mining Engineers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.214R</td>
<td>Mine Economics and Planning</td>
<td>S1: 1½</td>
<td>S2: 1½</td>
</tr>
<tr>
<td>7.424R</td>
<td>Feasibility Studies and Seminars</td>
<td>S1: 2</td>
<td>S2: 2</td>
</tr>
<tr>
<td>7.414R</td>
<td>Minerals Industry Project</td>
<td>S1: 4</td>
<td>S2: 4</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
<td>S1: 1½</td>
<td>S2: 1½</td>
</tr>
</tbody>
</table>

*Excursions are necessary.
†Candidates with sufficient practical experience in a mine survey office may be excused from the camp.
### Stage 5

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
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</thead>
<tbody>
<tr>
<td>7.125R</td>
<td>Introduction to Geotechnical Engineering</td>
<td>S1 2 S2 0</td>
</tr>
<tr>
<td>7.133R</td>
<td>Mine Transport</td>
<td>0 2 2½</td>
</tr>
<tr>
<td>7.153R</td>
<td>Power Supply in Mines</td>
<td>2½ 0</td>
</tr>
<tr>
<td>7.163R</td>
<td>Excavation Engineering</td>
<td>1½ 1½</td>
</tr>
<tr>
<td>7.213R</td>
<td>Mine Surveying</td>
<td>1 1</td>
</tr>
<tr>
<td>7.224R</td>
<td>Operational Management</td>
<td>1½ 1½</td>
</tr>
<tr>
<td>25.112R</td>
<td>Geology for Mining</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Engineers IIA</td>
<td>S1 2 S2 2</td>
</tr>
<tr>
<td></td>
<td>Two General Studies Electives</td>
<td>3 3</td>
</tr>
</tbody>
</table>

Note: A mining excursion of one week is necessary in either Stage 5 or Stage 6.

### Stage 6

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.114R</td>
<td>Geotechnical Engineering</td>
<td>S1 2 S2 2</td>
</tr>
<tr>
<td>7.143R</td>
<td>Mine Environment and Safety Engineering</td>
<td>2½ 2½</td>
</tr>
<tr>
<td>7.313R</td>
<td>Mineral Processing</td>
<td>5 5</td>
</tr>
<tr>
<td>25.122R</td>
<td>Geology for Mining</td>
<td>S1 2 S2 2</td>
</tr>
<tr>
<td>7.416R</td>
<td>Minerals Industry Project</td>
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<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Geology for Mining Engineers IIA</td>
<td>S1 2 S2 2</td>
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</table>

Stage 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.121</td>
<td>Chemistry IA</td>
<td>6 6</td>
</tr>
<tr>
<td>2.131</td>
<td>Chemistry IB</td>
<td>0 6</td>
</tr>
<tr>
<td>10.001</td>
<td>Mathematics I</td>
<td>6 6</td>
</tr>
<tr>
<td>7.112R</td>
<td>Mineral Resources</td>
<td>1 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Geology for Engineers I</td>
<td>1 6</td>
</tr>
</tbody>
</table>

### 4220

**Mineral Processing — Part-time Course**

**W. S. and L. B. Robinson University College, Broken Hill**

**Bachelor of Science (Technology) BSc(Tech)**

This course is designed to meet the requirements of students who are employed by the mineral processing industries. It extends over six part-time years of study and leads to the award of the degree of Bachelor of Science (Technology). A minimum of three years' concurrent industrial training in approved industries is required before graduation.

### Stage 4

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.002A</td>
<td>Physical Chemistry</td>
<td>3 3</td>
</tr>
<tr>
<td>2.042C</td>
<td>Inorganic Chemistry</td>
<td>6 0</td>
</tr>
<tr>
<td>2.002D</td>
<td>Analytical Chemistry</td>
<td>0 6</td>
</tr>
<tr>
<td>5.324</td>
<td>Automatic Control Engineering</td>
<td>3 3</td>
</tr>
<tr>
<td>25.201R</td>
<td>Mineragraphic Laboratory Work</td>
<td>S1 1½ S2 1½</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
<td></td>
</tr>
</tbody>
</table>

### Stage 5

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.972</td>
<td>Materials for Mining Engineers</td>
<td>1 1</td>
</tr>
<tr>
<td>7.113R</td>
<td>Mining Methods</td>
<td>3 3</td>
</tr>
<tr>
<td>8.172</td>
<td>Mechanics of Solids</td>
<td>2 2</td>
</tr>
<tr>
<td>8.250</td>
<td>Properties of Materials</td>
<td>2 2</td>
</tr>
<tr>
<td>10.022</td>
<td>Engineering Maths II</td>
<td>4 4</td>
</tr>
<tr>
<td>25.520</td>
<td>Geology for Engineers I</td>
<td>2 2</td>
</tr>
</tbody>
</table>

### Stage 6

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.972</td>
<td>Materials for Mining Engineers</td>
<td>1 1</td>
</tr>
<tr>
<td>7.113R</td>
<td>Mining Methods</td>
<td>3 3</td>
</tr>
<tr>
<td>8.172</td>
<td>Mechanics of Solids</td>
<td>2 2</td>
</tr>
<tr>
<td>8.250</td>
<td>Properties of Materials</td>
<td>2 2</td>
</tr>
<tr>
<td>10.022</td>
<td>Engineering Maths II</td>
<td>4 4</td>
</tr>
<tr>
<td>25.520</td>
<td>Geology for Engineers I</td>
<td>2 2</td>
</tr>
</tbody>
</table>

### Year 1

Stages 1 and 2 of Course No. 4200 combined.

### Year 2

Stages 3 and 4 of Course No. 4200 combined. Mine visits are necessary in conjunction with subject 7.113R Mining Methods.

### Year 3 and Year 4

Consists of Stages 5, 6 and 7 of Course No. 4200, plus, in Year 3 — Subject No. 7.193R Mine Technology, and in Year 4 — Subject No. 7.194R Mine Design Practice.

In addition at least 100 days of practical experience must be gained before graduation.
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 the second and third years. Students are normally required to undertake twelve weeks' industrial training during the long recesses between Years 2 and 3, and 3 and 4.

3170
Textile Technology — Full-time Course
Bachelor of Science
BSc

<table>
<thead>
<tr>
<th>Year 1 (All courses)</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.001 Physics I or</td>
<td>6</td>
</tr>
<tr>
<td>1.011 Higher Physics I</td>
<td></td>
</tr>
<tr>
<td>2.121 Chemistry IA and</td>
<td>6</td>
</tr>
<tr>
<td>2.131 Chemistry IB</td>
<td>6</td>
</tr>
<tr>
<td>5.010 Engineering A and</td>
<td>6</td>
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<tr>
<td>5.030 Engineering C</td>
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</tr>
<tr>
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<td>10.011 Higher Mathematics I</td>
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Textile Chemistry

<table>
<thead>
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<tbody>
<tr>
<td>2.002A Physical Chemistry</td>
<td>9</td>
</tr>
<tr>
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<td>2.002D Analytical Chemistry</td>
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</tr>
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<tr>
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<tr>
<td>13.111 Textile Technology I</td>
<td>1½</td>
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<tr>
<td>13.211 Textile Science I</td>
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</tr>
<tr>
<td>General Studies Elective</td>
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</table>

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 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.
### Textile Engineering

#### Year 2

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<tr>
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<td>5.611 Fluid Mechanics</td>
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<td>8.112 Materials and Structures</td>
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<td>10.022 Engineering Mathematics II</td>
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<tr>
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<tr>
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#### Year 3

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<tr>
<td>5.331 Dynamics of Machines I</td>
<td>2</td>
</tr>
<tr>
<td>6.851 Electronics and Instrumentation</td>
<td>3</td>
</tr>
<tr>
<td>6.852 Electrical Machinery and Supply</td>
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<td>12</td>
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<td>13.212 Textile Science II</td>
<td>2</td>
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<tr>
<td>13.311 Textile Engineering I</td>
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<td>Two General Studies Electives</td>
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### Textile Manufacture

#### Year 2

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<td>3</td>
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<td>14.501 Accounting and Financial Management IA</td>
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#### Year 3

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<tr>
<td>13.212 Textile Science II</td>
<td>2</td>
</tr>
<tr>
<td>13.311 Textile Engineering I</td>
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</tr>
<tr>
<td>14.081 Introduction to Financial Analysis</td>
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</table>
The aims of the course are to provide opportunities for students to prepare themselves for careers in research, extension, education, marketing, management and administration in those institutions, corporations, government departments, farms and farms which are involved with pastoral production in Australia and overseas.

The course consists of education in the theory and application of scientific, economic and business management principles which are relevant in: the production and utilization of pastures; the reproduction, nutrition, health, genetic improvement, ecology and management of sheep and cattle; the production, preparation for sale, measurement, specification and marketing of wool and meat animals; communication with the scientific, producer and marketing communities which are involved with the pastoral industries; and, the design and interpretation of experimental investigations.

There are similarities with courses in Agriculture and Rural Science, however special features of Wool and Pastoral Sciences are the education in Wool Science and the concentration on Australia's largest animal industries (sheep and cattle). Graduates of the course are eligible for corporate membership of the Australian Institute of Agricultural Science.

At the graduate level the School 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.

4. 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.
# 3220 Wool and Pastoral Sciences — Full-time Course

Bachelor of Science BSc

## Year 1

<table>
<thead>
<tr>
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<td>2.111</td>
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<td>2.121</td>
<td>Chemistry IA</td>
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<td>2.131</td>
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<td>6</td>
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<td>10.001</td>
<td>Mathematics I or</td>
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<td>Applied Physical Geography*</td>
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Total Hours: 24

*Students may with the approval of the Head of the School substitute 1011 Higher Physics I or 1.001 Physics I or 1.021 Introductory Physics for 27.001 Applied Physical Geography.

## Year 2

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<td>9.411</td>
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<td>4</td>
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Total Hours: 25½

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

## Optional subjects

### Group A

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<td>Animal Health II</td>
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<td>9.204</td>
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<td>9.811</td>
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*Students may with the approval of the Head of the School substitute 1011 Higher Physics I or 1.001 Physics I or 1.021 Introductory Physics for 27.001 Applied Physical Geography.

### Group B

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<td>9.203</td>
<td>Crop Agronomy†</td>
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*Range Management and Crop Agronomy are offered in alternate years.

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 3

<table>
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<tr>
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<th>Course Title</th>
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Total Hours: 22

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.
## Table of Progression in Subjects

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<th>Year 4</th>
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**Note:**
1. Students may take either Geography I or Physics I.
2. Subjects in italics are compulsory.

### 3210
**Wool and Pastoral Sciences — (Education Option) — Full-time Course**

**Bachelor of Science**

**BSc**

*This course will not be offered after 1980.*

**Year 1**

<table>
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<th>Hours per week</th>
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<tr>
<td>10.011 Higher Mathematics I or</td>
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**Session 2**

**Year 2**

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<td>9.201 Agronomy</td>
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**Year 3**

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### Undergraduate Study: Course Outlines

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<td>Methods of Teaching*</td>
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*Teaching Practice is arranged by the School of Wool and Pastoral Sciences over 3 hours each week which will be additional to the hours shown. Part of this requirement may be met outside University sessions.

### Year 4

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<td>9.203</td>
<td>Crop Agronomy</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>9.302</td>
<td>Agricultural Economics II</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>9.421</td>
<td>Animal Nutrition</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>43.121</td>
<td>Plant Physiology</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>44.111</td>
<td>Microbiology</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>58.062</td>
<td>Methods of Teaching*</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>58.514</td>
<td>Education IIA</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>58.063</td>
<td>Seminar and Thesis on</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Educational Issues</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
<td>1½</td>
<td>1½</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>19½</td>
<td>28½</td>
</tr>
</tbody>
</table>

*Teaching Practice is arranged by the School of Wool and Pastoral Sciences over 3 hours each week which will be additional to the hours shown. Part of this requirement may be met outside University sessions.
Graduate Study

Graduate Enrolment Procedures

All students enrolling in graduate courses should obtain a copy of the free booklet *Enrolment Procedures 1980* 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 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.

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 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 Graduate Diplomas are available at Kensington only. Candidates may register for all the research degrees at Kensington and for the degrees of Master of Science and Master of Engineering at the W. S. and L. B. Robinson University College, Broken Hill, 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.
Graduate Study

School of Applied Geology

8020
Engineering Geology-Hydrogeology-
Environmental Geology Course
Master of Applied Science
MApSc

The course consists of a Project (Group A) and six subjects chosen from Group B, at least one of which must be 25.402G Hydrogeology, 25.404G Environmental Geology, or 25.408G Engineering Geology. In special cases, eg where students have achieved a satisfactory standard in Geomechanics, those students taking 25.408G Engineering Geology and/or 25.409G Foundation Geology, may select in place of 25.406G 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><strong>Group A</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.403G Project (Engineering Geology Graduate Course)</td>
<td>0</td>
<td>18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Group B</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>25.402G Hydrogeology</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>25.404G Environmental Geology</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>25.405G Engineering Geophysics</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>25.406G Geological Basis of Geomechanics</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>25.407G Geopollution Management</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>25.408G Engineering Geology</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>25.409G Foundation Geology</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>25.410G Coastal Environmental Geology</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>

8090
Mineral Exploration Graduate Course
Master of Applied Science
MApSc

The course in mineral exploration has been designed to give specialized training to geologists, geophysicists, geochemists and mining engineers in modern methods of exploration for metallic mineral deposits. The course consists of eight subjects and a project. A wide choice of subjects is available to suit the interests and background of the student. The subjects are:

- 4.121 Principles of Metal Extraction
- 7.001G Exploratory Drilling
- 7.013 Principles of Mining
- 7.023 Mineral Process Engineering
- 25.000G Special Laboratory Project
- 25.033 Geology III (Mathematical Geology component only)
- 25.141 Advanced Engineering Geology or 25.337G Geophysical Procedures
- 25.338G Computer Applications in Exploration Geology
- 25.339G Geology in Exploration
- 25.340G Geochemical Prospecting
- 25.341G Remote Sensing
- 25.343G Mineral Economics, Leasing Law and Management
- 25.344G Field and Laboratory Methods in Exploration
- 25.345G Project

8070
Applied Geophysics Graduate Course
Master of Applied Science
MApSc

The Master of Applied Science degree course in Applied Geophysics is designed to meet the principal needs and the changing demands of the exploration industry, and the continuing rapid development in the scope, sophistication, application and geological interpretation of geophysical methods.

Students may be admitted to the MApSc degree course in Applied Geophysics provided that they are four-year graduates in Science, Applied Science or Engineering, or have an equivalent qualification, and provided further that they have reached a second year level in Physics and Mathematics and a first year level in Geology.

The duration of the proposed course is one academic year of full-time study, and consists of:

- 25.331G Applied Geophysics I
- 25.333G Applied Geophysics II A
- 25.335G Applied Geophysics Project

Fifteen days’ field tutorials and seminars are an integral part of the course.
Applied Science

School of Chemical Engineering

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

Master of Applied Science Degree Courses

The MAppSc courses involve a project, 3.900G, which must integrate and apply the principles treated in the course. It may take the form of a design feasibility study or an experimental 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 candidates. Candidates may specialize in the following areas:

8000 Bioprocess Engineering
8010 Chemical Engineering
8040 Environmental Pollution Control
8060 Fuel Technology
and
8080 Industrial Pollution Control

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, namely: Chemical Engineering, Environmental and Industrial Pollution Control, Fuel Technology, and Bioprocess Engineering.

The courses specializing in Chemical Engineering, Industrial Pollution Control 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.

An acceptable course is a program of formal study aggregating approximately twenty hours weekly for two sessions full-time or ten hours weekly for four sessions part-time, comprising:

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. 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 unitized 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>Unit Code</th>
<th>Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.281G</td>
<td>Design of Microbial Reactors</td>
<td>S1 0 S2 0</td>
</tr>
<tr>
<td>3.282G</td>
<td>Microbial Kinetics and Energetics</td>
<td>S1 1 S2 1</td>
</tr>
<tr>
<td>3.283G</td>
<td>Bioprocess Unit Operations and Equipment</td>
<td>S1 3 S2 2</td>
</tr>
<tr>
<td>3.284G</td>
<td>Heat, Mass and Momentum Transport</td>
<td>S1 1</td>
</tr>
<tr>
<td>3.285G</td>
<td>Bioprocess Laboratory</td>
<td>S1 3 or 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

*For additional information on the MAppSc degree course see above.
Graduate Study

interests in Biochemistry, Chemistry and/or Microbiology. Graduates with an inadequate background in Mathematics and/or rate processes will be 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 Material

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.281G</td>
<td>Unit 3 Design of Microbial Reactors</td>
<td>1</td>
</tr>
<tr>
<td>3.282G</td>
<td>Microbial Kinetics and Energetics</td>
<td>3</td>
</tr>
<tr>
<td>3.283G</td>
<td>Bioprocess Unit Operations and Equipment Design</td>
<td>2½</td>
</tr>
<tr>
<td>3.285G</td>
<td>Bioprocess Laboratory</td>
<td>1½</td>
</tr>
<tr>
<td>3.900G</td>
<td>Project</td>
<td>6</td>
</tr>
</tbody>
</table>

Plus 6 hours of other material, for example:

1. Students wishing a more complete coverage of the life sciences may select

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>42.211G</td>
<td>Principles of Biology</td>
<td>1½</td>
</tr>
<tr>
<td>42.212G</td>
<td>Principles of Biochemistry</td>
<td>1½</td>
</tr>
<tr>
<td>44.111</td>
<td>Microbiology</td>
<td>3</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>44.111</td>
<td>Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>3.281G</td>
<td>Unit 2—Fundamentals of Microbial Stoichiometry</td>
<td>½</td>
</tr>
</tbody>
</table>

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

Core Material

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.281G</td>
<td>Unit 1 Rate Processes</td>
<td>½</td>
</tr>
<tr>
<td>3.282G</td>
<td>Microbial Kinetics and Energetics</td>
<td>3</td>
</tr>
</tbody>
</table>

3.283G Bioprocess Unit Operations and Equipment Design
3.284G Heat, Mass and Momentum Transport
3.900G Project

Plus 6 hours of other material, for example:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.163G</td>
<td>Industrial Water and Wastewater Engineering</td>
<td>2</td>
</tr>
<tr>
<td>38.159G</td>
<td>Treatment and Utilization of Biological Effluents</td>
<td>½</td>
</tr>
<tr>
<td>3.396G</td>
<td>Unit Operations in Waste Management</td>
<td>1½</td>
</tr>
</tbody>
</table>

Reading List (Mathematics)

Hpw

8010 Chemical Engineering Graduate Course*

Master of Applied Science MAppSc

The graduate course in Chemical Engineering provides an opportunity, primarily for graduates in Chemical Engineering, to continue first degree formal studies into topics to a depth not found in an undergraduate course. It also provides an opportunity for graduates of some experience to periodically undertake advanced or refresher courses.

8040 Environmental Pollution Control Graduate Course*

Master of Applied Science MAppSc

The graduate course in Environmental Pollution Control leads to the award of the degree of Master of Applied Science. It extends over one full-time year or two part-time years. The course is primarily intended for candidates who have completed a four year Bachelor degree program in Chemical Engineering or Industrial Chemistry, but candidates from other disciplines may be admitted.

The advent of new laws governing the disposal of effluents into the environment will make the problems of industry more acute as industrial processes are developed and expanded. This course is intended to cover the problems in environmental engineering which may be encountered in industrial plants.

*For additional information on the MAppSc degree course see page 56.
### 1.3.170G Process Principles or Graduate Elective

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.170G Process Principles or Graduate Elective</td>
<td>2</td>
</tr>
</tbody>
</table>

**Note:** 3.170G Process Principles is a bridging subject for all candidates other than Chemical Engineering and Industrial Chemistry graduates. Candidates who have passed the equivalent of first year Chemistry take 3.170G Process Principles, and those who have passed the equivalent of second year Chemistry may take specified parts of 3.170G Process Principles and an approved graduate elective each for one hour per week. Graduates in Chemical Engineering or Industrial Chemistry take an approved elective.

All electives must be approved by the Head of the School but applications will be considered regarding any subject available in the University which has a relevance to Pollution Control.

Students intending to undertake the course over two part-time years may do so by attending on one afternoon and two evenings per week. Every effort should be made to include in the first part-time year the subjects listed in 1. and 2. above.

The work involved in 3.901G Minor Project must be embodied in a report and submitted in accordance with the requirements of the School.

### 3.163G Industrial Water and Wastewater Engineering

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.381G Atmospheric Pollution and Control</td>
<td>2</td>
</tr>
<tr>
<td>3.386G Unit Operations in Waste Management</td>
<td>1½</td>
</tr>
<tr>
<td>39.908G Community Noise Control</td>
<td>1</td>
</tr>
<tr>
<td>38.159G Treatment and Utilization of Biological Effluents</td>
<td>½</td>
</tr>
<tr>
<td>Optional Elective(s) and 3.901G Minor Project or 3.900G Project</td>
<td>3</td>
</tr>
</tbody>
</table>

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 is intended for graduates who wish to undertake further studies in environmental topics of a more specialized nature than the class of subjects offered in course 8040. For this reason applicants will normally have undertaken a first degree in an area of application to industrial processes.

Candidates design their proposed programs of study on the basis of subjects available in the 8040 course in a chosen specialized field. Supplementary supporting subjects, as may be available, are taken subject to the general rules above for acceptable formal study programs. In the design of their course candidates are expected to have an objective of contributing to the relief of industrial pollution problems.

### 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

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*For additional information on the MAppSc degree course see page 56.
Graduate Study

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

### Year 1

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.170G Process Principles or</td>
<td>2</td>
</tr>
<tr>
<td>3.172G Corrosion Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>3.171G Corrosion Technology I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5</strong></td>
</tr>
</tbody>
</table>

Chemical Engineering graduates will undertake:

3.172G Corrosion Laboratory

Science Graduates who have passed the equivalent of second year Chemistry will undertake parts of:

3.170G Process Principles (1 hr/wk)
3.172G Corrosion Laboratory (1 hr/wk)

Graduates who have passed only the equivalent of first year Chemistry will undertake 3.170G Process Principles.

### Year 2

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.173G Corrosion Materials</td>
<td>2</td>
</tr>
<tr>
<td>3.174G Corrosion Technology II</td>
<td>3</td>
</tr>
<tr>
<td>3.175G Seminar</td>
<td>1</td>
</tr>
<tr>
<td>3.176G Corrosion Literature Review</td>
<td>2†</td>
</tr>
<tr>
<td>3.177G Testing Laboratory (by roster)</td>
<td>2†</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>

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 Chemical Technology. The remainder, subject to approval and availability, may be undertaken in other schools within the university.

Graduate subjects in Chemical Technology may be selected from:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.110G Process Evaluation</td>
<td>3†</td>
</tr>
<tr>
<td>22.120G Machine Computation in Chemical Technology</td>
<td>6</td>
</tr>
<tr>
<td>22.130G Chemical Reactor Analysis and Control</td>
<td>6</td>
</tr>
<tr>
<td>22.131G Catalysis and Applied Reaction Kinetics</td>
<td>6</td>
</tr>
<tr>
<td>22.140G Chemical Process Simulation</td>
<td>6</td>
</tr>
<tr>
<td>22.141G Modelling in Chemical Technology</td>
<td>6</td>
</tr>
<tr>
<td>22.142G Chemical Process Control</td>
<td>6</td>
</tr>
<tr>
<td>22.150G Instrumental Analysis for Industry</td>
<td>3†</td>
</tr>
<tr>
<td>22.160G Industrial Electrochemistry</td>
<td>6</td>
</tr>
<tr>
<td>22.161G Electrochemical Techniques for Control and Analysis</td>
<td>6</td>
</tr>
<tr>
<td>22.210G Solid State and Mineral Chemistry</td>
<td>2</td>
</tr>
<tr>
<td>22.220G Refractory Technology I</td>
<td>6</td>
</tr>
<tr>
<td>22.221G Refractory Technology II</td>
<td>6</td>
</tr>
<tr>
<td>22.230G Chemistry of Glass Melting</td>
<td>6</td>
</tr>
<tr>
<td>22.300G Polymer Science</td>
<td>10</td>
</tr>
<tr>
<td>22.310G Analytical Characterization of Polymers</td>
<td>8</td>
</tr>
<tr>
<td>22.330G Polymer Engineering</td>
<td>6</td>
</tr>
<tr>
<td>22.340G Polymer Physics</td>
<td>6</td>
</tr>
<tr>
<td>22.900G Major Project</td>
<td>6†</td>
</tr>
<tr>
<td>22.901G Minor Project</td>
<td>3†</td>
</tr>
</tbody>
</table>

†This is the weekly equivalent of total hours for the subject. These hours may, however, be concentrated in one period.

*These subjects operate for two sessions at the stated hours per week.
The work involved in the project must be embodied in a report and submitted in accordance with the requirements of 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 corequisites. A given subject may not necessarily be conducted in any one year.

School of Food Technology

The School of Food Technology conducts formal courses leading to the award of the Master of Applied Science degree and 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. It is a course 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 Chemical Technology may be selected from:

<table>
<thead>
<tr>
<th>Hours per week*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject</td>
</tr>
<tr>
<td>38.151G Introductory Food Science</td>
</tr>
<tr>
<td>38.152G Food Process Laboratory</td>
</tr>
<tr>
<td>38.153G Food Technology Seminar</td>
</tr>
<tr>
<td>38.154G Food Technology</td>
</tr>
<tr>
<td>38.155G Dairy Technology</td>
</tr>
<tr>
<td>38.156G Oenology</td>
</tr>
<tr>
<td>38.157G Technology of Cereal Products</td>
</tr>
<tr>
<td>38.158G Marine Products</td>
</tr>
<tr>
<td>38.160G Food Quality Assessment</td>
</tr>
<tr>
<td>38.161G Food Additives and Toxicology</td>
</tr>
<tr>
<td>38.162G Postharvest Physiology and Handling of Fruit and Vegetables</td>
</tr>
<tr>
<td>38.351G The Microbial Ecology of Foods</td>
</tr>
<tr>
<td>38.551G Advanced Nutrition</td>
</tr>
<tr>
<td>38.552G Methods in Food and Nutritional Education</td>
</tr>
<tr>
<td>38.553G Methods in Nutritional Assessment and Analysis</td>
</tr>
<tr>
<td>39.900G Major Project</td>
</tr>
<tr>
<td>38.901G Minor Project</td>
</tr>
</tbody>
</table>

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 corequisites. A particular subject may not necessarily be conducted in any one year.

*Weekly equivalent of total hours for subject. These hours may be concentrated in one session.
**5020 Food Technology Graduate Diploma Course**

**Graduate Diploma GradDlp**

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 Applied Science in Food Technology (GradDip) is awarded on the successful completion of one year of full-time study (18 hours/week), or two years of part-time study (9 hours/week). It involves the following program:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>38.151G</td>
<td>Introductory Food Science</td>
<td>1</td>
</tr>
<tr>
<td>38.152G</td>
<td>Food Process Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>38.153G</td>
<td>Food Technology Seminar</td>
<td>1</td>
</tr>
<tr>
<td>38.154G</td>
<td>Food Technology</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Electives†</td>
<td>7</td>
</tr>
</tbody>
</table>

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

**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 Metallurgy who are interested in doing research in metallurgy leading to the award of the degrees of Master of Science, Master of Engineering or Doctor of Philosophy.

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 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.

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

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### Graduate Subjects

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</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>
</tbody>
</table>

Detailed studies relating to one or more of the following:

1. Extractive Metallurgy
2. Metal working and forming
3. Foundry practice
4. Welding and metal fabrication
5. Metal finishing and corrosion protection

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<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>
</tbody>
</table>

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

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### Undergraduate Subjects

These subjects are intended for inclusion in qualifying courses and to satisfy prerequisites and co-requisites for students whose first degree is in a field other than metallurgy.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.121</td>
<td>Principles of Metal Extraction</td>
<td>3</td>
</tr>
<tr>
<td>4.131</td>
<td>Principles of Physical and Mechanical Metallurgy</td>
<td>3</td>
</tr>
<tr>
<td>4.141</td>
<td>Experimental Techniques in Physical Metallurgy</td>
<td>2</td>
</tr>
</tbody>
</table>

The above undergraduate subjects offered by the School of Metallurgy and undergraduate and graduate subjects offered by other Schools of the University may be included, but may not exceed 20 per cent of the total program.

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### School of Mining Engineering

The School offers a graduate course leading to the award of a Graduate Diploma (GradDip).

#### 5040 Mining and Mineral Engineering Graduate Diploma Course

**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 the beneficiation of minerals or the preparation of coal.

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>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.013</td>
<td>Principles of Mining</td>
<td>2</td>
</tr>
<tr>
<td>7.023</td>
<td>Mineral Process Engineering</td>
<td>2</td>
</tr>
<tr>
<td>7.033</td>
<td>Mineralogical Assessment</td>
<td>1</td>
</tr>
<tr>
<td>7.234</td>
<td>Mineral Economics</td>
<td>0</td>
</tr>
<tr>
<td>7.311G</td>
<td>Mineral Beneficiation</td>
<td>0</td>
</tr>
<tr>
<td>7.111G</td>
<td>Mining Engineering</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

### Year 2 — Part-time

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.122G</td>
<td>Mining Engineering Technology</td>
<td>6</td>
</tr>
<tr>
<td>7.322G</td>
<td>Mineral Beneficiation Technology</td>
<td>6</td>
</tr>
<tr>
<td>7.132G</td>
<td>Mining Engineering Laboratory and Project</td>
<td>0</td>
</tr>
<tr>
<td>7.332G</td>
<td>Mining Engineering Laboratory</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>
When appropriate, up to 3 hours per week may be selected from approved courses available within this School or offered by other Schools within the University.

## School of Wool and Pastoral Sciences

### 5080
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 of two optional graduate level subjects to the extent of ten hours lecture and laboratory work per week for two sessions plus approved undergraduate subjects to the extent of eight hours 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

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.105G Livestock Production</td>
<td>6</td>
</tr>
<tr>
<td>9.504G Wool Science</td>
<td>6</td>
</tr>
<tr>
<td>9.803G Animal Breeding</td>
<td>4</td>
</tr>
<tr>
<td>9.813G Quantitative Methods</td>
<td>4</td>
</tr>
</tbody>
</table>

Plus a maximum of 8 hours per week of study of 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.

## School of Mechanical and Industrial Engineering

### 5450
Industrial Engineering Graduate Diploma Course

**Graduate Diploma**

**GradDip**

Students who have graduated from schools of the Faculty of Applied Science and who wish to continue their studies in the field of scientific management, may enrol in the Graduate Diploma course in Industrial Engineering offered by the School of Mechanical and Industrial Engineering.

This course provides instruction in accountancy, economics, industrial law, economic analysis, the use of human and physical resources, organization and administration, operations research and production control.
Graduate Study

Conditions for the Award of Higher Degrees

First 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.

Higher Degrees

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: Faculty Table (Graduate Study) in the Calendar.

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

<table>
<thead>
<tr>
<th>Title</th>
<th>Abbreviation</th>
<th>Calendar/Handbook</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher Degrees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctor of Science</td>
<td>DSc</td>
<td>Calendar</td>
</tr>
<tr>
<td>Doctor of Letters</td>
<td>DLitt</td>
<td>Calendar</td>
</tr>
<tr>
<td>Doctor of Laws</td>
<td>LLD</td>
<td>Calendar</td>
</tr>
<tr>
<td>Doctor of Medicine in the Faculty of Medicine</td>
<td>MD</td>
<td>Calendar Medicine</td>
</tr>
<tr>
<td>Doctor of Philosophy</td>
<td>PhD</td>
<td>Calendar and all faculties</td>
</tr>
<tr>
<td>Master of Applied Science</td>
<td>MAppSc</td>
<td>Applied Science</td>
</tr>
<tr>
<td>Master of Architecture</td>
<td>MArch</td>
<td>Architecture</td>
</tr>
<tr>
<td>Title</td>
<td>Abbreviation</td>
<td>Calendar/Handbook</td>
</tr>
<tr>
<td>--------------------------------------------------------------</td>
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</tr>
<tr>
<td>Master of Arts</td>
<td>MA(Hons)</td>
<td>Arts, Military Studies</td>
</tr>
<tr>
<td></td>
<td>MA</td>
<td>Arts, Military Studies</td>
</tr>
<tr>
<td>Master of Biomedical Engineering</td>
<td>MBiomedE</td>
<td>Engineering</td>
</tr>
<tr>
<td>Master of Building</td>
<td>MBuild</td>
<td>Architecture</td>
</tr>
<tr>
<td>Master of the Built Environment (Building Conservation)</td>
<td>MBEnv</td>
<td>Architecture</td>
</tr>
<tr>
<td>Master of Business Administration</td>
<td>MBA</td>
<td>AGSM</td>
</tr>
<tr>
<td>Master of Chemistry</td>
<td>MChem</td>
<td>Sciences*</td>
</tr>
<tr>
<td>Master of Commerce (Honours)</td>
<td>MCom(Hons)</td>
<td>Commerce</td>
</tr>
<tr>
<td>Master of Commerce</td>
<td>MCom</td>
<td>Commerce</td>
</tr>
<tr>
<td>Master of Education</td>
<td>MEd</td>
<td>Professional Studies</td>
</tr>
<tr>
<td>Master of Educational Administration</td>
<td>MEdAdmin</td>
<td>Professional Studies</td>
</tr>
<tr>
<td>Master of Engineering</td>
<td>ME</td>
<td>Applied Science, Engineering, Military Studies</td>
</tr>
<tr>
<td>Master of Engineering without Supervision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master of Engineering Science</td>
<td>MEngSc</td>
<td>Engineering, Military Studies</td>
</tr>
<tr>
<td>Master of General Studies</td>
<td>MGenStud</td>
<td>General Studies, Military Studies</td>
</tr>
<tr>
<td>Master of Health Administration</td>
<td>MHA</td>
<td>Professional Studies</td>
</tr>
<tr>
<td>Master of Health Personnel Education</td>
<td>MHPEd</td>
<td>Calendar†</td>
</tr>
<tr>
<td>Master of Health Planning</td>
<td>MHP</td>
<td>Professional Studies</td>
</tr>
<tr>
<td>Master of Landscape Architecture</td>
<td>MLArch</td>
<td>Architecture</td>
</tr>
<tr>
<td>Master of Laws by Research</td>
<td>LLM</td>
<td>Law</td>
</tr>
<tr>
<td>Master of Librarianship</td>
<td>MLib</td>
<td>Professional Studies</td>
</tr>
<tr>
<td>Master of Mathematics</td>
<td>MMath</td>
<td>Sciences*</td>
</tr>
<tr>
<td>Master of Optometry</td>
<td>MOptom</td>
<td>Sciences*</td>
</tr>
<tr>
<td>Master of Physics</td>
<td>MPhys</td>
<td>Sciences*</td>
</tr>
<tr>
<td>Master of Psychology</td>
<td>MPsychol</td>
<td>Sciences‡</td>
</tr>
<tr>
<td>Master of Public Administration</td>
<td>MPA</td>
<td>AGSM</td>
</tr>
<tr>
<td>Master of Science</td>
<td>MSc</td>
<td>Applied Science, Architecture, Engineering, Medicine, Military Studies, Sciences*‡</td>
</tr>
<tr>
<td>Master of Science without Supervision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master of Science (Acoustics)</td>
<td>MSc(Acoustics)</td>
<td>Architecture</td>
</tr>
<tr>
<td>Master of Science and Society</td>
<td>MScSoc</td>
<td>Sciences*</td>
</tr>
<tr>
<td>Master of Science (Biotechnology)</td>
<td>MSc(Biotech)</td>
<td>Sciences‡</td>
</tr>
<tr>
<td>Master of Science (Building)</td>
<td>MSc(Building)</td>
<td>Architecture</td>
</tr>
<tr>
<td>Master of Social Work</td>
<td>MSW</td>
<td>Professional Studies</td>
</tr>
<tr>
<td>Master of Statistics</td>
<td>MStats</td>
<td>Sciences*</td>
</tr>
<tr>
<td>Master of Surgery</td>
<td>MS</td>
<td>Medicine</td>
</tr>
<tr>
<td>Master of Surveying</td>
<td>MSurv</td>
<td>Engineering</td>
</tr>
<tr>
<td>Master of Surveying without Supervision</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* indicates Sciences
† indicates Calendar
‡ indicates Surveying without Supervision
Doctor of Philosophy (PhD)

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:

Qualifications

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

(1) hold an honours degree from the University of New South Wales; or

(2) hold an honours degree of equivalent standing from another approved university; or

(3) if the candidate holds a degree without honours from the University of New South Wales or other approved university, have achieved by subsequent work and study a standard recognized by the higher degree committee of the appropriate faculty or board of studies (hereinafter referred to as the committee) as equivalent to honours; or

(4) in exceptional cases, submit such other evidence of general and professional qualifications as may be approved by the Professorial Board on the recommendation of the committee.

Registration

4. A candidate for registration for a course of study leading to the degree of Doctor of Philosophy shall apply to the Registrar on the prescribed form at least one calendar month before the commencement of the session in which registration is to begin.

5. Subsequent to registration the candidate shall pursue a program of advanced study and research for at least six academic sessions, save that:

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

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

(3) in exceptional cases, the Professorial Board on the recommendation of the committee may grant permission for a candidate to be exempted from not more than two academic sessions.
6. A candidate who is fully engaged in research for the degree shall present for examination not later than ten academic sessions from the date of registration. A candidate not fully engaged in research shall present for examination not later than twelve academic sessions from the date of registration. In special cases an extension of these times may be granted by the committee.

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

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

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

(3) in special circumstances, the committee may, with the concurrence of the 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.

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.

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.

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 600 words.

The abstract shall indicate:

(1) the problem investigated;

(2) the procedures followed;

(3) the general results obtained;

(4) the major conclusions reached;

but shall not contain any illustrative matter, such as tables, graphs or charts.

14. A candidate may not submit as the main content of the thesis any work or material which has previously been submitted for a university degree or other similar award.

*Or department where a department is not within a school.
Applied Science

Entry for Examination

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.

Master of Applied Science (MAppSc)

1. The degree of Master of Applied Science may be awarded by the Council on the recommendation of the Professorial Board to a candidate who has satisfactorily completed a program of advanced study comprising formal course work and including, where set down in course programs, the submission of a report on a project approved by the Higher Degree Committee of the Faculty or Board of Studies.

*Or department where a department is not within a School.
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.

(2) The Higher Degree Committee of the Faculty (hereinafter referred to as 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.

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 six (6) weeks 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 by 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.

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) (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.

5. Consequent upon consideration of the examiners' reports, where appropriate, and the candidate's other results in the prescribed course of study, the Committee shall recommend to the Professorial Board whether the candidate may 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. 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, in an appropriate school.

(2) In exceptional cases a person may be permitted to register as a candidate for the degree if he submits evidence of such academic and professional attainment as may be approved by the Professorial Board on the recommendation of the appropriate Committee.

(3) Notwithstanding any other provisions of these conditions, the Committee may require an applicant to demonstrate fitness for registration by carrying out such work and sitting for such examinations as the Committee may determine.

3. (1) An application to register as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least one full calendar month before the commencement of the session in which the candidate desires to register.

(2) In every case, before permitting an applicant to register as a candidate, the Committee shall be satisfied that adequate supervision and facilities are available.

(3) An approved applicant shall register in one of the following categories:

(a) student in full-time attendance at the University

(b) student in part-time attendance at the University

(c) student working externally to the University

(4) Every candidate for the degree shall be required to carry out a program of advanced study to take such examinations and perform such other work as may be prescribed by the Committee which shall include the preparation and submission of a thesis embodying the results of an original investigation. The work shall be carried out under the direction of a supervisor appointed by the Committee or under such conditions as the Committee may determine.

(5) No candidate shall be considered for the award of the degree until 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 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 shall, if possible, be an external examiner.

(3) It shall be understood that the University retains the three copies of the thesis submitted for examination and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act, 1968 the University may issue the thesis in whole or in part, in photostat or microfilm or other copying medium.

5. Having considered the examiners' reports the Committee shall recommend whether or not the candidate should be admitted to the degree.

6. An approved candidate shall pay such fees as may be determined from time to time by the Council.
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 in an appropriate
School or Department.

(2) In exceptional cases a person may be permitted to register as a candidate for the degree if
he submits evidence of such academic and professional attainments as may be approved by the
Professorial Board on the recommendation of the appropriate Committee.

(3) Notwithstanding any other provisions of these conditions the Committee may require an
applicant to demonstrate fitness for registration by carrying out such work and sitting for such
examinations as the Committee may determine.

3. (1) An application to register as a candidate for the degree of Master of Science shall be made
on the prescribed form which shall be lodged with the Registrar at least one full calendar month
before the commencement of the session in which the candidate desires to register.

(2) In every case before permitting an applicant to register as a candidate the Committee shall be
satisfied that adequate supervision and facilities are available.

(3) An approved applicant shall register in one of the following categories:

(a) student in full-time attendance at the University

(b) student in part-time attendance at the University

(c) student working externally to the University

(4) Every candidate for the degree shall be required to submit three copies of a thesis embodying
the results of an original investigation or design, to take such examinations and to perform such
other work as may be prescribed by the Committee. This work shall be carried out under the
direction of a supervisor appointed by the Committee or under such conditions as the Committee
may determine.

(5) At least once a year and at any other time that the Committee sees fit the candidate's
supervisor shall present to the Head of School in which the candidate is registered a report on
the progress of the candidate. The Committee shall review the report and as a result of its review
may 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 himself for examination
not later than six academic sessions from the date of registration. A candidate not fully engaged
in research shall present himself for examination not later than twelve academic sessions from the
date of his registration. In special cases an extension of these times may be granted by the
Committee.

4. (1) A candidate for the degree shall be required to submit three copies of the thesis referred
to in paragraph 3.(4) which shall be presented in a form which complies with the requirements
of the University for the preparation and submission of higher degree theses. The candidate may
submit also for examination any work he has published whether or not such work is related to the
thesis.
### Master of Science (MSc) and Master of Engineering (ME) without Supervision

#### Qualifications

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:

#### Registration

2. An applicant for registration shall have been admitted to a degree of Bachelor in the University of New South Wales.

3. (1) An application to register as an external candidate for the degree of Master of Science, Master of Engineering or Master of Surveying without supervision shall be lodged with the Registrar for recommendation by the Head of School and consideration by the Higher Degree Committee of the appropriate Faculty (hereinafter referred to as the Committee) not less than six months before the intended date of submission of the thesis. A graduate who intends to apply in this way should in his own interest at an early stage, seek the advice of the appropriate School with regard to the adequacy of the subject matter for the degree. A synopsis of the work should be enclosed.

(2) A candidate shall not be considered for the award of the degree until the lapse of six sessions in the case of honours graduates and eight sessions in the case of pass graduates from the date of graduation.

#### Thesis

4. (1) (a) Every candidate for the degree shall be required to submit three copies of a thesis embodying the results of an investigation or design. The thesis shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses. A candidate may submit also for examination any work he has published, whether or not such work is related to the thesis.

(b) Every candidate shall submit with the thesis a statutory declaration that the material contained therein is his own work, except where otherwise stated in the thesis.

(2) For each candidate there shall be at least two examiners appointed by the Professorial Board on the recommendation of the Committee, one of whom shall be an internal examiner.

(3) If the thesis reaches the required standard, the candidate shall be required to attend for an oral examination at a time and place nominated by the Committee. The examiners may also arrange at their discretion for the examination of the candidate by written and/or practical examinations on the subject of the thesis and/or subjects related thereto.
Graduate Study: Conditions for the Award of Higher Degrees

(4) It shall be understood that the University retains the three copies of the thesis submitted for examination and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act, 1968 the University may issue the thesis in whole or in part, in photostat or microfilm or other copying medium.

5. Having considered the examiners' reports the Committee shall recommend whether or not the candidate should be admitted to the degree.

6. An approved applicant shall pay such fees as may be determined from time to time by the Council.

1. An application for admission to a graduate diploma course shall be made on the prescribed form which should be lodged with the Registrar at least two full calendar months before the commencement of the course.

2. An applicant for admission to a graduate diploma course shall be:

(1) a graduate of the University of New South Wales or other approved university.

(2) a person with other qualifications as may be approved by Faculty.

3. Notwithstanding clause 2. above, Faculty may require an applicant to take such other prerequisite or concurrent studies and/or examinations as it may prescribe.

4. Every candidate for a graduate diploma shall be required to undertake the appropriate course of study, to pass any prescribed examinations, and if so laid down in the course, to complete a project or assignment specified by the Head of the School. The format of the report on such project or assignment shall accord with the instructions laid down by the Head of the School.

5. An approved applicant shall be required to pay the fee for the course in which he desires to register. Fees shall be paid in advance.
Subject Descriptions

Identification of Subjects by Number

Each of the subjects taught in the University is identifiable both by number and by name. This is a fail-safe measure at the points of enrolment and examination against a student nominating a subject other than the one intended. Subject numbers are allocated by the Assistant Registrar, Examinations and Student Records, and the system of allocation is:

1. The School offering a subject is indicated by the number before the decimal point;
2. If a subject is offered by a Department within a School, the first number after the decimal point identifies that Department;
3. The position of a subject in a sequence is indicated by the third number after the decimal point. For example, 2 would indicate that the subject is the second in a sequence of subjects;
4. Graduate subjects are indicated by the suffix G.

As indicated above, a subject number is required to identify each subject in which a student is to be enrolled and for which a result is to be returned. Where students may take electives within a subject, they should desirably be enrolled initially in the particular elective, and the subject numbers allotted should clearly indicate the elective. Where it is not possible for a student to decide on an elective when enrolling or re-enrolling, and separate examinations are to be held in the electives, Schools should provide to the Examinations and Student Record Section in April (Session 1) and August (Session 2) the names of students taking each elective. Details of the actual dates in April and August are set out in the Calendar of Dates earlier in this volume.

Those subjects taught in each Faculty are listed in full in the handbook of that Faculty, in the section entitled Subject Descriptions.

Details of subjects available in Faculty of Applied Science courses but not included in this list may be obtained from the School responsible for the subject. Details of subjects in the Faculty of Arts which may be taken as humanities subjects may be found in the current Arts Faculty Handbook.

The identifying numbers for each School are set out on the following page.

Servicing Subjects are those taught by a School or Department outside its own faculty and are listed at the end of Undergraduate Study and Graduate Study of the relevant School. Their subject descriptions are published in the handbook of the Faculty in which the subject is taught.

HSC Exam Prerequisites

Subjects which require prerequisites for enrolment in terms of the HSC Examination percentile range, refer to the 1978 and subsequent HSC Examinations.

Candidates for enrolment who obtained the HSC in previous years or hold other high school matriculation should check with the appropriate School on what matriculation status is required for admission to a subject.

Information Key

The following is the key to the information supplied about each subject: S1 (Session 1); S2 (Session 2); F (Session 1 plus Session 2, ie full year); S1 or S2 (Session 1 or Session 2, ie choice of either session); SS (single session, ie which session taught is not known at time of publication); L (Lecture, followed by hours per week); T (Laboratory/Tutorial, followed by hours per week); hpw (hours per week); C (Credit).
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<td>School of Metallurgy</td>
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<td>School of Accountancy*</td>
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<td>Biological Sciences*</td>
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<td>School of Mechanical and Industrial Engineering (Industrial Engineering)*</td>
<td>Engineering</td>
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<td>Department of Industrial Arts</td>
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<td>School of Geography</td>
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<td>School of Food Technology</td>
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<td>School of Biological Technology*</td>
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<td>School of Botany*</td>
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<td>School of Microbiology*</td>
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<td>School of Zoology</td>
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</table>
School of Physics

Undergraduate Study

Physics Level I units

1.001 Physics I

Prerequisites:

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<th>HSC Exam Percentile</th>
<th>Range Required</th>
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<tbody>
<tr>
<td>2 unit Mathematics</td>
<td>71-100</td>
</tr>
<tr>
<td>or 3 unit Mathematics</td>
<td>21-100</td>
</tr>
<tr>
<td>or 4 unit Mathematics</td>
<td>1-100</td>
</tr>
<tr>
<td>and 2 unit Science</td>
<td>31-100</td>
</tr>
<tr>
<td>(incl. Physics and/or Chem.)</td>
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</tr>
<tr>
<td>or 4 unit Science</td>
<td>31-100</td>
</tr>
<tr>
<td>(incl. Physics and/or Chem.)</td>
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</tbody>
</table>

Co-requisites: 10.021C or 10.001 or 10.0011.

Aims and nature of physics and the study of motion of particles under the influence of mechanical, electrical, magnetic and gravitational forces. Concepts of force, inertial mass, energy, momentum, charge, potential fields. Application of the conservation principles to solution of problems involving charge, energy and momentum. Electrical circuit theory, application of Kirchhoff’s Laws to AC and DC circuits. Uniform circular motion, Kepler’s Laws and rotational mechanics.

A molecular approach to energy transfer, kinetic theory, gas laws and calorimetry. The wave theories of physics, transfer of energy by waves, properties of waves. Application of wave theories to optical and acoustical phenomena such as interference, diffraction and polarization. Interaction of radiation with matter, photoelectric effect. Compton effect, spectroscopy. Resolution of the wave-particle paradox by means of wave mechanics and the uncertainty principle.

1.011 Higher Physics I

Prerequisites:

<table>
<thead>
<tr>
<th>HSC Exam Percentile</th>
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</tr>
</thead>
<tbody>
<tr>
<td>2 unit Mathematics</td>
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<td>or 3 unit Mathematics</td>
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<tr>
<td>and 2 unit Science</td>
<td>31-100</td>
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<tr>
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<tr>
<td>or 4 unit Science</td>
<td>31-100</td>
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<tr>
<td>(incl. Physics and/or Chem.)</td>
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</tr>
</tbody>
</table>

Co-requisite: 10.001 or 10.011

Properties of solids and liquids, elasticity, hydrostatics, hydrodynamics, damped and forced vibrations, resonance, coupled systems, normal modes, Fourier analysis, waves, group velocity, reflection and transmission at a boundary.

Kinetic theory, Maxwell velocity distribution, transport coefficients, first and second laws of thermodynamics, thermodynamic functions, simple applications, microscopic approach to thermodynamics, Boltzmann probability.

1.022 Electromagnetism and Modern Physics

Prerequisites: 1.001 or 1.011, 10.001. Co-requisites: 10.2111.

Electrostatics in vacuum and in dielectrics, Gauss’ law, current density, magnetostatics in vacuum and in magnetic materials, electromagnetic induction, displacement current, Maxwell’s equations, simple solutions, applications.

Special theory of relativity, Lorentz transformation, simultaneity, relativistic mass, momentum and energy, formalism of wave mechanics Schrodinger’s equation, simple solutions, hydrogen atom, spectra, electron spin, selection rules, exclusion principle, Zeeman effect molecules.

1.021 Introductory Physics I

(For Health and Life Scientists)
1.032 Laboratory  F T3
Prerequisite: 1.001, 1.011, 10.001. Excluded: 1.922

Alternating current circuits, complex impedance, resonance, mutual inductance, introductory electronics, diode 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.

1.033 Electromagnetism and Optical Physics  S2 L3T1
Prerequisites: 1.012, 1.022, 10.2111, 10.2112.

Wave equation, reflection and transmission at dielectric, metallic and plasma interfaces, Fresnel equations, skin depth, waveguides and cavities, radiation fields, dipole and long antenna.

Fourier theory, diffraction from rectangular and circular apertures, interference and interferometry, coherence, image formation, resolution, holography, Fourier transform spectroscopy.

Additional material is studied for the award of Distinction/High Distinction.

1.043 Experimental Physics A  F T4
Prerequisites: 1.012, 1.022, 1.032.

Basic experimental techniques and analysis of results in the following areas of physics: electricity, magnetism, diffraction optics (including X-ray and electron diffraction, solid state physics, nuclear physics, atomic physics and spectroscopy, vacuum systems).

School of Chemistry

Undergraduate Study

2.002A Physical Chemistry  S1 or S2 L3T3
Prerequisites: 2.121 and 10.011 or 10.001 or 10.021B and 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 non-electrolytes and electrolytes, electrochemical cells.
Applied Science

Kinetics: Order and molecularity; effect of temperature on reaction rates; elementary reaction rate theory.

Surface Chemistry and Colloids: Absorption, properties of dispersions; macromolecules and association colloids.

2.002B Organic Chemistry S1 or S2 L3T3
Prerequisite: 2.131.

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 sulphonylic acids.

2.002C Inorganic Chemistry S1 or S2 L2T4
Prerequisites: 2.121 and 2.131.

Chemistry of typical metals; transition metals; introduction to nuclear chemistry. Quantitative inorganic analysis.

2.002D Analytical Chemistry S1 or S2 L2T4
Prerequisites: 2.121 and 2.131.

Chemical equilibria in analytical chemistry. Acid-base, complex formation, redox systems, solid/solution, and liquid/liquid equilibria with applications to volumetric, gravimetric and complexometric analysis, and to liquid/liquid extractions.


2.003B Organic Chemistry S1 or S2 L2T4
Prerequisite: 2.002B.

Alicyclic Chemistry: Stereochemistry of acyclic systems; classical and non-classical strain in cyclic systems; stereochemistry and conformation of monocyclic and polycyclic compounds; synthesis, reactions and rearrangement of monocyclic compounds, including stereo-chemical selectivity; transannular reactions in medium rings. Synthesis and reactions of fused and bridged polycyclic systems.

Heterocyclic Chemistry: Synthesis and reactions of the following hetero- aromatic systems: pyridine, quinoline, isoquinoline. Flavones and isoflavones; pyrimidine, pyrrole, furan, thiopeph, indole, imidazole.

2.003H Molecular Spectroscopy and Structure S2 L3T3
Prerequisites: 2.121 and 2.131.

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.

2.013L Chemistry and Enzymology of Foods F L1T2
Prerequisite: 2.002B. Excluded: 2.023L, 2.043L, 2.053L.

The chemistry of food constituents at an advanced level and the relationship between the chemistry and enzymology associated with the origin and handling of foodstuffs. Treatment of the stability of constituents, changes in colour and texture occurring during processing and storage. Methods of assessment, chemical and physical.

General classification of constituents, role of free and combined water. Fixed oils and fats, rancidity of enzymic and autoxidative origin, anti-oxidants — natural and synthetic — theories on mechanisms of action, carbohydrates, reactivity, role in brewing processes, carbohydrate polymers, starch structure, enzymic susceptibility and mode of action, estimations, enzymic degradation and enzymic browning, reactions and stability of natural pigments, vitamins, preservatives.

2.042C Inorganic Chemistry S1 or S2 L2T4
Prerequisites: 2.121 and 2.131.

Chemistry of the non-metals, including B, C, Si, N, P, S, Se, Te, halogens, and noble gases. 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.

2.043L Chemistry and Enzymology of Foods
Prerequisite: 2.002B. Excluded: 2.013L, 2.023L, 2.053L.

Syllabus as for 2.013L but in greater detail and depth.

2.111 Introductory Chemistry† S1 L2T4
Prerequisite: Nil.

Classification of matter and the language of chemistry. The gas laws and the Ideal Gas Equation, gas mixtures and partial pressure. The structure of atoms, cations and anions, chemical bonding, properties of ionic and covalent compounds. The Periodic classification of elements, oxides, hydrides, halides of selected elements. Acids, bases, salts, 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† S1 or S2 L2T4
Prerequisites:

2 unit Science (any strands) or
4 unit Science (multistrand) or
Chemistry 2.111.

Stoichiometry and solution stoichiometry. Structure of matter, solids, liquids, gases. Thermochemistry. Equilibria and equilibrium constants, entropy changes, free energy changes, the relationship between

† Students who have passed 2.121 may not subsequently enrol in 2.111. Students meeting the 2.121 prerequisite are not permitted to enrol in 2.111 without permission of the Head of the School of Chemistry. Once students enrol in 2.111 they must pass 2.111 before proceeding to 2.121 or 2.131.
equilibrium and standard free energy changes. Ideal solutions, colligative properties. Equilibrium in electrolyte solutions, acid-base equilibria, solubility equilibria, and redox equilibria. The rate of a chemical change and chemical kinetics.

2.131 Chemistry 1B  
S1 or S2 L2T4

Prerequisite: 2.111 or 2.121.


Graduate Study

2.271G Chemistry and Analysis of Foods

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.

Subject matter 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.

School of Chemical Engineering

Undergraduate Study

General

Students are expected to possess a slide rule having exponential (log-log) scales, or a calculator of equivalent capabilities (ln x and exp x or ‘x to the ‘y’), and these 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 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.

Department of Chemical Engineering

3.011 Introduction to Chemical Engineering

S2 L½T1½

Application of material and simple energy balances in chemical process operations. Primary reference to the oil, heavy chemical and related process industries with additional examples of the application of chemical engineering technology to identifying and solving problems in areas such as environmental pollution, food technology and medicine.

3.021 Chemical Engineering IA

Unit 1 Flow of fluids  
S1 L1T1

Prerequisite: 10.001.


Unit 2 Dimensions and Dimensional Analysis  
S1 L½T½

Prerequisites: 1.001 and 10.001.

Units and measures. Conversions of units and equations. Dimensions and Dimensional Analysis. Basic principles of modeling.

Unit 3 Material Balances  
S1 L1T1

A revision and extension of material balance calculations with more complex examples, including those arising from stagewise operation of extraction equipment. Graphical solution of multi-stage calculations.
3.022 Chemical Engineering IB

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 Pumps and Pumping [S2 L½T½]
Prerequisite: 3.021 Unit 1.
Types of piping and fittings. Blow cases. Air lift pumps. Reciprocating pumps, centrifugal pumps and gear pumps. Blowers and compressors.

Unit 3 Thermodynamics I [S2 L1T1]
Prerequisite: 2.002A.
Basic thermodynamic principles leading to the Phase Rule, P-V-T relationships. Energy balances. 2nd Law of Thermodynamics. Entropy.

Unit 4 Computations I [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 3.021 and 3.022.

3.025 Chemical Engineering for Chemical Technologists
Consists of Units 1 and 2 of 3.021 and Units 1 and 2 of 3.022.

3.031 Chemical Engineering IIA

Unit 1 Mass Transfer (Theory) [S1 L1T1]
Prerequisite: 2.002A, 3.021.
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 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.

Unit 2 Heat Transfer II (Theory) [S1 L1]
Prerequisite: 3.022, Unit 1. Co-requisite: 10.032.
An extension of the work covered in 3.022 Unit 1, with an emphasis on the fundamentals of conduction, convection and unsteady state heat transfer.

3.032 Chemical Engineering IIB

Unit 1 Reaction Engineering I [S1 L1]
Prerequisites: 2.002A, 10.031.
A course of lectures together with weekly assignments covering the design and analysis of ideal reactor systems, involving single and multiple reactor types, in which simple or complex, single or multiple reactions are effected.

Unit 2 Plant Layout I [S1 T1]
Factory Layout: Factors governing location of processing plant. Typical dispositions of process batters, 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 & Fittings: fabrication, standards, most used sizes and types. Welded, screwed and bolted connections. Common valve types; their flow and serviceability characteristics, relative costs and integrity, blinds and blanking valves. Practical assessment of pressure loss and line sizing in straight runs and simple networks involving pumps, or blowers, valves and bends.

Process Battery: Considerations of accessibility for maintenance, operator convenience and safety. Distribution of utility fluids. Methods of erecting major process units.

Unit 3 Process Engineering I [S1 L1]

Unit 4 Economics I [S1 L1]

Unit 5 Process Report [S1 T1]
The process report is a compilation of recent information on a process or the production of a specific chemical or a group of chemicals. The report will cover such aspects as: historical account of the process with process details; Australia’s imports and exports of the particular chemical, local production, company ownership and overseas connections; the present state of the process and its future in Australia with particular respect to scale, raw materials and alternative and competing end products and processes.
3.033 Chemical Engineering IIIC

Unit 1 Fluid-particle Systems I
Prerequisite: 3.021 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.

Unit 2 Multicomponent Separation
Prerequisites: 3.031 Unit 1, 3.031 Unit 3.

Unit 3 Thermodynamics III
Prerequisite: 3.031 Unit 3.
Applications of thermodynamics, including power cycles, refrigeration and liquefaction. Thermodynamic analysis of processes.

Unit 4 Solids Handling
Prerequisite: 3.021 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.

3.034 Chemical Engineering IID

Unit 1 Reaction Engineering II
Prerequisite: 3.032 Unit 1.
Lectures together with assignments covering the concept of process rate and rate of change of process variables. Differential balances and examples in mass and heat transfer, and reactive systems.

Unit 2 Process Dynamics I
Prerequisite: 10.031.

Unit 3 Instrumentation

Unit 4 Computations II
Prerequisite: 10.031, 3.022 Unit 4.

3.035 Chemical Engineering IIE

Unit 1 Mass Transfer (Design)
Prerequisite: 3.031 Unit 1.
The design of equipment for absorption, distillation and liquid-liquid extraction. Selection of column type. Design of sieve and other types of plate for plate columns. Design of packed columns. Performance characteristics of plate and packed columns. Selection of equipment for liquid-liquid extraction. Design of mixer settlers and column-type extractors. Factors affecting the performance of liquid-liquid extraction equipment. Other mass transfer equipment.

Unit 2 Heat Transfer II (Design)
Prerequisite: 3.031 Unit 2.
Thermal design procedures for shell and tube heat exchangers and fin-fan coolers. Service fluids for heating and cooling duties.

Unit 3 Process Vessels
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 Design Report
Prerequisite: 3.032 Unit 3.
The basis of this subject is a design report to test knowledge of principles and design as applied to a possible industrial situation. The report should take the form of a set of iterative calculations and specifications for the components of a simple processing battery and is usually limited in size to a battery consisting of two principal unit operations in series (e.g. extractor and fractionator, reactor and separator, etc.). Particular attention is paid to operating instructions, hazards and safety, economic evaluation, use of standards and general presentation.
Applied Science

3.036 Chemical Engineering Laboratory I

Unit 1 and 2

Prerequisites: 3.021, 3.022, 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 & B and II A-E, 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.

3.040 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.

3.041 Chemical Engineering IIIA

Prerequisite: 3.031

Unit 1 Convective Mass Transfer

Models for convective mass transfer at 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

Psychrometry, 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 will be discussed.

Unit 3 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 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 4 Transport Phenomena

A generalised 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.

3.042 Chemical Engineering IIIB

Prerequisite: 10.032.

Unit 1 Process Dynamics II

Prerequisite: 3.034 Unit 2.

Extension of material on linear systems to distributed-parameter cases. Linear frequency response. Experimental characterization of linear systems. The analysis of non-linear systems by linearization and numerical methods. The application of these techniques to particular processes and instruments will be stressed.

Unit 2 Control I

Prerequisite: 3.043 Unit 4.


Unit 3 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.

3.043 Chemical Engineering IIIC

Unit 1 Safety and Failure Tolerance


Unit 2 Economics II

Prerequisite: 3.032 Unit 4.


Unit 3 Atmospheric Pollution Control

Introduction, dispersion of pollutants, source and ambient measurement and monitoring, industrial pollution control.

Unit 4 Water Pollution Control


3.044 Chemical Engineering Laboratory II

Prerequisite: 3.036.

An integrated chemical engineering laboratory at a more advanced level than the 3.036 laboratory and with an emphasis on open-ended experiments.
3.090 Industrial Experience

Students are expected to accumulate, by the end of their full-time course, 12 weeks of industrial experience during recesses.

Advanced Chemical Engineering Electives

3.0451 Plant Layout II

Prerequisite: 3.032 Unit 2.


Plant layout: Site and battery plant layout to suit process, piping and operational requirements. Making the best use of topography. Preparation of plot and site plans and specifications. Logic operations and critical path planning. Project engineering.

Storage: Tank farm arrangement, layout and associated pumps and piping.

Miscellaneous: Pneumatic and slurry transfer systems. Steam reticulation, trapping and condensate handling. Detailed consideration of layout and piping around particular equipment items, and preparation of associated drawings.

3.0452 Advanced Chemical and Phase Equilibria

Prerequisites: 3.031 Unit 3.

Sources of thermodynamic data. Methods of estimating and presenting thermodynamic data. Advanced chemical and phase equilibria of application in chemical and process engineering.

3.0453 Control II

Prerequisite: 3.042 Unit 2.

Material covered in Control 1 is applied during tutorials to selected case studies, and is illustrated by laboratory work, and by analogue and digital computation. Lecture material complements the laboratory work, and introduces selected topics such as multi-look system control, system identification and estimation and sequencing control.

3.0454 Reactor Engineering

Differential balances with reaction, non-ideal homogenous reactors, reaction in mixing streams, rate equations for heterogenous reactions, non-catalytic fluid-solid, and fluid-fluid reactors, solid catalysed fluid reactors, examples of complex reactors.

3.0455 Fluid Particle Systems II

Prerequisite: 3.033 Unit 1 and 4.

Lectures and demonstrations dealing with fluidized and spouted bed techniques.


Spouted beds: criteria for spouting, minimum spouting velocity, maximum pressure drop. Gas and solids motion in the spouted bed. Design aspects and applications.

3.0456 Process Engineering II

Prerequisites: 3.031, 3.032, 3.033, 3.034, 3.035, 3.043.


Fault Detection and Correction: Detection, location and identification of malfunctions in a simulated chemical plant. Selection of most appropriate remedies. Studies of repair and maintenance practices; onstream corrections versus those requiring process shut-down. Temporary and permanent corrections. Exercises in fault analysis and correction using cases from practice.

Equipment: Detailed chemical engineering design of selected equipment items.

3.0457 Oil and Gas Processing

Prerequisites: 3.311, 3.0313, 3.032.

Sources of data on hydrocarbon properties. Process design applied to gas and oil treatment plants, pipelines and storage. The petroleum refinery.


3.0461 Introductory Reservoir Engineering

Prerequisites: 3.311, 3.0313, 3.0331.

Origin of petroleum, rock properties, fluid distribution in reservoirs, phase behaviour of hydrocarbons, material balance equations, analysis of reservoirs: gas reservoirs; gas condensate reservoirs; solution gas drive reservoirs; water drive reservoirs.
Applied Science

3.0462 Advanced Reservoir Engineering S2 L2
Prerequisite: 3.046.
Application of potential flow equations, multi-phase flow through porous media, fluid displacement, recovery efficiency, well testing. Well productivity, maximum efficient rate of withdrawal. Numerical techniques for reservoir simulation, new recovery methods.

Servicing Subjects

3.023 Chemical Engineering Science I
3.024 Chemical Engineering Principles I
3.037 Chemical Engineering Science II
3.038 Chemical Engineering Principles II
3.101 Computation and Modelling in Applied Chemistry

Department of Fuel Technology

3.301 Fuel Engineering (for Mining Engineers) F L2T1
An elective introductory subject in fuels and energy for Mining Engineering students based on the subject 3.311 Fuel Engineering I, supplemented by appropriate laboratory experiments (consisting of 28 lectures and 14 hours of laboratory classes per session, taught over two sessions).

3.302 Fuels and Energy S2 4hpw
A servicing subject for students in Electrical Engineering which deals with sources and properties of fuels (with particular emphasis on coal, crude oil and natural gas), principles of combustion including combustion calculations and the technology of boilers and other fuel plant. A variety of alternative energy sources and review of the national and global energy situation.

Department of Biological Process Engineering

3.211 Biological Process Engineering F L2T4
Prerequisite: 44.111.


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.
3.321 Fuel Engineering II

Unit 1 Combustion — Fundamentals and Science  S1 or S2 L1

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

Unit 4 Measurements in Flames and Furnaces S1 or S2 L1

Unit 5 Laboratory F T1
Analysis and characterization of solid, liquid and gaseous fuels.

3.331 Fuel Engineering III

Unit 1 Combustion Engineering S1 or S2 L1

Unit 2 Furnace Design S1 or S2 L1
Furnace design for continuous or intermittent operation.

Unit 3 Fuel Plant Design S1 or S2 L1

Unit 4 Fuel Conservation and Efficiency S1 or S2 T1
A case history and investigative approach to energy saving in industrial, commercial and domestic applications.

Unit 5 Liquid Fuels S1 or S2 L1

Unit 6 Coal and its Evaluation S1 or S2 L1
Constitution, classification and evaluation of coals. Carbonization: blending, additives, plastic behaviour.

Unit 7 Laboratory F T3

3.340 Fuel Engineering Project S1 T1 S2 T11
Projects selected involving the design of fuel plant or experimental aspects of fuel science and/or fuel processing and utilization.

No books are recommended. Students are supplied with reading lists appropriate to individual requirements.

Graduate Study

Department of Chemical Engineering

3.162G Urban Planning
Priorities in urban planning: topography, community services, industry; selective zoning and decentralization; relationships to regional planning. Cost of pollution and control measures; legal aspects; planned development; architectural aspects; density distribution. Case histories.

3.163G 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.

3.164G 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, sulfur dioxide, oxides of nitrogen, hydrocarbons, ozone and oxidants, particulates, carcinogens.
3.166G Legislative Aspects


3.170G Process Principles


3.171G Corrosion Technology I


3.172G Corrosion Laboratory

Laboratory assignments to illustrate and measure the mechanism of corrosion. Electroplating/anodising experiments.

3.173G 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.

3.174G Corrosion Technology II


3.175G Corrosion Seminar

Joint University/Industry colloquia on theory and practice of corrosion technology.

Students present material arising from literature and/or laboratory assignments and industrialists are invited to contribute papers and/or participate in the colloquia.

3.176G 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.

3.177G Testing Laboratory

Candidates undertake a project involving the design/evaluation of corrosion testing equipment/techniques. A comprehensive report is submitted.

3.181G Advanced Process Dynamics


3.182G 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.

3.183G Equilibrium Concepts in Water Systems

The application and limitations of chemical thermodynamics in water systems. Particular attention is given to aqueous inorganic process systems including water treatment and minerals processing and with consideration of the effects and control of pollution.
Thermodynamic diagrams such as InE/pH, 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.

3.184G 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.

3.185G 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.

3.186G Fluid Particle Interactions


3.187G Design of Process Envelopes

Not offered in 1980.

Theoretical treatments concerning stress analyses with time and temperature as variables, stresses at discontinuities and transitions in vessel geometry. Theories and modes of material behaviour, gas solubility effect, design of insulation, reinforcement, etc. Analyses of stresses and reactions in piping subject to large temperature changes. Code requirements. Practical aspects will include a treatment of high pressure components, eg, valves, fittings, pumps, safety devices. Economic aspects.

3.189G Graduate Colloquia

Colloquia on research developments in Chemical Engineering. Students are required to participate actively in the colloquia and give at least one dissertation based on their own investigations.

3.190G Specialist Lectures

3.191G Advanced Thermodynamics


Molecular theory and statistical thermodynamics: partition functions, monatomic and diatomic gases; Chapman-Enskog theory, evaluation of 1. thermodynamic potentials; 2. virial coefficients.

Compressible flow: flow of compressible fluids in ducts including 1. supersonic flow; 2. shock waves; 3. stagnation properties.

3.192G 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.

3.401G Chemical Engineering in Medicine


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.
3.281G Design of Microbial Reactors

Unit 1 Rate Processes

This unit is a bridging course designed to provide the background in rate processes in heterogeneous systems required for Unit 3. This unit could not be offered to a graduate with background in advanced rate processes, the equivalent of 3.045 Unit 6 Reactor Engineering.

Covers 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 44.111. 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.

Covers 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.

Reactor Design Fundamentals: Ideal and non-ideal reactors, residence time distribution and non-ideal reactor models. The significance of mixing and diffusion in microbial reactors for freely suspended microorganisms. The concept of a microfluid and a macrofluid 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.

3.282G Microbial Kinetics and Energetics

Unit 1 Microbial Kinetics

Prerequisite or co-requisite: 3.281G Unit 2 or equivalent.


Unit 2 Microbial Energetics

Prerequisite or co-requisite: 3.281G 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.

3.283G Bioprocess Unit Operations and Equipment Design

Prerequisite or co-requisite: 3.284G or equivalent.

Engineering design and operating characteristics of plant and processes normally used e.g. 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.

3.284G Heat, Mass and Momentum Transport

A bridging course designed to provide an introductory understanding of the mechanisms of transport processes. This unit could not be offered to a graduate with a background in chemical engineering principles.


3.285G Bioprocess Laboratory

Practical experience in the industrial processing of biological and microbial systems. The essential nature of this work is 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.

3.380G Fuel Seminar

1 (SU) to be given in Session 2, compulsory in MApSc (Fuel Engineering) degree course. Content bias to choice of G subjects.
3.381G Atmospheric Pollution and Control
Unit 1 (4 SU) Causes, properties, dispersion, monitoring control and legislation.
Unit 2 (4 SU) Advanced atmospheric pollution (extension for EPC, IPC courses only, Unit 1 is a prerequisite).

3.382G 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

3.383G 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

3.384G 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

3.385G 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

3.386G 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.

3.387G Fuel Technology Practice
Compulsory in MAppSc (Fuel) (4 SU). Content bias towards choice of G subjects.

3.900G Project

3.901G Minor Project

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 6 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 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 L3T0
A condensed treatment of physical and mechanical metallurgy.
Applied Science

4.141 Experimental Techniques in Physical Metallurgy L0T2
A condensed course of instruction in metallographic, crystallographic and X-ray diffraction techniques.

4.302 Chemical and Extraction Metallurgy I L1T2
Co-requisite: 2.002A.
Metal extraction from ores in terms of unit operations and overall systems, illustrated by the extraction of iron, copper, aluminum and other metals. Elementary process analysis. Laboratory — analysis and solution of problems.

4.303 Chemical and Extraction Metallurgy II L3T2
Prerequisites: 4.302, 4.602 and 4.402 or 4.412.

4.312 Chemical and Extraction Metallurgy IA S1 L1T0 S2 L2T3
Co-requisite: 2.002A.
As for subject 4.302 above.

4.314 Chemical and Extraction Metallurgy IIIA S1 L3 T1½
Prerequisite: 4.303.

4.324 Chemical and Extraction Metallurgy IIIB S2 L3½T1
Prerequisite: 4.303.
A selection of advanced topics in chemical and extractive metallurgy.

4.374 Metal Extraction Processes L2T1
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 changes; penalties and bonuses; by-products.

4.402 Physical Metallurgy I S1 L3T3 S2 L2T4

4.403 Physical Metallurgy II L4T5
Prerequisite: 4.402.

4.404 Physical Metallurgy III S1 L3T4½ S2 L3T1½

4.412 Metallurgical Phases— Structure and Equilibrium, Part 1 S1 L3T3
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 S1 L3T1½
Prerequisite: 4.403.

4.422 Metallurgical Phases — Structure and Equilibrium, Part 2 S2 L2T4
4.424 Physical Metallurgy IIIB  S1 LOT3 S2 L3T½
Prerequisite: 4.403.

Selection of advanced topics in physical metallurgy including radiation damage, martensitic transformations, neutron diffraction, internal friction, sintering, creep, superplasticity, fracture, microplasticity.

4.433 Physical Metallurgy IIC  S1 L4T5 S2 L3T3
Prerequisite: 4.402.


4.502 Mechanical Properties of Solids  S1 L2T2
Co-requisite: 4.402.


4.503 Mechanical Metallurgy  S2 L1T2
Prerequisite: 4.502.


4.504 Mechanical and Industrial Metallurgy  S1 L3T0 S2 L3T6
Prerequisites: 4.403 or 4.433, 4.503.

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  F3
Prerequisites: 4.433, 4.503.

Description as for subject 4.504.

4.602 Metallurgical Engineering I  S2 L3T2
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  S1 L4T2 S2 L3T6
Prerequisite: 4.623.

Process dynamics and automatic control. Dynamics of simple linear systems; representation and analysis of metallurgical processes by linear models; effect of various control elements; analysis by empirical models; design of control systems for metallurgical processes. Optimization: as for 3.042 Chemical Engineering IIB, Unit 3. Atmospheric Pollution Control: As for 3.043 Chemical Engineering IIIC, Unit 3. Water Pollution Control: As for 3.043 Chemical Engineering IIIC, Unit 4.

Industrial Practice: Case studies, design studies and assignments related to industrial practice and integrated process schemes for metal extraction, refining, fabrication, treatment and finishing.

4.613 Metallurgical Engineering IIA  S1 L2T1
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 3.032 Chemical Engineering IIB Unit 4.

4.623 Metallurgical Engineering IIB  S2 L3T1
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
(Includes three weeks laboratory work during the mid-year recess.) An experimental investigation of some aspects of metallurgical engineering.

4.703 Materials Science  S2 L2T1
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 applications, corrosive environments, nuclear engineering, fuel cells, magnetic applications.

4.802 Metallurgical Physics  S2 L2T0
Prerequisites: 1.001 or 1.011.

4.813 Mathematical Methods
Prerequisites: 10.031 or 10.211 A.
1. 10.351 Statistics SM (see Engineering Handbook)

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

4.921 Materials Science

4.931 Metallurgy

4.941 Metallurgy for Engineers

4.951 Materials Technology
The structure, properties and technology of wood.

4.961 Materials and Corrosion
A short subject covering the theory of corrosion and materials of construction.

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 S2 L1½T1½
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.

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: For subject descriptions see under 4.001.

5.020 Engineering B SS L4T2
Prerequisite: 5.010.
(For students in Applied Geology and Mining Engineering)

Engineering Dynamics: Kinetics of the plane motion of a particle; equations of motion, dynamic equilibrium, work and energy. Kinetics of systems of particles; impulse and momentum. Rotation of rigid bodies about a fixed axis. Belt, rope and chain drives, gear trains.


5.030 Engineering C SS L/T6

and either

Introduction to Chemical Engineering (Compulsory for Chemical Engineering students): Application of material and simple energy balances in chemical process operations. Primary reference to the oil, heavy chemical and related process industries with additional examples of the application of chemical engineering technology to identifying and solving problems in areas such as environmental pollution, food technology and medicine. See subject 3.001.

or

Introduction to Metallurgical Engineering: For subject description see under 4.002.

or

Introduction to Mining Engineering (Compulsory for Mining Engineering students): 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.

or

Introduction to Ceramic Engineering (Compulsory for Ceramic Engineering students): The nature of ceramics. Classification of materials. The materials science approach. History of ceramics. The ceramic engineer and society. The origin, classification, physical properties and use 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.

or


5.111 Mechanical Engineering Design I
Prerequisite: 5.010. Co- or prerequisites: 5.330, 5.611, 5.411 or 8.112, 8.259.

Introductory lectures illustrating the interdependence of design and technology. Mechanical technology, interpretation of engineering drawing practice. Philosophy and technique of design. Simple creative design assignments. Basic engineering elements.

5.330 Engineering Dynamics
Prerequisites: 1.001 or 1.011 or 1.951, 5.010 and 10.001 or 10.011.

Kinematics and kinetics of particles and rigid bodies in planar motion: absolute motion and motion relative to translating and rotating frames of reference; constraint and degrees of freedom; dynamic equilibrium, differential equations of motion; work and energy, variational principles; impulse and momentum, impact.

5.331 Dynamics of Machines I
Prerequisites: 5.330, 10.022.


Mechanical Vibrations: Simple harmonic motion. One degree of freedom systems, free and forced vibrations, transmissibility and motion isolation. Whirling of shafts.

5.411 Mechanics of Solids II
Prerequisites: 5.010, 5.020.


5.611 Fluid Mechanics/Thermodynamics I
Prerequisites: 1.001 or 1.011 or 1.951, 5.010, 6.020, 10.001. Co- or prerequisites: 5.330, 10.022.


5.611 Fluid Mechanics
Prerequisites: 1.001 or 1.011 or 1.951, 5.010, 5.020, 10.001. Co- or prerequisites: 5.330 or 5.311, 10.022.


School of Mining Engineering

Undergraduate Study

7.013 Principles of Mining and 7.013R


7.023 Mineral Process Engineering and 7.023R


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.

7.052 Electrical Machinery and Supply S2 L1T2

Prerequisite: 6.851.

A user-oriented introduction to the usage of electrical power in industry, covering the characteristics and selection of electrical machinery, their interface with the prime power supply protection, electrical safety and compliance with Australian standards. Included is an applications-oriented interdisciplinary project.

7.111 Introduction to Mining Engineering S2 L2

Forms part of 5.030 Engineering C.


7.112 Mineral Resources and 7.112R S1 L1

Historical and economic introduction, definitions. Geological time scale. Renewable and non-renewable resources. Types of mineral resources, their abundance, distribution and availability. The consumption and use of metals, precious stones, industrial minerals and rocks, fossil and nuclear fuels. Ownership and leasing of mineral rights. Exercises in mine planning.

7.113 Mining Methods F L2

Prerequisite: 7.122.


7.113R Mining Methods F L2T1


7.114 Geotechnical Engineering and 7.114R F L2T1


7.122 and 7.122R Mine Development


7.123 and 7.123R Geomechanics

Prerequisites for 7.123: 8.172, 8.250, 10.341, 10.002.


7.124 Coal Face Mechanisation


7.125R Introduction to Geotechnical Engineering


7.134 Metalliferous Mining Systems

Prerequisite: 7.113.


7.143 and 7.143R Mine Environment and Safety Engineering

Prerequisites for 7.143: 5.611, 7.122.


7.144 Surface and Offshore Mining


7.153 Power Supply in Mines and 7.153R


7.154 Petroleum Engineering

Properties of liquid and gaseous petroleum. Exploration techniques. Elements of reservoir engineering. Drilling rigs. Cable tool, rotary and

7.163 Excavation Engineering
and 7.163R


7.164 Tunnel 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.

7.193R 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
and 7.213R

Prerequisites for 7.213: 10.341 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
and 7.214R

Prerequisite for 7.214: 7.113.


7.224 Operational Management
and 7.224R


7.234 Mineral Economics


7.313 Minerals Engineering Processes

Prerequisites: 25.101 or 25.201, 5.030.


7.313R Mineral Processing

A combination of 7.313, with selected topics from 4.374.

7.314 and 7.314R Mineral Process Technology

Prerequisite for 7.314: 7.313.

Broken Hill students take 7.313R.

Physics and chemistry of surfaces. Measurement of surface properties.

7.316R Mineral Processing II


7.326R Mineral Industry Processes

Principles underlying extraction of some common metals, pyrometallurgy, hydrometallurgy, electro-metallurgy, chemical extraction, agglomeration, sintering, mineral processing as a bridge between mining and metallurgical industries.

7.411R Fluid Mechanics


7.414 Minerals Industry Project F L1

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 S1 S2 T4

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 F T2

A shorter version of 7.414R above.

7.424 Industrial and Research Seminars F L1

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 F T2

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.

Graduate Study

Generally the 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 techniques, shovels, draglines, bucket wheel excavators, dredges, front-end loaders, tractor scrapers. Operating factors, selection procedures, cost estimating. Materials handling, continuous, semi-continuous, batch systems, cost analysis.

7.311G Mineral Beneficiation

Prerequisite: 7.023.


7.322G Mineral Beneficiation Technology

Prerequisite: 7.311G.

1. Fluid mechanics of mineral pulps, free, hindered and zone settling, thickening, classification, hydrocyclones, dewatering, filtration. Gravity concentration, jigging, sink and float, flowsheet, 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, depressants, modifiers, frothers, flocculants. 3. Sulphide mineral flotation, 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. Selection and location of equipment, fluid-solids flow, design of auxiliary units, development and presentation of flow-sheets. Sampling and experimental techniques, batch, continuous and pilot plant testing. Scale up. Product disposal. Principles of chemical analysis, instrumentation, measurement of variables in mineral processing, controllers, use of computers. Technical management.

7.332G Mineral Engineering Laboratory

Prerequisite: 7.311G.

Laboratory investigations may be selected from the following according to availability and specialization: metalliferous ore concentration; coal preparation; beneficiation of non-metals; 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 preparation 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.

7.442G Mineral Industry Analysis

Advanced work in the technical and economic analysis of mining or mineral operations. Cases are selected for examination and analysis, and a critical review must be written of the operations analysed.
School of Civil Engineering

Undergraduate Study

8.112 Structures S1 L1T2

8.171 Mechanics of Solids I SS L1½T½
Prerequisite: 8.170.
Concepts of stress, strain. Stress and deformation due to axial force; linear and non-linear problems; compound bars. Concepts of stiffness and flexibility. Bending moment and shear force in simple beams. First and second moments of area. Stress and deformation due to bending; linear and non-linear problems; use of step functions.

8.172 Mechanics of Solids II SS L2T2
Prerequisite: 8.171.
Structural statics. Bending moments, shear force and torsion. Stresses due to shear force in solid and thin-walled sections; shear centre. Torsion of circular, non-circular and thin-walled sections. Principal stresses and strains; yield criteria. Combined stresses. Concepts of instability.

8.250 Properties of Materials F L1T1

Graduate Study

8.820G Structural Analysis and Finite Elements I (SAFE 1) C3

8.753G Soil Engineering C3

School of 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 school and research organisations. There are also seminars on communication in wool and pastoral sciences and on problems facing rural industries.
Subject Descriptions

9.101 Biology of Grazing Sheep and Cattle  S1 L2T4
Introduces the principles of Wool and Pastoral Sciences. Covers the sheep and cattle industries and wool and meat as end products of these industries; production and use of pasture, nutrition of grazing ruminants; reproduction in sheep and cattle; climate and animal production; and introduction concepts of animal health.
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. Cross-breeding, prime lamb production.
Sheep and cattle management; nutrition, reproduction, survival.
A field excursion of 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  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  S1 L2T1
Prerequisite: 9.131.

9.201 Agronomy  F L2T2
Prerequisite: 9.101.

9.202 Pastoral Agronomy  F L1½T1½
Prerequisite: 9.201.

9.203 Crop Agronomy  S2 L2T1
Prerequisite: 9.201.
Crop growth and development of rangeland plants. Rangeland management practices. Monitoring of long-term trends in productivity. Applications of remote sensing and ground truth sampling. Wild life resources and feral animals and their management. Sheep and beef cattle production in and semi-arid areas. Pasture evaluation and pasture research techniques.

9.204 Range Management  S2 L1T2
Co- or Prerequisite: 9.202.
The course involves one week of instruction at Fowlers Gap Research Station.

9.301 Agricultural Economics and Management I  S1 L2 S2 L2T2
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 stimulation methods.

Feeding standards and the quantitative application of nutritional data with particular reference to Australian conditions. Utilization of forage by grazing ruminants. Supplementary and drought feeding. Consideration of disorders due to nutrition.

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; organisational 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:** 17.021.

Physiological systems of mammalia 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.


9.901 Rural Extension

Development of communication skills through experiential or active learning situations. Educational, psychological and sociological factors relating to the diffusion of innovations. Program planning and evaluation.

9.504G Wool Science

Applied genetics in relation to sheep and other farm livestock. Chromosomes, linkage and the physical basis of heredity. Gene action in physiology, development and sex determination. Mutation. Principles of statistical genetics, strength of inheritance, selection, interrelationships, genetics and livestock improvement.

9.803G Animal Breeding

Co-requisite: 9.802.

Definition of breeding objectives; case studies of production recording and breed improvement programs for sheep and beef cattle. Development of performance recording systems: choice of traits to be recorded, recorded and processing methods. Estimation of breeding value from performance records. Breed evaluation. Optimal design for breeding programs. The impact on genetic improvement of techniques for controlling reproduction.

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.

School of Mathematics

Undergraduate Study

10.001 Mathematics I

Prerequisites:

HSC Exam Percentile

<table>
<thead>
<tr>
<th>Range Required</th>
<th>71-100</th>
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<tbody>
<tr>
<td>2 unit Mathematics</td>
<td>21-100</td>
</tr>
<tr>
<td>3 unit Mathematics</td>
<td>1-100</td>
</tr>
<tr>
<td>4 unit Mathematics</td>
<td>10.021B</td>
</tr>
<tr>
<td><strong>Excluded</strong>: 10.011, 10.021A, 10.021B, 10.021C.</td>
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Calculus, analysis, analytic geometry, linear algebra, an introduction to abstract algebra, elementary computing.

** If a unit in this list is counted the unit above may not be counted.

Graduate Study

9.105G Livestock Production

Biology of reproduction and reproductive performance of sheep and cattle; growth and body composition; meat production and quality.
10.011 Higher Mathematics I  F L4T2
Prerequisites:

- HSC Exam Percentile
  - Range Required
  - 71-100

- 3 unit Mathematics
  - 1-100

or

- 4 unit Mathematics
  - 11-100

Excluded**: 10.001, 10.021A, 10.021B, 10.021C.

Calculus, analysis, analytic geometry, linear algebra, an introduction to abstract algebra, elementary computing.

10.021A General Mathematics IA*  S1 L4T2

Number systems (including absolute value, inequalities, surds, etc.); coordinate geometry; polynomials, quadratics; concepts of the function; trigonometric functions, logarithmic and indical functions and their laws of operation; introduction to differentiation and integration with simple applications.

10.021B General Mathematics IB  S1 or S2 L4T2
Prerequisites:

- HSC Exam Percentile
  - Range Required
  - 51-100

- 2 unit Mathematics
  - 11-100

or

- 3 unit Mathematics
  - 1-100

or

- 4 unit Mathematics
  - 11-100

or

- 10.021A

Excluded**: 10.001, 10.011.

Functions (and their inverses), limits, asymptotes, continuity; differentiation and applications; integration, the definite integral and applications; inverse trigonometric functions; the logarithmic and exponential functions and applications; sequences and series; mathematical induction; the Binomial Theorem and applications; introduction to probability theory; introduction to 3-dimensional geometry; introduction to linear algebra.

10.021C General Mathematics IC  S2 L4T2
Prerequisite: 10.021B. Excluded**: 10.001, 10.011, 10.021A.

Techniques for integration, improper integrals; Taylor's Theorem; first order differential equations and applications; introduction to multivariable calculus; conics; finite sets; probability; vectors, matrices and linear equations.

10.022 Engineering Mathematics II  F L2T2
Prerequisite: 10.001.

Differential equations, use of Laplace transforms, solutions by series; partial differential equations and their solution for selected physical problems, use of Fourier series; introduction to numerical methods; matrices and their application to theory of linear equations, eigenvalues and their numerical evaluation; vector algebra and solid geometry; multiple integrals; introduction to vector field theory.

10.031 Mathematics‡  F L1T1
Prerequisite: 10.001 or 10.021C (Cr.).

Differential equations, use of Laplace transforms, solutions by series; partial differential equations and their solution for selected physical problems, use of Fourier series; multiple integrals, matrices and their application to theory of linear equations, eigenvalues, introduction to numerical methods.

10.032 Mathematics†  F L1T1
Prerequisite: 10.031.

Vector calculus; special functions; convolution theorem and applications, complex variable theory; Fourier integrals; Laplace transforms with application to ordinary and partial differential equations.

10.111A Pure Mathematics II — Linear Algebra  F L1½T1
Prerequisite: 10.001. Excluded: 10.121A.


10.1113 Pure Mathematics II — Multivariable Calculus  S1 or S2 L1½T1
Prerequisites: 10.001. 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. 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

Linear Algebra: vector spaces, commutative rings, polynomials, modules, linear transformations, eigenvectors, invariant subspaces, etc.

*Entry to General Mathematics IA is allowed only with the permission of the Head of the School of Mathematics, and that permission will be given only to students who do not qualify to enter General Mathematics IB.

**If a unit in this list is counted the unit above may not be counted.

‡Mathematics 10.031 is included for students desiring to attempt only one Level II Mathematics unit. If other Level II units in Pure Mathematics or Applied Mathematics are taken, 10.031 Mathematics will not be counted.

§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.
Subject Descriptions

10.1213 Higher Pure Mathematics II — Multivariable Calculus
Prerequisite: 10.011. Excluded: 10.1113.
As for 10.113 but in greater depth.

10.1214 Higher Pure Mathematics II — Complex Analysis
Prerequisite: 10.1213. Excluded: 10.114.
As for 10.114 but in greater depth.

10.2111 Applied Mathematics II — Vector Calculus
Prerequisite: 10.001. Excluded: 10.2211, 4.813.
Vector fields; divergence, gradient, curl of a vector; line, surface, and volume integrals. Gauss’ and Stokes’ theorems. Curvilinear co-

10.2112 Applied Mathematics II — Mathematical Methods for Differential Equations
Prerequisite: 10.001. Excluded: 10.2212, 4.813.

10.2211 Higher Applied Mathematics II — Vector Analysis
Prerequisite: 10.011 or 10.001 Dist. Excluded: 10.2111.
As for 10.2111 but in greater depth.

10.2212 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: 10.331, 10.311A, 10.311B, 10.321A, 10.321B, 10.301, 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.

School of Psychology

Undergraduate Study

12.001 Psychology 1

13.111 Textile Technology I
Yarn Manufacture: Introduction, historical development. Principles and practices of manufacture of yarns on the cotton and worsted systems.


13.112 Textile Technology II F L5T7


Part B. Yarn Manufacture: Principles and practice of yarn manufacture for wool on the woolen system and for other natural fibres such as silk, flax, jute, etc. Fancy yarns, paper yarns, twistless yarns. Manufacture of yarns from man-made fibres and blends with natural fibres.


Part D. Dyeing and Finishing: General descriptions of properties of dyes, dyeing assistants, solvents used in dyeing, water supplies and water treatment, machinery used in dyeing, classification and methods of application of dyes, textile printing methods. Objects of finishing and typical flow diagrams, the principles underlying and the technology of processes concerned with: the removal of impurities and discoloration; the improvement and elimination of deficiencies in properties of textile fibres.

13.113 Textile Technology III F L4½T2

Part A. Testing and Yarn Manufacture: Functions of quality control. The organisation and integration of a quality control department in a textile factory. Fault investigation. Recent developments and trends in industrial textile testing methods. Recent research and development in yarn manufacture.


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


(b) Varieties of macromolecules. Interactions with macromolecular structures. The physical properties of polymeric solids (including biopolymers). Absorption and the role of water in polymers.

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.
**Subject Descriptions**

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.

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14.511  Accounting and Financial Management IA  S1 or S2 LT4½

Prerequisite: 14.501.

Development of basic concepts introduced in Accounting and Financial Management IA including management accounting and operations research, corporate reporting, business finance, system design, elementary computer programming and applications.

14.602  Information Systems IIA  S1 or S2 L2T1

Prerequisite: Nil.

Introduction of Information Systems in business and commerce; systems design concepts; the theory of modelling; feasibility studies; internal control and auditing. An introduction to programming.

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**School of Accountancy**

**Undergraduate Study**

14.081  Introduction to Financial Analysis  S2 LT4

Prerequisite: Nil.

Aims to provide students, other than those enrolled within the Faculty of Commerce, with an understanding of the basic concepts and principles necessary to make effective financial management decisions.

The nature of financial management; the business environment; financial analysis, planning and control; capital investment decisions; organization of the financial structure; operating and working capital management; growth and development; and the causes and prevention of financial instability and failure.

Specific industry studies.

14.501  Accounting and Financial Management IA  S1 or S2 LT4½

Prerequisite: Nil.

The basic concepts of financial model building and information systems, including the double-entry recording system, the accounting cycle, income measurement and financial reporting, and an introduction to basic elements of taxation and auditing.

**School of Economics**

**Undergraduate Study**

15.001  Microeconomics I  S1 or S2 L2T1½


15.002  Microeconomics II  S1 L2T2

Prerequisites: 15.011 plus

<table>
<thead>
<tr>
<th>HSC Exam Percentile</th>
<th>Range Required</th>
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<tbody>
<tr>
<td>2 unit Mathematics</td>
<td>51-100</td>
</tr>
<tr>
<td>3 unit Mathematics</td>
<td>21-100</td>
</tr>
<tr>
<td>4 unit Mathematics</td>
<td>1-100</td>
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Revealed preference theory of demand, index numbers and aggregation; externalities, time preference, consumer surplus and compensation concepts. Short and long-run costs, returns to scale, producer surplus and quasi-rents. Monopolistic competition, oligopoly, cartels, public enterprise. Investment criteria, benefit-cost analysis. Efficiency and equity trade-offs, microeconomic policy in a second best framework.

15.003 Macroeconomics III S1 L2T2
Prerequisite: 15.042.

Macroeconomic theory and policy, including an introduction to the theory of economic policy, the structure and dynamic characteristics of macro-models, recent developments in monetary theory and policy, theories of inflation and policy in a dynamic setting.

15.011 Macroeconomics I S1 or S2 L2T1½
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 disequilibrium situations, inflation and the balance of payments.

15.042 Macroeconomics II S2 L2T2
Prerequisite: 15.011.

Extensions to the Keynesian model of income determination to include 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 The Soviet Economy
Prerequisite: 15.002 or 15.072.

A study of how basic economic problems are solved in the contemporary Soviet economy within a socialist institutional framework. The emphasis is on analysis of the actual operation of the Soviet economy and on an assessment of the extent to which and the efficiency with which it meets its own posited goals. For comparative, illustrative and analytical purposes reference is also made to other East European socialist countries, including Yugoslavia.

15.053 Economic Development S2 L2T1
Prerequisite: Any Year II Economics subject.

The gap between the welfare of the rich and the poor nations. Earlier theories of development as a basis for an appreciation of the various economic and non-economic theories of underdevelopment; such as social and technological dualism, balanced and unbalanced growth, structural change and development. The general principles and techniques of development planning and their application in particular countries.

15.073 Natural and Environmental Resources Economies S2 L2T1
Prerequisite: 15.002 or 15.072 with the approval of the Head of the Department of Economics.

An introduction to the concepts and issues in the management and evaluation of natural and environmental resources.

15.082 Labour Economics S1 L2T1
Prerequisite: Any Year II Economics subject.

The theory of the labour market 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 and job satisfaction; unemployment and underemployment; 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.

15.093 Public Sector Economics S1 L2T1
Prerequisite: 15.002 or 15.072 with the approval of the Head of the Department of Economics.

Public goods and social issues, such as poverty, health, education, transport and conservation. Analysis of case studies employing cost-benefit analysis to evaluate public projects and examine economic, social and environmental impacts of investment projects. The pricing policies of public utilities.

15.103 International Economics S2 L2T1
Prerequisite: 15.002 or 15.012.


15.143 Microeconomics III S1 or S2 L2T2
Prerequisite: 15.002 or 15.012.


15.501 Introduction to Industrial Relations S1 or S2 L2
Prerequisite: Nil.

For students enrolled in Faculties other than Commerce and Arts. It is designed to provide a practical introduction to important industrial relations concepts, issues, and procedures. Topics covered include the origins, evolution, and operation of the Australian system of industrial

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relations; the structure and role of trade unions and employer bodies; the function of industrial tribunals such as the Australian Conciliation and Arbitration Commission and the N.S.W. Industrial Commission; wages structure and determination; employment, unemployment and retraining, the nature and causes of strikes and other forms of industrial conflict; the processes and procedures for conflict resolution.

Where appropriate to class composition, particular attention is paid to individual industries.

15.601 Economic History IA — The Making of Modern Economic Society S1 or S2 L2T1½
Prerequisite: Nil.

Analysis of the forces that have determined the pattern and course of economic and social development in the twentieth century. Modern problems placed within a historical perspective including the relationship between economic growth, the emergence of the corporate economy, and the changing quality of life. The development of interdependence in modern economies in terms of the growth of big business, multinational enterprise, and changes in the distribution of income since the nineteenth century. Use of historical material as the basis of understanding of the background to the contemporary economic world.

15.611 Economic History IB — Australian Economic Development in the Twentieth Century S1 or S2 L2T1½
Prerequisite: Nil.

The development of the Australian economy from the Long Boom and the deep depression at the end of the nineteenth century to the present day. Topics include: a general overview of Australian economic development and its main features; economic fluctuations and their consequences, especially the Great Depression of the 1930s; the rise of Australian economic institutions; changes in the philosophy of development and the role of the State; impact of war; migration and the development strategies of the States; the growth of manufacturing and the creation of an industrial base; problems of the rural sector; and changes in the Australian standard of living. Throughout the course particular attention is given to Australia’s changing economic relations with other countries.

17.031 Cell Biology S1
Prerequisite: Nil.

HSC Exam Percentile
Range Required
31-100

2 unit Science (any strand)
31-100

or

4 unit Science (multistrand)

Basic cell structure; membranes, organelles, prokaryotic and eukaryotic cells; cellular locomotion; basic biological molecules; enzymes; structure and metabolic roles, cellular compartmentalization and enzyme function; diffusion, osmosis and active transport; theory of inheritance, linkage, gene interaction, sex determination, mutation, selection and evolution; information transfer and protein synthesis.

17.021 Biology of Higher Organisms S2
Prerequisite: 17.031.

The diversity of living things and the ways in which they have adapted to varying environments. Emphasis on flowering plants and vertebrate animals, and the complex organ systems they possess. The structure and function of these organs, as well as their coordination and control, examined in practical experiments to form the basis of lecture and tutorial programs.

Department of Industrial Engineering

Undergraduate Study

18.121 Production Management F L3T0
Prerequisites: 10.031, 10.331.

Engineering Economy: Economic objectives of the firm. Economic measures of performance: net present value, annual equivalent value and the DCF rate of return (including the incremental rate of return) and their application in the selection and replacement of processes and equipment. The Use of Human and Physical Resources: Methods engineering, ergonomics, motion and time study, financial incentives, applications to machine controlled processes, work sampling and data collection. Plant location, factory layout. Production and Quality Control: Control of jobbing, repetitive batch and continuous production. Manufacturing 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, queuing theory, inventory models, simulation.

18.551 Operations Research

Prerequisites: either 5.071 and 18.021 or 10.031, 10.331 and 18.121.

The formulating and optimization of mathematical models. The development of decision rules. Some techniques of operations research such as mathematical programming, queuing theory, inventory models, replacement and reliability models, and simulation will be introduced. These techniques will be applied to situations drawn from industrial fields, eg production planning and inventory control. Practical problems of data collection, problem formulation and analysis will be included.

18.131 Operations Research

F L1 T1

18.113 Industrial Chemistry Processes

Prerequisites: 2.002A, 22.112. Co- or prerequisites: 2.002B, 2.042C.

A study of 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.

22.114 Processes

Prerequisite: 22.113.

Topics selected from the following are studied in depth: refractories, high-temperature processes, high pressure processes (especially ammonia synthesis — thermodynamics and equipment), nuclear metals, industrial polymers, fermentation industries (for details see 42.114 Fermentation Processes), applied electrochemistry, applications of thermodynamics to gas/solid and aqueous systems concerned with the processing of inorganic materials.

School of Chemical Technology

Undergraduate Study

22.101 Introduction to Chemical Technology


22.112 Chemical Process Equipment

Co- or prerequisite: 2.001, 2.121, 2.131.

Review of services in the chemical industry; the principles of operation, construction and fields of application of equipment used in carrying out various processes and operations in the chemical industry.

22.122 Instrumental Analysis

Prerequisites: 1.001, 2.121, 2.131. Co- or prerequisites: 22.132.

Basic principles of volumetric and gravimetric analysis and the application of spectrometric and selected techniques to the analysis of process streams and quality control.

22.123 Chemical Thermodynamics and Kinetics


Thermodynamics: the laws of thermodynamics, power cycles, thermodynamics of fluids, heterogeneous equilibrium, chemical reaction equilibrium, irreversible thermodynamics.


22.124 Applied Kinetics

Prerequisite: 22.123.

The defect solid state; solid-state diffusion; heterogeneous catalysis and heterogeneous kinetics; continuous stirred tank reactors; semibatch reactors; tubular reactors; fixed bed catalytic reactors; optimization, scale-up of reactors; residence time distributions.
22.132 Industrial Chemistry Calculations

Prerequisites: 2.121, 2.131, 10.001.

Conversion of units; the role of stoichiometry in industrial chemistry; the influence of the dynamic situation; transposition of chemical and physical data; evaluation of the accuracy of data from experimental analytical measurements. Development of algorithms for the solution of selected examples relevant to the process chemical industry.

22.133 Data Processing

Prerequisites: 10.331, 22.132.

Computer programming and numerical methods: Fortran IV and Basic II programming, solution of equations (Newton-Raphson), simultaneous linear algebraic equations, numerical differentiation and integration, interpolation, ordinary differential equations, partial differential equations, least squares approximations, matrix operations, numerical optimization (Simplex method), linear programming, linear models with one and more than one independent variable, non-linear models. Application of the principles of statistics to chemical problems (z test, t test, F test and $X^2$ test), analysis of variance, design of experiments, correlation and regression, quality control. Use of graphical methods; fitting empirical equations to experimental data. Preparation of nomograms using constructional determinants.

22.134 Applied Thermodynamics

Prerequisites: 22.123, 22.153.


22.143 Introduction to Analog Computation

A course of 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.

22.153 Material and Energy Balances

Prerequisites: 2.002A, 10.031, 22.132.

Units, material balances, gases, vapours and liquids, energy balances, combined energy and material balances, unsteady-state material and energy balances.

22.154 Process Simulation

Prerequisites: 3.111, 22.113, 22.123, 22.133, 22.153, 22.163.

The application of the hybrid computer to the study of the dynamics of processes encountered in the chemical industry.

22.163 Instrumentation and Process Control I

Prerequisites: 1.922, 10.031, 22.122 or 2.002D. Co- or prerequisite: 22.113 or 22.233.

Analog computation: theory and application of basic analog computing elements, magnitude scaling and time transformation, application to solution of linear differential equations with constant coefficients. Transducers. Measuring instruments, indicators and recorders: analog type instruments, digital measuring instruments, data-logging systems. Introduction to process control: block diagrams, feedback, transfer functions, final control elements and characteristics, introduction to controllers, empirical timing of controllers.

22.164 Instrumentation and Process Control II

Prerequisite: 22.163.

Analog computation: programming techniques, representation of non-linear phenomena, application to non-linear differential equations. Process dynamics: first order processes, response of single and multiple first-order systems to a variety of forcing functions, second and higher order processes, state variable presentation of processes, the complex plane, frequency response of linear systems, identification of ill-defined processes from analysis of indicial response data. Dynamics of closed-loop systems: closed loop transfer functions, derivation of characteristic equation, performance criteria, non-linear and linear controllers, transient response of linear control systems.


22.174 Seminars

Co- or prerequisite: 22.184.

Students are required to deliver two lecturetes 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.

22.184 Process Analysis

Prerequisites: 22.113, 22.133, 22.163. Co- or prerequisites: 22.124, 22.134.

An assignment on the integrated design of process flow diagrams involving specification of basic chemical reactions and physico-chemical parameters, selection of types of equipment required, statement of variables to be measured for the control of raw materials, process conditions and final product, and the preparation of a process model suitable for automatic control.

22.194 Project (Industrial Chemistry)

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.
22.213 **Chemical Ceramics**  

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.

22.224 **Physical Ceramics**  
Prerequisites: 22.213, 22.233.

Physical Ceramics: Application of the principles of physical chemistry and solid-state physics to a study of the preparation and properties of ceramic materials. Clay Mineralogy: Structures and properties of the various clay minerals; techniques employed in the identification of clay minerals; composition and properties of the ceramic clays of New South Wales.

22.231 **Introductory Ceramic Engineering**  
Co- or prerequisites: 3.311, 7.023, 22.232.

The nature of ceramics. Classification of materials. The materials science approach. History of Ceramics. The ceramic engineer and society. 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.

22.232 **Ceramic Engineering I**  
Co- or prerequisites: 3.311, 7.023, 22.232.

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.

22.233 **Ceramic Process Principles**  

Students are required to take part in a series of factory inspections.

22.234 **Ceramic Engineering II**  
Prerequisites: 3.111, 8.112, 22.233, 22.232.


Students are required to take part in a series of factory inspections.

22.294 **Project (Ceramic Engineering)**  
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.

22.303 **Polymer Science**  


22.314 **Polymer Chemistry**  
Prerequisite: 22.303.

Inorganic polymers, polymers for high temperature service, the use of modern instrumental methods for establishing composition and structure of high polymers.

22.324 **Physical Chemistry of Polymers II**  
Prerequisite: 22.303.

Selected topics from basic texts and the original literature, covering anionic polymerization, polymer degradation, polymer rheology, polymer, visco-elasticity, fracture and environmental stress cracking, polyelectrolytes.
22.341 Statistical Techniques  S1 L1T1
Prerequisite: 10.331.
The application in the Polymer industry of the z test, t test, X squared test and F test, correlation of one and two variables, single factor and two factor analysis of variance.

22.412 Ceramic and Polymer Materials  F L2
Ceramic Materials: History of ceramics, introduction to ceramic raw materials, processing of ceramics including forming, drying, firing, introduction to crystal chemistry and phase changes in ceramics, the nature and properties of crystalline ceramic glasses, ceramic fibres and composites.

Polymers: Introduction to the chemistry, industrial processing, physical and chemical properties and use of the principal types of polymers of commercial importance. Includes thermoplastic and thermosetting materials for use as plastics, rubbers, sealants, adhesives, coatings and fibres with emphasis on materials produced, manufactured or processed in Australia.

Graduate Study

22.110G Process Evaluation  F L1T2
Critical scientific and economic evaluation of industrial chemistry processes and research and development procedures. Process methodology, physicochemical data and their implications, equipment and control parameters. Novel and controversial chemical processes relevant to the Australian chemical industry.

22.120G Machine Computation in Chemical Technology  S1 or S2 L2T4
Applied numerical methods for solution of industrial chemistry problems; statistical methods including non-linear and multiple regression; model discrimination and experimental design methods; plant tests and product quality control experiments; numerical optimization techniques.

22.130G Chemical Reactor Analysis and Control  S1 or S2 L2T4
Concepts of heat and mass transfer; analysis of fixed-bed catalytic reactors; fluidized beds and catalytic risers; residence time distributions; maximum mixedness and segregated flow; multiple steady states; control of tubular and stirred tank reactors.

22.131G Catalysts and Applied Reaction Kinetics  S1 or S2 L2T4
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, electrochemical reaction kinetics and electrocatalysis; industrial catalytic processes; application of statistical methods to the solution of complex chemical data.

22.140G Chemical Process Simulation  S1 or S2 L2T4
The simulation of chemical process models using analog and digital computers. Analog and digital computer simulation techniques. The role and application of hybrid computers to the chemical industry, including simulation techniques.
Optimization of chemical reactions by simulation. The economics of simulation. Practical simulation studies of selected industrial chemical processes.

22.141G Modelling in Chemical Technology  S1 or S2 L2T4
Basics of modelling methods and their relationship to chemical industry.

The modelling of dynamics physico-chemical processes common to the chemical industry including the systems and subsystems approach; continuous and discrete-time physical process models; lumped- and distributed-parameter models; evolution of models from fundamental physico-chemical principles. Approximation methods for complex and ill-defined chemical processes. Integrated chemical process models.

22.142G Chemical Process Control  S1 or S2 L2T4
Data acquisition from chemical instrumentation and its application to the control of chemical processes. Modern control techniques in the chemical industry including non-linear control, linear digital control, multivariable process control systems, and optimal control.

22.150G Instrumental Analysis for Industry  F L1T2
Role of analysis in process optimization. Accuracies of analytical methods compared to needs for quality control. Frequency of analysis in relationship to control and analytical costs. Importance of speed of analysis for information feed-back. Case studies for selected processes in relation to selecting the analytical method.

22.160G Industrial Electrochemistry  S1 or S2 L2T4
Fundamentals of electrodes, the Butler-Volmer equation, current/potential laws in relationship to reaction mechanism. Electrocatalysis, 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. Automation and control for optimum conditions.

22.161G Electrochemical Techniques for Control and Analysis  S1 or S2 L2T4
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.
22.210G Solid State and Mineral Chemistry  F L2

Principles of crystal chemistry; structures of selected crystal types and glasses. Thermodynamics of solid systems; phase relations. 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 rocks and minerals. Chemical strengthening of ceramics.

Mechanism and Kinetics: Step growth polymerization, kinetics, structure effects; chain growth polymerization. Free radical polymerization, chemistry and properties of free radicals and initiators; kinetics of propagation and termination reactions; co-polymerization; monomer radical structure and reactivity. Cationic and anionic polymerization; stereoregular polymers.

Polymers Characterization: Molecular weight: averages and distributions; thermodynamics of polymer solutions; theta temperature; fractionation methods; measurement of number-average molecular weight and weight-average molecular weight.

Polymer Physics: Principles of operation of conventional polymer processing equipment; safety procedures; polymer compound design; stress/strain behaviour of polymers in tension, compression, shear and flexure; elementary rheological behaviour of polymers; rubber elasticity; thermal characteristics of polymers.

22.220G Refractory Technology I  S1 or S2 L4T2

Chemical Property and Service Behaviour: This subject 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 reactions occurring between refractories and solid, liquid and vapour phases will be made. 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 22.213 Chemical Ceramics (Session 1).

22.230G Chemistry of Glass Melting  S1 or S2 L3T3

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.

22.240G Polymer Science  S1 or S2 L6T4

Polymer Processes: Classification of polymers, methods of polymerization; bulk, solution, emulsion, suspension, high pressure; processes; step growth, chain growth; the chemistry and applications of polymer systems including polyesters, polyamides, phenolic condensation resins, vinyl polymers, synthetic elastomers. Natural polymers.
School of Nuclear Engineering

Undergraduate Study

23.051 Nuclear Power Technology
Atomic nuclei, radioactivity, neutron reactions, fissile and fertile materials, nuclear conversion and breeding cycles, plutonium. Criticality requirements, heat removal, control and safety of nuclear reactors. The thermal, hydraulic and structural aspects of gas and liquid cooled thermal reactors and liquid metal cooled fast breeder reactors. The status of fusion research and development.

Field Work of up to one and a half days is a compulsory part of this subject.

25.120 Earth Environments and Dynamics
Prerequisite: 25.110.


Field Work of three and a half days is a compulsory part of this subject.

School of Applied Geology

Undergraduate Study

New course 3000 subjects.

25.110 Earth Materials and Processes
Prerequisites:

HSC Exam Percentile Range Required
2 unit Science (any strand) 31-100
4 unit Science (multistrand) 31-100


Earth Processes: The origin of igneous rocks; plutonism and volcanism. The geological cycle. Weathering processes, soil formation and

25.211 Earth Materials I
Prerequisite: 25.120.


Practical: Macroscopic and microscopic examination of rock forming and ore minerals and igneous rocks in the field and the laboratory.

25.221 Earth Materials II
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 deposits.


Field Work of up to 10 days, equivalent to 28 tutorial hours is an essential part of the subject.
25.212 Earth Environments I  
Prerequisite: 25.120.


Field Work of up to three days, equivalent to seven tutorial hours is an essential part of this subject.

25.223 Earth Physics  
S2 L2T4

Global Geophysics: Principles of gravity, geomagnetism, palaeomagnetism, geothermy and seisimology and their relation to shape, internal constitution, dynamic processes and major tectonic features of the earth.

Exploration Geophysics: Physical properties of rocks and soils. An introduction to electrical, electromagnetic, seismic, gravity, magnetic 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.


25.311 Earth Materials III  
S1 L2T4

Prerequisite: 25.221.


Economic Mineralogy: Nature of reflected light. Orthoscopic and conoscopic rotation, dispersion phenomena. Microhardness and reflectivity, etch tests, XRD and microprobe techniques. 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 textual studies.


25.312 Earth Environments II  
S1 L3T3

Prerequisite: 25.212.

Stratigraphy: Biological and physical methods of correlation. Definition of international stratigraphic boundaries, stratotypes and reference points. The development of the Precambrian craton of Australia. The geological evolution of eastern Australia, particularly the late Palaeozoic and Mesozoic history of the Tasman Mobile Belt. Intraplate basins of western and southern Australia and the effects of the dispersal of Gondwanaland. Geological evolution of the northern margin of the Australian plate, particularly the Mesozoic to Recent of Papua-New Guinea. Stratigraphic and structural evolution of autacogens.


25.313 Exploration and Data Processing  
S1 L4T2

Prerequisites: 25.223.

Exploration Geophysics: The practice and theory of geophysics as a basic tool of geological exploration with applications in areas of energy, mineral and ground-water resources and engineering projects.

Mathematical Geology: An introduction to develop proficiency in the acquisition, display and analysis of geological data utilizing digital computer processing. Elementary descriptive and inferential statistics and sampling. Fortran programming language (including hands-on computing experience). Analytical methods of mathematical geology including time series analysis, Markov Chain analysis, map analysis and multivariate identification and classification techniques. A practical approach is adopted throughout whereby the student makes extensive use of a library of programs implemented on the University’s CDC
multi-mainframe Cyber 72/171 installation for processing and interpretation of real data.

Field Work of up to five days is an essential part of the subject.

25.314 Mineral and Energy Resources I

Prerequisite: 25.221. Co-requisite: 25.311.

Metallic Resources: Classification and origin of ore deposits, geochemical processes, research methods. Orthomagmatic, hydrothermal, porphyry, volcanic-sedimentary, Mississippi Valley type, chromium, iron, manganese ores, residual and mechanical ores. Introduction to mineral exploration. Laboratory study of hand specimens, thin sections and polished sections of various ore types; study of selected mining areas representing various genetic types of ore.

Field Work of up to six days is an essential part of the subject.

25.324 Mineral and Energy Resources II

Prerequisite: 25.312.


25.325 Engineering and Environmental Geology


25.326 Geological Techniques

Prerequisites: 25.212, 25.311.


25.411 Resource Geology

Geophysics: The planning of geophysical surveys within the context of overall exploration and engineering development programs. Geological interpretation of geophysical data and discussion of selected case studies.


Mineral Exploration: Use of geology in mineral exploration and area selection; principles of exploration geochemistry; radiometric and remote sensing methods; exploration drilling; ore reserve estimation; exploration ground tenure in New South Wales.


World Evolution: Seminars on the world's geology from varied aspects.

25.412 Mineral and Energy Resources

Students taking this option are expected to show preference for either mineral or energy resources. Projects, lectures, tutorials and seminars are designed accordingly.

Mineral Resources: A major part is a student field-laboratory research project in some aspect of mineral resources. This may be a general geological project, or a specialised mineral exploration project, eg, geochemical, geophysical, mineralogical, etc. During the first session only there are additional lectures/seminars that follow on from 25.411 to give more detailed appreciation of various aspects of mineral resources and include exploration management, mine evaluation, exploration geochemistry, exploration geophysics and mathematical geology. The content and extent of tuition in these subjects varies from year to year according to student requirements.

Energy Resources: A major section consists of a field mapping project in a sedimentary terrain. Depending on students' requisites, specialised field/laboratory studies are arranged in sedimentology, macro- and micropalaeontology, palynology, mathematical geology, geophysics and well-log analysis. Where possible, projects are directed related to problems of coal and petroleum occurrence. During the first session attendance is expected at lectures/seminars described in the Mineral Resources section above and of common interest to understanding evaluation and exploitation of energy resources.
25.413 Engineering and Environmental Resources

A major part is a field/laboratory research project in some aspect of engineering or environmental geology. During the first session additional lectures are given on: foundation geology; construction materials; rock weathering and fabric analysis applications to engineering problems; site investigations; practical construction geology; soil slope stability analyses and stabilization; geomechanical principles; engineering geophysical techniques; engineering geological case histories; and advanced geological surveying applied to engineering works.

Old course 3000 subjects.

25.013 Geology IIIA

Prerequisites: 2.121, 2.131, 25.012, 25.022.


Laboratory: Hand specimen study of ores and associated features; introductory mineragraphy.

Mineralogy and Petrology


Sedimentary Petrology: The influence of transportation, deposition and diagenesis on the composition, texture and structure of detrital sedimentary rocks including limestones. The classification of the detrital sedimentary rocks. The chemically formed sedimentary rocks including the phosphates, zeolites, evaporites, ferruginous and siliceous deposits. Introduction to coal petrology.

25.023 Geology IIIB

Prerequisites: 2.121, 2.131, 25.012, 25.022.

Geophysics

Global Geophysics: The physics, shape, structure and constitution of the earth seismology, gravity, geology, geothermy, geomagnetism, palaeomagnetism, geo-electricity and geochronology. Geoelectronics and geodynamics: geophysical expression and relation to geology and geochemistry. Exploration Geophysics: Covering the following methods seismic, electrical, electromagnetic, gravity, magnetic and radioactive with applications for mining, petroleum, engineering, hydrology and well logging.

25.033 Geology IIIC


Mathematical Geology and Geological Surveying

Mathematical Geology: Mathematical techniques and concepts which may be applied to the analysis of geological data. Measurement scale, probability axioms, frequency analysis and basic geostatistics. Sampling theory and techniques. FORTRAN computer programming forms a substantial part of the course with programming exercises in the analysis of map information and other geological data. Quantitative map interpretation with emphasis on trend surface analysis and automatic contouring techniques.


Geochemistry and Petrology


Clay Mineralogy: The structures and properties of the clay mineral groups including the kandites, illites, smectites, chlorites, mixed layered and fibrous clay minerals. Techniques for the identification of the clay minerals. Clay-water systems and ion exchange. Chemical weathering and the origin of the clay minerals.


Practice: Macroscopic and microscopic study of igneous and metamorphic rocks.

Advanced Structural Geology

Analysis of structural elements at the microscopic, mesoscopic and macroscopic scales. Modern methods of analysis, especially petrofabric analysis and A.V.A. Detailed studies of the analysis of metamorphic terrains, e.g. Otago Schists; Cooma Complex.

Sedimentary Basin Analysis and Geology of Hydrocarbons

Basin evolution. Analysis of sedimentary and palaeoecological systems in fluvial deltaic, nearshore and deepwater environments. Structural

Field Mapping and Remote Sensing

Field Mapping: Field mapping in a complex geological terrain, with concentration on the structural geology of deformed and metamorphosed sequences. Writing geological reports, and drafting geological maps.

Remote Sensing: Exercises in the combined usage of air photos and ERTS imagery for the interpretation of regional and structural geology.

In addition, one of the following topics are selected after consultation with the Head of School:

1. Economic Geology B, Mineragraphy, Experimental Petrology

Economic Geology B: Detailed study of selected major deposits representing particular types of mineralization — geological setting, petrology, mineralogy and genetic aspects. Experimental work in ore genesis — isotope studies, trace elements, phase equilibria, inclusions in minerals.


Laboratory: Economic Geology and Mineragraphy: Study of regional setting, current research, petrology and mineragraphy of selected deposits dealt with in lectures.

2. Micropalaeontology

Morphology, stratigraphic distribution and significance of the principal microfossil groups: foraminifera, ostracoda, conodonts, spores and pollen, dinoflagellates, coccoliths and chitinozoa. Extraction techniques.

3. Surficial Geology


Quaternary geology — methods of dating, sea level change, glacial sequences, surficial geology of non-glaciated areas of Australia — especially the Riverine Plain. Quaternary sequences in Canada and Europe.

25.014 Geology IV: Advanced Applied Geology

Prerequisites: 25.013, 25.023, 25.033.

Computer Applications in Geology: Advanced methods in mathematical geology, including time series analysis, Markov chain analysis, deterministic simulation of sedimentary processes such as delta formation. Classification procedures including R & Q cluster analysis techniques, factor analysis as applied to facies delineation. A major section of the course is devoted to processing geological data using library programs available on the computer.

Exploration Geophysics: An introductory course in the practice, theory and interpretation of geophysical methods of exploration in petroleum, mineral deposits and engineering geology, extending beyond Exploration Geophysics of Geology III.

Seminar: A weekly participatory activity.

25.024 Geology IV: Project

Prerequisites: 25.013, 25.023, 25.033.

An individual field assignment carried out under supervision and consisting essentially of geological mapping plus supporting laboratory work.

25.034 Geology IV: Engineering Geology

Prerequisites: 25.013, 25.023, 25.033.

Introductory Geomechanics: Engineering classification behaviour, and tests of rocks and soils. Stress and strain; elasticity and plasticity, stress distribution in virgin rock masses, about excavations, and beneath foundations.

Hydrogeology: Hydrological cycle; aquifers; fluid flow in rocks and soils; hydraulic properties of rock. Hydrogeological mapping and maps. Pollution of groundwater. Arid zone hydrology.

Environmental Geology: Geology in urban development and regional planning. Terrain evaluation, with special reference to beaches. Rehabilitation.

Site and Material Investigations: Methods and field tests. Petrography, physical and chemical properties of concrete aggregates, road and earth construction materials. Quarry sites and borrow areas.


25.044 Geology IV: Mineral Exploration


Geochemistry: Sampling and sample preparation. Principles of the analysis of silicate rocks by X-ray fluorescence spectrometry; accuracy and precision. Acquisition and interpretation of geochemical data. A field and laboratory project is an essential; part of the course.

Students taking this option are required to take 7.023.
25.054 Geology IV: Sedimentary Basins

Prerequisites: 25.013, 25.023, 25.033.

Lectures, tutorials and a laboratory project in Advanced Sedimentology, Palaeontology, Palaeoecology and Petroleum Geology.

25.064 Geology IV: Applied Geophysics

Prerequisites: 25.013, 25.023, 25.033.

Exploration and applied geophysics, its practice, theory and interpretation in petroleum, mining and engineering exploration and in applied geology.

25.074 Special Project

A field-laboratory project related to the option selected by the student.

Other Geology subjects

25.332 Geology for Geomorphologists and Pedologists

Prerequisites: 25.211, 25.221, 25.212.

Clay Mineralogy: The structure and properties of the clay groups, including the kaolins, illites, smectites, chlorites, mixed layered and fibrous clay minerals. Techniques for the identification of the clay minerals. Clay-water systems and ion exchange. Chemical weathering and the origin of the clay minerals.


25.520 Geology for 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 course is divided equally between lectures and laboratory work. Field Tutorial hours are additional.

25.521 Geology for Mining Engineers II


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 nonmetallic 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.

25.532 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.

25.541 Mineralogy (Applied Science Course)

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.

25.112R Geology for Mining Engineers IIA
Prerequisite: 25.520.

Laboratory Work: Examination of rocks in hand specimen and thin section. Examination of hand specimens of economic minerals. Mineragraphic examination of ore mineral suites. Study of geological maps of economic mineral deposits.

25.122R Geology for Mining Engineers IIB
Prerequisite: 25.520.

Laboratory Work: Exercises in structural analysis including the analysis of structure of an ore deposit. Hand specimen examination of non-metallic economic minerals. Exercises in groundwater hydrology.

25.201R Mineragraphic Laboratory Work
Comprises the mineralogy and Introductory Mineragraphy topics from 25.112R Geology for Mining Engineers IIA.

25.301R Geoscience IIIA F 3 hpw
Stratigraphy, palaeontology, oceanography.

25.302R Geoscience IIIIB F 3 hpw
X-ray crystallography, mineralogy, metamorphic petrology, structural geology, tectonics.

25.303R Geoscience IIIC F 3 hpw
Igneous petrology, geochemistry, clay mineralogy, sedimentary petrology.

25.304R Geoscience IIID F 3 hpw
Economic geology, mathematical geology, geophysics.

Servicing Subjects

25.621 Marine Geology I
25.622 Hydrological and Coastal Surveying
25.631 Marine Geology II
25.632 Estuarine Geology
25.634 Marine Mineral Deposits and Exploration
25.635 Marine Resources

Graduate Study

25.331G Applied Geophysics I

Electrical Methods: Introduction to galvanic and electromagnetic methods in geophysics with applications to mineral, groundwater and other engineering applications. Electrical properties of rocks and minerals. Quantitative interpretation of conduction methods. Electrochemical mechanisms of spontaneous and induced polarization effects. The effect of electrode arrays in galvanic methods. Time and frequency domain equivalents in induced polarization and electro-magnetic methods. Theory of electromagnetic induction and electro-magnetic induction methods: Natural and applied electromagnetic field methods, including audio-frequency, magneto-telluric, continuous wave and transient systems in ground and airborne applications. Basic
instrumentation and field procedures. Qualitative and quantitative interpretation of the above techniques; their interrelation and integration with other geophysical methods in exploration and their geological interpretation.


Radioactive, Thermal and Other Ancillary Methods in Ground and Airborne Remote Sensing Applications: The application of geophysical techniques to bore-hole logging in petroleum engineering and mineral exploration.

25.333G Applied Geophysics IIA
A more advanced treatment of seismic, electrical, electromagnetic, gravity and magnetic methods of geophysical exploration.

Seismic: Wave theory and the propagation of elastic waves in continuous, layered and in homogenous media; direct, reflected, refracted, surface and guided waves. Interpretation techniques with variable velocity conditions. Advanced computer processing of seismic data and specialized instrumental, field and computer techniques of signal/noise improvement and data enhancement. Further geological interpretation in petroleum and engineering applications. In situ and laboratory determination of elastic properties of rocks.


25.335G Applied Geophysics Project Assignment
A project involving interpretation of geophysical field data which may be collected by the students.

25.337G Geophysical Procedures
Selection of geophysical methods, field procedures, features and limitations of geophysical methods, interpretation of results, the place of geophysical methods in integrated exploration programs, geophysical case histories, costs and logistics.

25.338G Computer Applications in Exploration and Mining Geology
Probabilistic approaches to regional exploration and target area delineation; systems approach to exploration planning; drilling patterns and intersection probability; computerized ore reserve computation; optimum mine design and discounted cash flow analysis.

25.339G Geology in Exploration
Ore genesis theories in exploration, ore environments, ore environment extrapolation in time and space, synthesis in exploration, regional patterns of ore occurrence in relation to modern tectonic theory, guides to mineralization. Evaluation of outcrops and size and depth predictions. Geology and evaluation of detrital deposits and of non-metallic deposits.

25.340G Geochemical Prospecting
Review of geochemical methods; geochemical prospecting as related to types of mineralization, topography and climate; soil, rock and soil gas geochemistry; stream and stream sediment geochemistry; airborne methods; biogeochemical and geobotanical prospecting; geochemical case histories, costs and logistics.

25.341G Remote Sensing
The electromagnetic spectrum and the physics of remote sensing, active and passive sensing, conventional photography in exploration, black and white and colour infra-red photography in exploration, low sun-angle photography, side-looking air radar, gamma ray spectrometry, thermography, ERTS, case histories in remote sensing.

25.343G Mineral Economics, Leasing Law and Management
Principles of mineral economics, metal prices, price fluctuations, imports and exports, policy formulation by companies and by governments; mining law in Australia with special reference to land tenure and lease acquisition; organizing and managing a mineral exploration venture, personnel management.

25.344G Field and Laboratory Methods in Exploration
Tutorials and demonstrations both in the field and the laboratory in the use of various instruments relevant to mineral exploration. The work in this subject is directed particularly, but not exclusively, toward the Field Project.

25.402G Hydrogeology
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 groundwater fields.
25.403G 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.

25.404G Environmental Geology S1 L1½T1½


Several field tutorials form part of this subject.

25.405G 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, electromagnetic 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.

25.406G Geological Basis of Geomechanics S1 L2T1


25.408G Engineering Geology S1 L2T1

Co-requisite: 25.406G.


25.409G Foundation Geology S1 L1½T1½

Co-requisite: 25.406G.


25.410G Coastal Environmental Geology S1 L1½T1½


Subject Descriptions

School of Geography

Undergraduate Study

27.111 Applied Physical Geography I F L2T4

Prerequisite:

2 unit Geography

or

3 unit Geography

HSC Exam Percentile Range Required

71-100

31-100
or
2 unit Science (any strand) 31-100
or
4 unit Science (multistrand) 31-100
or
2 unit Mathematics 71-100
or
3 unit Mathematics 31-100
or
4 unit Mathematics 11-100

A systematic introduction to physical geography as a basis for applied studies.


27.112 Applied Physical Geography II F L2T3

Relationships and interactions between atmosphere, water, land and biota, and the impact of man in accelerating change within the physical landscape.

Climatic aspects of catchment hydrology and water resources. Analysis of climatic data for quantifying variability and the probability of extreme weather conditions producing natural hazards of floods, droughts and destructive winds. Evaluation of climatic elements affecting weathering and erosion potential. Topographic controls of local climate. Drainage basin morphometry, dynamics and function, including hillslope hydrology and geometry, and controls of runoff and sediment transport. Soil genesis in Australia including soil stratigraphy and periodicity. Soil and environmental properties in relation to hydrology and plant growth.

The ecosystem model and hypotheses as to the nature of the plant community. Biogeochemical cycles. Effects of disturbance on energy and nutrient flow within ecosystems. Study of selected habitats — their composition, structure and environmental controls. Man’s impact upon climate, soils, hydrologic conditions, landforms and the habitats of plants and animals. Climatic change and its effect upon the character of landforms, soils and vegetation.

27.133 Pedology S2 L2T3

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 chemical characteristics with emphasis on properties associated with land capability assessment. Statistical analysis of soil data and its application to mapping.

27.143 Biogeography S1 L2T3


27.153 Climatology S2 L2T3


27.163 Methods in Physical Geography F L½T1

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.

27.172 Environmental Measurements F L½T1

Observation, measurement and recording of climatic variables. Statistical qualities of data representing the various climatic elements. Collection and summary of climatic data. Tests for spatial and temporal homogeneity in climatic records. Maintenance of climate stations. Network densities in relation to spatial variation in climatic elements. Use of air photographs and maps for collection of topographic data and

*Offered subject to availability of staff.*

27.173 Remote Sensing Applications† S2 L1T2
Principles and technical aspects of remote sensing. Forms of available imagery, their utility and facilities for their interpretation. Application of remote sensing for the assessment and mapping of land properties, resources and land use. Applications in resource and environmental management.

27.183 Geomorphology S1 L2T3

27.234 Applied Geomorphology and Pedology S1 L4T4
Methods of classifying and mapping soils and related land-surface elements. Runoff processes, movement of water through the soil, and physiographic factors in catchment hydrology and flooding. Problems of the stability of slopes and soils, and related investigational methods. Factors affecting denudation and accelerated erosion, measurement of processes, and methods of control. These studies are applied in both natural and urban environments. Supporting field and laboratory studies.

27.344 Applied Biogeography and Bioclimatology S1 L4T4

27.504 Projects in Applied Geography
Biogeography and 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 and 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 F L2T4/L2T1
Prerequisite:

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<th>HSC Exam Percentile</th>
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<tr>
<td>2 unit Geography</td>
<td>71-100</td>
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<td>3 unit Geography</td>
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<td>2 unit Economics</td>
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<td>3 unit Economics</td>
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<td>2 unit Mathematics</td>
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<td>3 unit Mathematics</td>
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<tr>
<td>4 unit Mathematics</td>
<td>11-100</td>
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Emphasis is on basic concepts, themes and issues in economic geography. Topics include: spatial interaction and analysis of movement patterns; location principles; the organization of settlement patterns and the space economy; behavioural and decision-making processes. Australian case studies are stressed. Laboratory classes deal with handling and presentation of data in economic geography.

27.612 Applied Economic Geography IIA S2 L2T4
Theoretical principles underlying the location of the firm and the spatial organization of land use are emphasized. Topics include: factor costs and the location problem; demand, scale and agglomeration; rent theory and location patterns; location decisions under conditions of uncertainty; linear models in location analysis.

27.613 Applied Economic Geography III F L2T2
Problems and approaches to mathematical model building for spatial analysis including: Location-allocation models, diffusion models, transport and interact models, and land-use models.

†Offered subject to availability of staff.
27.622 Applied Economic Geography IIB  S1 L2T4

Focus is on processes of change in urban and regional systems. Topics include: the spatial distribution of economic activities; the economic structure of cities and regions; regional linkages and the transmission of economic change; input-output analysis; urban and regional growth and decline; concentration and dispersion of economic activities; regional disparities; policy issues in urban and regional development. Laboratory classes include methods of urban and regional analysis and an introduction to regional forecasting.

27.624 Geographic Thought and Perspectives  S1 T3

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.

27.631 Geographic Data Analysis I  S2 L1T3

Emphasis is on a variety of methods for measuring spatial associations and relationships within a hypothesis-testing framework. Laboratory work is based on the use of S.P.S.S. procedures.

27.632 Geographic Data Analysis II  F L1T2

Focus is on inferential problems in the analysis of location patterns and the application of multivariate methods in economic geography, particularly multiple regression and factor analysis. Laboratory work is based on the use of the CYBER and FORTRAN language with particular reference to geographical information systems.

27.633 Geographic Data Analysis III  F L2T4

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.

27.642 Mathematical Methods for Spatial Analysis  F L1T2

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  S1 T4

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  S2 L2T1

An introduction to source material and published statistics of relevance to Economic Geographers; problems of geocoding and spatial identifiers; coding information and data banks; and automated cartography. Project work in the development of information systems for monitoring spatial change.

27.662 Urban Systems  S1 L2T2

The exploration of concepts relating to the city as a complex system with emphasis on spatial structure and processes and change in the spatial organisation of urban areas. Particular emphasis is on industrial location, residential development, population distributions, and service provision.

27.713 Marketing Geography*  S2 L2T2

Spatial reality as a result of consumer and producer decisions. The relationship between consumer spatial behaviour and the pattern and structure of marketing establishments. Organisation 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*  S2 L2T2

The analysis of the transportation system in terms of its relationship with economic and geographical indicators. Focus on network analysis, flow studies, modal systems, circulation theory, impact studies, transport and economic development, and the urban transport problem. Laboratory classes involve practical application of pertinent methodology, while seminars stress the consideration of major problem areas in transportation in Australia.

27.733 Regional Policy and Planning*  S1 L2T2

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 concentrate on methodology.

27.743 Regional Population Analysis*  S1 L2T2

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 on regression 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.

*Offered subject to availability of staff.
27.753 Social Welfare and Urban Development* S1 L2T2
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.

27.763 Rural Resource Problems* S2 L2T2
Structural adjustment in agriculture; government intervention; rural land
subdivision; competing uses for rural land; conservation/development
conflicts; the future of country towns; depressed rural regions as poles
of underdevelopment; economic and social organisations — family
farms, agribusiness, village co-operatives and farm tourism; integrated
rural planning initiatives. Emphasis on Australian cases with international
experience as context. Workshops to emphasise planning applications.

27.773 Spatial Aspects of the Housing Market* S2 L2T2
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* S1 L2T2
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.

27.793 Models of Spatial Systems* S2 L2T2
The design and development of models of spatial systems, including:
Entropy maximisation methods; control theory; evaluation of alternative
models; and case studies of models in urban and regional analysis.

27.824 Spatial Population Analysis
27.825 Urban Activity Systems
27.826 Urban and Regional Development
27.834 Spatial Population Analysis (Advanced)
27.835 Urban Activity Systems (Advanced)
27.836 Urban and Regional Development (Advanced)
27.412 Coastal Geomorphology
27.860 Landform Studies
27.862 Australian Environment and Natural Resources
27.863 Ecosystems and Man
27.870 Landform Studies (Advanced)
27.872 Australian Environment and Natural Resources (Advanced)
27.880 Advanced Geographic Methods
27.890 Thesis and Associated Seminars
27.893 Honours Physical Geography
27.894 Honours Urban Geography
27.895 Honours Social Geography

Graduate Study
27.901G Geomorphology for Hydrologists S2 L1½T1½
Geomorphological controls in the initiation of drainage systems. Drainage
networks as geomorphological systems. Types of drainage
channel. River floodplains and terraces. Drainage systems of arid
regions. Geomorphology of representative basins and vigi catchments.
Geomorphology in the assessment of water resources. Landforms
produced by underground water. Aerial photo and map analysis of drainage
features and map and field study of a vigil catchment.

27.902G Meteorological and Hydrological Principles S2 L3TO
Global pressure, wind and climatic patterns. Atmospheric stability,
temperature inversions, aerological diagrams. Synoptic and local wind
systems, dispersal of atmospheric pollutants under various conditions of
stability and wind. Precipitation and precipitation fallout. Weather
forecasting with particular reference to forecasting pollution potential.

relationships; frequency analyses in hydrology. Drought and low flow
analyses. Channel morphology and stream velocity characteristics, tidal
estuaries, ocean currents. Dispersal of pollutants in flowing water.

Servicing Subjects
27.295 Physical Geography for Surveyors S1 L2T2
27.801 Introduction to Physical Geography
27.802 Introduction to Human Geography
27.811 Physical Geography
27.812 Human Geography
27.813 Geographic Methods

*Offered subject to availability of staff.
27.904G Geomorphology for Engineering Geologists S2 L1/2T1/2

28.032 Behavioural Science S1 L2T2
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. The nature and scope of behavioural science; culture; social institutions; groups; social class; interpersonal and mass media communication; learning; perception; personality.

28.042 Consumer Behaviour
Prerequisite: 28.032
The specific sociological and psychological topics in Behavioural Science are applied to the problem of understanding the consumer in the marketing context. The following areas are covered: motivation and arousal; consumer behaviour as a decision process; problem recognition; search behaviour; choice behaviour; purchasing processes; post-purchase behaviour.

28.012 Marketing Systems
A conceptual introduction to marketing from the systems viewpoint. Discusses the 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 the 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.

28.022 Marketing Models
Quantitative analysis in marketing decision-making in business situations. The derivative (pricing for profit maximization, inventory policy for cost minimization); linear programming (designing programs to maximize profits); techniques of planning (product launch using PERT); probability competitive bidding theory; market decision-making under conditions of uncertainty; assignment algorithm (allocation of salesmen to territories); physical distribution (total system costing, etc.)

The program is designed to provide students with the opportunity to develop their ability to apply quantitative methods to practical marketing problems.

29.441 Surveying for Engineers S1 or S2 L2T4

29.491 Survey Camp
A one-week field camp for students studying 29.441 Surveying for Engineers.

†Offered subject to availability of staff.
Subject Descriptions

Department of Organizational Behaviour

Undergraduate Study

30.043 Societal and Organizational Change  S2 L1T2

Prerequisites: 14.542, 15.526, 15.052, 15.062, 28.012.

Social change in Australia from an institutional and organizational perspective. Emphasises the interaction of scientific, technological, political, economic, kinship and other institutions and the role played in this process by complex organizations. Among the themes and topics covered are: the nature of social institutions with some Australian examples; the dynamics of institutional and organizational conflict and change; changing values and their impact on organizations; organizational responses to changing environments. Special topics: ideologies of work and leisure, employment and unemployment, public and private sector organizations, analysis of consequences of change for the individual and society.

School of Food Technology

Undergraduate Study

38.121 Food and Man  S2 L3T3

Prerequisites: 2.121, 2.131, 17.031, 17.021, 41.101, 44.143.


Inspection of bulk food handling facilities in areas of horticultural products, milk, meat and eggs; assessment of modern food retailing systems; quality and nutritional assessment of foods by instrumental and panel techniques.

38.131 Principles of Food Preservation  S1 L4

Prerequisite: 38.121.


38.132 Plant Food Science  S1 L3

Co-requisite: 38.131.

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; chemical and sensory quality control procedures. Cereals: structure, composition and uses of wheat, rice, rye, corn, sorghum; wheat milling, flour properties; technology of bread, pasta, biscuit and cake manufacture; starch-gluten separations and derived products.

Plant-Derived Products. Sugars: sources, types, composition, use with other foods; sugar milling, refining; confectionery manufacture, control of spoilage. Lipids: sources, composition, extraction, purification processes, chemistry; processing of cooking oils, margarine, margarinates, and other fat products. Other Plant-Derived Products: Technological aspects of herbs and spices, tea, coffee, tobacco, cereal foods, etc.

School of Town Planning

Undergraduate Study

36.411 Town Planning

shortenings; use with other foods. Proteins; sources, extraction procedures, nutritional and toxicological factors, texturizing processes, use with other foods.

38.133 Animal Food Science

Prerequisites: 2.002A, 2.002B, 2.002D, 38.121.


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.


38.134 Food Science Laboratory


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, 38.431 and 38.531. 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. Includes metropolitan factory inspections and a field excursion of one week to food production, processing and research organizations in Northern N.S.W. and Queensland.

38.140 Food Technology Project

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: 2.043L, 38.131, 38.132, 38.133, 38.134, 38.331, 38.531.

Food legislation: State and NH&MRC food standards and mechanisms; Codex standards; case studies in food standards development; food and nutrition policy.

Process control: revision of statistics, mean, variance, test of hypotheses, sample procedures; measurement of residence time distribution curves.

Pest control: creation of pest problems; techniques of pest control; effects of control measures on environment.

Non-microbial hazards in foods: definition; types of compounds that can be found in food and their effect on man; foods in which toxicants are found; methods of inactivation.

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.

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; vine 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 procedures, 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 fortified 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.

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.

38.147 Food Quality Assessment  S2 L2
Prerequisite: 38.141.
Characteristics of food quality: colour, its instrumental assessment, standards and grades in food products; flavour perception, theories of taste and odour response, the characterisation of food volatiles by GC, IR, MS; texture and consistency of foods, their subjective and objective assessment.

Taste panel methodology: design of questionnaires, environmental conditions, panel selection and training; case studies of several types of taste tests, including consumer surveys; correlation of objective and subjective results of particular foods, masking and synergism of flavours.

38.148 Communications in Food Science and Nutrition  S1 L1T2
Prerequisites: 38.131, 38.132, 38.133, 38.134, 38.331, 38.531.
Sociocultural and psychological basis of attitudes and beliefs in food nutrition and food hygiene. Educational techniques for implementing behavioural and attitudinal change at varying levels of specialization. Skills in preparation and delivery of oral and written presentation, use of instructional media, preparation of audiovisual aids. Planning and evaluation of instructional units.

38.331 Food Microbiology I  S2 L2
Prerequisite: 44.143 or other equivalent introductory Microbiology course.
Food spoilage: Microbial ecology of food spoilage; specific microbial associations; taxonomy of dominant species. Biochemistry and physiology of microbial growth in foods; psychrophiles, mesophiles, thermophiles, osmophiles, halophiles; production of degradative enzymes, off-flavours, odours and slimes.
Food fermentation: Microbial fermentation of foods as a means of preservation and flavour enhancement; microbial ecology and biochemistry of food fermentations. Fermented milk, vegetable, meat and seafood products; Baker's yeast, food yeasts and yeast autolysates. Single cell protein. Microbial enzymes and polysaccharides in foods.

38.431 Food Engineering I  F L3
The basic equations describing the transport of momentum, energy and mass through solids, liquids and gases; engineering thermodynamics, automatic process control; the engineering approach to problem solving; the selection and operation of processing equipment relevant to the food industry.

38.441 Food Technology (Chemical Engineering)  L4T3

38.442 Food Engineering II  F L3
Prerequisite: 38.431.
An extension of material introduced in 38.431 Food Engineering I with an emphasis on the analysis of flowsheets of selected food plants; discounted cash flow analysis; plant layout; energy conservation in the food industry.
38.531 Nutrition

Prerequisite: 38.121.

Food consumption patterns of various socio-economic groups. Dietary imbalance, nutritional disorders of affluence including coronary heart disease, obesity, hypertension; problems of undernutrition including protein, energy, mineral and vitamin deficiencies. Nutrition of risk groups, particularly infants, children, pregnant women and the elderly. Effects of food processing on macronutrients and micronutrients, significance within normal mixed diet. Effects of nutrification of foods on human nutritional status.

38.541 Advanced Nutrition

Prerequisite: 38.531.

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.

38.542 Special Topics in Nutrition

Prerequisite: 38.541.

Detailed review of specific areas of nutrition of current and/or controversial interest including vitamin supplementation; diet and coronary heart disease; treatments for obesity; nutrition and mental development; alternative food cults; the role of dietary fibre; trace mineral nutrition; food additives and hyperkinesis, infant feeding; nutrition of low-income groups.

38.543 Field and Laboratory Methods in Nutrition

Prerequisite: 38.541.

Methods of nutritional assessment including anthropometry, energy expenditure, dietary intakes, biochemical assay of nutrients and metabolites in body tissues and fluids. Survey design, data processing and interpretation. Analytical methods for nutrients in foods, including advanced instrumental techniques.

Graduate Study

38.151G Introductory Food Science

Prerequisites or co-requisites: 2.271, 42.211G, 42.212G, or their equivalents.

An introduction to the history of food preservation and human nutrition. Current world food patterns, organisations and trade. Food chemistry and the role of nutrients in human nutrition; elements of food microbiology, food hygiene and public health aspects of foods. Parameters of food quality; food choice and social behaviour; food and society.

38.152G Food Process Laboratory

Co-requisite: 38.154G.

An integrated series of laboratory and pilot plant exercises illustrating the principles and procedures involved in processing 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.

38.154G Food Technology

Co-requisite: 38.151G.


38.155G Dairy Technology

Prerequisites or co-requisites: 2.271, 42.211G, 42.212G, or their equivalents.

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 cereal strand.

World production of cereals; cultivation, diseases, harvesting and storage of cereal crops. Grain morphology and components, cereal quality, quality and yield improvements by breeding. Milling of wheat, flour types, flour testing, suitability for different purposes, flour component interactions in doughs, flour bleaches and dough improvers.

38.158G Marine Products
Prerequisite: 38.133 or marine strand of 38.154G.


38.159G Food Process Wastes
Prerequisite or co-requisite: 3.163G.


38.160G Food Quality Assessment

The characteristics of food quality. Colour, its subjective and objective assessment, standards and grades in food products. Flavour, the physiology of flavour perception, theories of taste and odour perception, the characterization of food volatiles. Texture and consistency of foods, their subjective and objective assessment. The use of taste panels and evaluation of results. Principles of consumer testing.

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: 38.151G.

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.

38.351G The Microbial Ecology of Foods
Prerequisites: An introductory course in Microbiology, 38.154G 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 standards.

38.551G Advanced Nutrition
Prerequisite: 38.151G. Co-requisite: 38.154G.

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 Nutrition 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.
Graduate School of the Built Environment

Graduate Study

39.908G Community Noise Control S2 L1T1

Introduction; sound and sound propagation; sound power, sound pressure, decibels; sound perception, psychoacoustics; loudness, annoyance, phons and dB(A); hearing conservation; acoustic measuring and analysing 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.

41.102A Biochemistry of Macromolecules S1 L3T9

Prerequisites: 41.101 and 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 and 2.002B.


41.102C Plant Biochemistry S2 L2T4

Prerequisites: 41.101 and 2.002B.

The biochemistry of the major pathways characteristic of plants will be studied; topics include the energetics and carbon path of photosynthesis, glyoxalate cycle, growth hormones and regulatory phenomena, nitrogen fixation and assimilation. Experimental work to illustrate and amplify the subject utilizes radioactive isotopes and a number of newer techniques.

41.102D Biosynthesis of Plant Metabolites S2 L2T4

Prerequisites: 41.101 and 2.002B. Co-requisite: 41.102C.

This unit complements 41.102C and is taken with it. Topics covered: cell wall formation and the synthesis and mobilization of reserve materials; biosynthesis of amino acids, its regulation, and their conversion into non-protein material, eg. alkaloids and cyanogenic glycosides; aromatic ring formation and the isoprene pathway as a source of rubber, steroids, carotenes and essential oils. Flower pigments and phytoalexins will be discussed briefly. Practical work, combined with 41.102C illustrates and amplifies the subject and includes a wide range of the latest techniques.

School of Biochemistry

Undergraduate Study

41.101 Biochemistry S1 L4T8

Prerequisites: 17.021, 2.121 and 2.131. Excluded: 2.003J.

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.
Subject Descriptions

School of Biological Technology

Undergraduate Study

42.102A  Biotechnology A  S1 L2T4
Prerequisites: 41.101 and 42.101 or 44.101.

The basic principles involved in the operation of microbial processes on an industrial scale, including: 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. Discussion of 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 fermenter operation, microbial enzyme isolation, visits to industrial fermentation plants and industrial seminars.

42.102B  Biotechnology B  S2 L2T4
Prerequisite: 42.101.

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 will be 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, are major components.

Graduate Study

42.211G  Principles of Biology

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 is 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 fermentor design; control of the microbial environment involving computer/fermentor interactions. Industrial examples are selected from: antibiotic and enzyme production, alcoholic beverages, single cell protein (SCP), microbial waste disposal and bacterial leaching.

Tutorial/practical sessions include: problem solving, instrumentation, continuous culture techniques, and mathematical modelling and simulation of industrial processes.

School of Botany

Undergraduate Study

43.101  Introductory Genetics  S2 L2T4
Prerequisites: 17.001 or 17.011 and 17.021 or 17.031 and 17.021.

Various aspects of molecular, organismal and population genetics, including: meiotic and non-meiotic recombination, genome variation, mutagens and mutation rates, cytoplasmic inheritance, gene function, genetic code, gene structure, collinearity of polynucleotide and polypeptide, control of gene action, genes and development, population genetics, genetics and improvement of plants and animals.

43.111  Flowering Plants  S1 L2T4
Prerequisites: 17.001 or 17.011 and 17.021 or 17.031 and 17.021.

The vegetative and floral morphology of Angiosperms with special reference to variations in morphology, elements of biological
classification, nomenclature and identification of native plants. Weekend field work is part of the subject.

43.112 Plant Taxonomy*  
S2 L2T4  
Prerequisite: 43.111. Prerequisite or co-requisite: 43.101.

Considers the assessment, analysis and presentation of data for classifying plants both at the specific and supra-specific level with emphasis on vascular plants. Field work is part of the subject.

43.121 Plant Physiology  
S2 L2T4  
Prerequisites: 17.001 or 17.011 and 17.021 or 17.031 and 17.021 and 2.001 or any two (2) units of 2.111, 2.121, 2.131.

The physiology of the whole plant: photosynthesis, inorganic nutrition, transport, translocation, physiology of growth and development, plant growth substances and their application in agriculture.

43.142 Ecology and Environmental Botany*  
S1 L2T4  
Prerequisites: 17.001 or 17.011 and 17.021 or 17.031 and 17.021.

The soil and atmospheric environments in which plants live and the interaction of plants with their environment. Emphasis is placed on the role of environmental sciences in food production. Students are required to attend three week-day field excursions as part of the practical course.

43.162 The Plant Kingdom*  
S2 L2T4  
Prerequisite: 43.111.

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 is part of the subject.

School of Sociology

Undergraduate Study

53.001 Introduction to Sociology (Double Unit)


Under these two headings such issues are social control, power, racism, sexism, work and leisure, class distinction, etc. treated both factually and theoretically, are considered as they relate to the situation in Australia and in the developing countries.

*Note: 1. The subject 43.112 Plant Taxonomy, alternates with 43.162 The Plant Kingdom (43.112 will be given in 1980). 2. 43.112 Plant Taxonomy and 43.142 Environmental Botany. These units may be taken in either second or third year of the Science course provided that prerequisites have been completed.
School of Education

Undergraduate Study

58.061 Methods of Teaching I  F L1T2
Prerequisite: 58.512. Co-requisite: 58.513.

Application of principles of educational philosophy and educational psychology to learning in sheep and wool technology, eg, a discussion of aims, verbal learning, learning of skills, procedures to assist learning such as lesson planning and the use of audio-visual aids. Methods of teaching special aspects of sheep and wool technology.

58.062 Methods of Teaching II  F L1T2
Prerequisite: 58.061. Co-requisite: 58.514.

An introduction to curriculum theory. The planning of units of work and programming. Evaluation of the outcomes of instruction. A continuation of the methods of teaching special aspects of sheep and wool technology.

58.063 Seminar and Thesis on Educational Issues  F T2

58.512 Introduction to Education  F L2

The subject serves as a basis for study in greater depth of educational psychology, philosophy and theory of education, research methods and sociology of education in succeeding years and shows the contribution of each to the practice of teaching. This contribution is discussed in lectures and seminars and illustrated by school visits which take place at various times throughout the year.

The time allocation for the subject includes 14 hours spent in field work involving the visits to schools.

58.513 Education IA  F L4
Prerequisite: 58.512. Co-requisite: 58.061.

This subject covers Educational Psychology, Philosophy and Theory of Education, Research Methods and Sociology of Education. Educational Psychology: The Educational Psychology strand of the subject includes learning, cognition and individual differences. Philosophy and Theory of Education: Curriculum theory and curriculum development, theory in education with reference to educational objectives, and an analysis of values leading to a concept of education. Various concepts within the context of theory and values, such as responsibility and punishment, indoctrination, equality, creativity. Research Methods in Education: An introduction to the methods and principles of research in education. Topics emphasize those techniques necessary for the analysis and interpretation of data from educational research designs of both the experimental and survey type, which include simple and multiple correlation and regression, and a detailed treatment of analysis of variance. Sociology of Education: The sociology of education. The role of education in Australian society with particular attention to inequality, adolescent groups including a study of deviants and cultural deprivation. A sociological analysis of classroom groups including group interaction, reference group theory and role theory. An analysis of social structure in the secondary school and the school in the local community. A study of teacher groups with particular attention to role and professionalism.

58.514 Education IIA  F L4
Prerequisite: 58.513. Co-requisite: 58.062.

Four options, each of which occupies two hours per week of class time for one session. The options may be chosen from those given below. However, whether a given option is offered depends on the availability of staff in a given year and other options may be added from time to time.

Options in Educational Psychology

Educational Measurement: The purposes and methods of measurement available to the classroom teacher, including the use of standardized tests. The place of Guidance Counsellors in an evaluation program.

Motivation in the Classroom: Observations of various forms of communication in the classroom suggestive of inner needs. Procedures to facilitate awareness of motives and possible methods for satisfying or controlling them.

Personality: Structure and culture; normal and abnormal behaviour; adjustment and readjustment; attitudes and traits; analysis and measurement; a further look at empathy, role playing, and sensitivity training in classroom.

Computer Assisted Instruction: Within the next few years computers will be commonplace in the classroom requiring teachers with new skills and knowledge. The purpose of this option is to provide a foundation for the skill development necessary to use CAI effectively. It involves both theoretical and practical components, the latter using computer terminals located in the School of Education. No prior experience is assumed.

Programmed Instruction: Students develop appropriate skills and knowledge in the field of programmed instruction to enable them to function effectively in the preparation of instructional sequences which are educationally sound. The use of computer assisted instruction, allowing a practical evaluation of its effectiveness. Students co-operate in the preparation and trialling of programmed materials which might contribute to available teaching resources in their area.

Audio-visual Aids: Students discuss psychological concepts such as attention, novelty and its determinants, perception in relation to the process. This provides a basis for a study of the techniques and equipment involved in the preparation of teaching aids for classroom use. A group project utilizing these skills and knowledge should produce some useful, psychologically-based materials.

Options in Philosophy and Theory of Education

Ethical Theory and Moral Education: The educational implications of the major ethical theories: the structure of ethical theories; educational implications consistent with a given structure; and practical issues concerned with moral education.

Justification for Teaching: Certain broad aims of education and expectations of teachers; the extent of their justification and their practical possibility. The stated aims of the Wyndham Scheme are then put to the theoretical and practical test, and students are asked to defend the teaching of certain subjects with special reference to science and industrial arts by showing what benefits will be brought to their
pupils. (This option does not duplicate material covered in curriculum and instruction strands.)

Methodology for Criticism: 1. Develops methods and techniques whereby meaningful discussion of educational issues can take place; 2. Critical discussion on issues such as: examinations, assessments, schooling, discipline, equality of opportunity, university degrees, authority, curricula, subjects, and indoctrination.

Moral Education in the Schools: What is moral education? How best can it be brought about? Should schools be concerned with moral education? Do schools confuse moral with practical, prudential, religious and even aesthetic issues, and what might be the consequences and implications of this?

Social Philosophy and Education: Some of the main themes in social philosophy, including the social principles of democracy, freedom and authority, constraint, the individual and society, equality of opportunity. The social functions of the school, and the problems of the above concepts within the closed society of the school.

Philosophy of the Curriculum: How is knowledge involved in education? Are there structures of knowledge which could structure the curriculum? What are the connections between knowledge and skill and knowledge and understanding? What is meant by 'integration of the curriculum'? What is at issue between the advocates of specialized versus general education? Should there be a compulsory curriculum? What is the importance of psychological and sociological considerations in the curriculum formation?

The Aims of Education in Theory and Practice: The theories of some influential educationists and some attempts to apply them. Progressive theories and schools, and the de-schooling movement.

Philosophy of Science and the Teaching of Science: Post-'classical' philosophy of science with an emphasis on the work of Kuhn, Lakatos and Feyerabend, and some elements of Karl Popper's work as a background. What is scientific activity? Evaluation of School Science courses, and ways in which they can be improved. The social dimensions of science and recent work on values, goals, purposes in scientific activity, encompassing wide ranging issues from rationality in science; religion and science. Are Marxism and Freudianism scientific enterprises? What bases are there for the 'Science for the People' movement? What influences science in a capitalist society?

Science and Religion in Education: Comparison of religious beliefs with science, the place of science and religion in the school. Do science and religion conflict? Are religious beliefs like scientific beliefs? Are they rational? How can they be supported? Can faith replace reason? Is there a God? Can there be miracles? Has the teaching of religion a place in schools? Should a science teacher avoid disturbing religious belief? Has the teacher the right to argue for a religious or atheist viewpoint? The problem of evil.

Option In Research Methods in Education

Educational Research: Provides a basis in some depth for applied educational research. It forms a sequence with the research methods strand in 58.513 Education IA.

Options in Sociology of Education

Australian Education Systems: An Historical and Sociological Analysis: The historical development of Australian education and the application of the sociological perspective to investigate whether Australian education systems are meeting the needs of Australian society.

Society Today and Tomorrow: Implications for Education: Some major characteristics of and trends in society, such as urbanization, social change, bureaucratic organization, the counter culture, community vs. association, work and leisure patterns, with special reference to the ecological situation and to the significance of values and value transfer. Possible curriculum implications and some of the fundamental questions these social issues raise concerning the role education plays in society.

Socio-cultural influences on the Education of Adolescents: The application of the sociological perspective to the education of adolescents.

The Education of Disadvantaged Groups: The education of disadvantaged groups in Australia, in particular women and migrants.
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 Faculty Information 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 earlier in this handbook (see General Information: Financial Assistance to Students) there are a number of scholarships available to students. What follows is an outline only. Full information may be obtained from the Student Employment and Scholarships Unit, located in 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>$150 pa</td>
<td>Minimum period of approved degree/combined degree course</td>
<td>Merit in HSC and total family income not exceeding $4000</td>
</tr>
</tbody>
</table>

*Apply to The Secretary, Bursary Endowment Board, Box 460, PO, North Sydney 2060 immediately after sitting for HSC.
### Undergraduate Scholarships (continued)

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>General (continued)</strong></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>

### Applied Geology

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Esso Australia Ltd</td>
<td>Up to $600 pa</td>
<td>1 year</td>
<td>Permanent residence in Australia and eligibility for admission to Year 4 or honours year of full-time Applied Science or Science Course in Geology or Geophysics</td>
</tr>
</tbody>
</table>

### Ceramic Engineering

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian Ceramic Society</td>
<td>Up to $600 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 first or second year of the full-time degree course in Ceramic Engineering</td>
</tr>
<tr>
<td>Australian Consolidated Industries Ltd</td>
<td>Up to $600 pa</td>
<td>1 year renewable for the duration of the course subject to satisfactory progress</td>
<td>Permanent resident status in Australia and eligibility for admission to the first or second year of the full-time degree course in Ceramic Engineering</td>
</tr>
<tr>
<td>The Brick Manufacturers' Association of New South Wales</td>
<td>Up to $900 pa</td>
<td>1 year renewable for the duration of the course subject to satisfactory progress</td>
<td></td>
</tr>
<tr>
<td>The State Brickworks</td>
<td>Up to $900 pa</td>
<td>1 year renewable for the duration of the course subject to satisfactory progress</td>
<td></td>
</tr>
<tr>
<td>Wunderlich Limited</td>
<td>Up to $600 pa</td>
<td>1 year renewable for the duration of the course subject to satisfactory progress</td>
<td></td>
</tr>
</tbody>
</table>
**Undergraduate Scholarships (continued)**

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chemical Engineering</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shell Refining (Australia) Pty Ltd</td>
<td>Up to $400 pa</td>
<td></td>
<td>Eligibility for admission to the second year of the full-time course in Chemical Engineering</td>
</tr>
<tr>
<td>Dow Chemical (Australia)</td>
<td>Up to $500 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 second year of the full-time 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 Fuel Technology</td>
</tr>
<tr>
<td><strong>Food Technology</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bush Boake Allen Pty Ltd</td>
<td>Up to $4000 over 4 years</td>
<td></td>
<td>Permanent residence in Australia and eligibility for admission to the first year of the full-time degree course in Food Technology</td>
</tr>
<tr>
<td>Coca-Cola Export Corporation</td>
<td>Up to $1000 pa</td>
<td>1 year renewable for the duration of the course subject to satisfactory progress</td>
<td>Not more than 22 years of age on 1 December preceding the year in which the award commences and eligibility for admission to the full-time degree course in Food Technology</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>Gillespie/White Wings</td>
<td>Up to $1000 pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fuel Technology</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 Fuel Technology</td>
</tr>
<tr>
<td><strong>Metallurgy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School of Metallurgy</td>
<td>Up to $500 pa</td>
<td>1 year renewable for the duration of the course subject to satisfactory progress</td>
<td>Eligibility for admission to the first year of the full-time course in Metallurgy or Metallurgical Engineering</td>
</tr>
</tbody>
</table>
### Undergraduate Scholarships (continued)

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining Engineering</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 the third or fourth year of the full-time degree course in Mining Engineering</td>
</tr>
<tr>
<td>Textile Technology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Australian Wool Corporation</td>
<td>$2348 or</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>Bonds Industries Ltd</td>
<td>$1523 pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bradmill Industries Ltd</td>
<td>Up to $4000 over 4 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wool and Pastoral Sciences</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Australian Estates Co Ltd</td>
<td>Up to $1000 pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Australian Wool Corporation</td>
<td>$2348 or</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>Commercial Banking Company of Sydney Limited</td>
<td>Up to $1000 pa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dalgety Australia Limited</td>
<td>Up to $4000 over 4 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Merck Sharp &amp; Dohme (Aust) Pty Ltd</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 $1000 pa</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Graduate Scholarships

Application forms and further information are available from the Student Employment and Scholarships Unit, located in the Chancellery. This unit provides information on additional scholarships which may become available from time to time, mainly from funds provided by organizations sponsoring research projects.
### Graduate Scholarships (continued)

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of New South Wales Research Awards</td>
<td>Living allowance of $4200 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 Registrar by 31 October (30 November in special circumstances)</td>
</tr>
<tr>
<td>Commonwealth Postgraduate Research Awards</td>
<td></td>
<td>As above</td>
<td>Applicants must be honours graduates (or equivalent) who will graduate with honours in current academic year, and who are permanent residents in Australia.</td>
</tr>
<tr>
<td>Commonwealth Postgraduate Course Awards</td>
<td>1-2 years; minimum duration of course</td>
<td></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 (in special circumstances applications will be accepted 30 November).</td>
</tr>
<tr>
<td>Australian American Educational Foundation Travel Grant*</td>
<td></td>
<td></td>
<td>Applicants must be graduates, senior scholars or post-doctoral fellows. Applications close 30 September.</td>
</tr>
<tr>
<td>Australian Federation of University Women</td>
<td>Amount varies, depending on award</td>
<td>Up to 1 year</td>
<td>Applicants must be female graduates who are members of the Australian Federation of University Women.</td>
</tr>
<tr>
<td>The British Council Commonwealth University Interchange Scheme</td>
<td>Cost of travel to UK or other Commonwealth country university</td>
<td></td>
<td>Applicants must be: 1. University staff on study leave. Applications close with Registrar by 30 November, for visits to commence during ensuing financial year 1 April to 31 March. 2. Graduate research workers holding research grants. Applications close with Registrar in December for visits to commence during ensuing 1 April to 31 March.</td>
</tr>
<tr>
<td>The Caltex Woman Graduate of the Year</td>
<td>$5000 pa 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 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.</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>Year/s of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commonwealth Scholarship and Fellowship Plan</strong></td>
<td>Varies for each country. Generally covers travel, living, tuition fees, books and equipment, approved medical expenses. Marriage allowance may be payable.</td>
<td>Usually 2 years, sometimes 3</td>
<td>Applicants must be graduates who are Commonwealth citizens or British Protected Persons, and who are not older than 35 years of age. Applications close with Registrar by 1 October.</td>
</tr>
<tr>
<td><strong>Sam Cracknell Memorial</strong></td>
<td>Up to $3000 pa</td>
<td></td>
<td>See above under Undergraduate Scholarships, General</td>
</tr>
<tr>
<td><strong>Ruth A. Cumming (ESU)</strong></td>
<td>$500-$2000</td>
<td></td>
<td>Applicants must be residents of NSW or ACT. Awarded to young graduates to further their studies outside Australia.</td>
</tr>
<tr>
<td><strong>Gowrie Graduate Research</strong></td>
<td>Maximum $2000 pa in Australia, and $2750 if tenable overseas</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.</td>
</tr>
<tr>
<td><strong>Harkness Fellowships of the Commonwealth Fund of New York</strong>&lt;sup&gt;a&lt;/sup&gt;</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>Between 12 to 21 months</td>
<td>Candidates must be either: 1. Members of the Australian or a State Public Service or semi-government Authority. 2. Staff or graduate students at an Australian university. 3. 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 30 years of age. Applications close July.</td>
</tr>
<tr>
<td><strong>Frank Knox Memorial Fellowships at Harvard University</strong></td>
<td>Stipend of $3800 pa plus tuition fees</td>
<td>1 year, 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><strong>Nuffield Foundation Commonwealth Travelling Fellowships†</strong></td>
<td>Living and travel allowances</td>
<td>1 year</td>
<td>Australian citizens usually between 25 and 35 who are graduates preferably with higher degrees and who have at least a year’s teaching or research experience at a university. Applications close by February.</td>
</tr>
</tbody>
</table>

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*Application forms must be obtained from the Australian representative of the Fund, Mr L. T. Hinde, Reserve Bank of Australia, Box 3947, GPO, Sydney, NSW 2001. These must be submitted to the Registrar by 24 July.

†Applications to the Secretary, The Nuffield Foundation Australian Advisory Committee, PO Box 783, Canberra City 2601.

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Graduate Scholarships (continued)

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Rhodes Scholarship**</td>
<td>Approximately £3300-£3600 pa</td>
<td>2 years, may be extended for a third year</td>
<td>Unmarried male and female Australian citizens, between the ages 19 and 25 who have been domiciled in Australia at least 5 years and have completed at least 2 years of an approved university course. Applications close in July each year.</td>
</tr>
<tr>
<td>Rothmans Fellowships Award‡</td>
<td>$14000 pa</td>
<td>1 year, renewable up to 3 years</td>
<td>The field of study is unrestricted. Applications close early September each year.</td>
</tr>
</tbody>
</table>

Applied Science

| Australian Wool Corporation Research Scholarship in Textile Technology | $4200 pa plus allowances | 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 | Applicants must be graduates in textile physics, textile chemistry, or textile engineering or an appropriate discipline in science or engineering |
| Nigerian Meat Research Committee Award* | Minimum 2 years. Maximum 3 to 4 years | | |

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.
## Undergraduate University Prizes

### General

<table>
<thead>
<tr>
<th>Name of Prize</th>
<th>Value</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sydney Technical College Union Award</td>
<td>50.00</td>
<td>Leadership in the development of student affairs, and academic proficiency throughout the course.</td>
</tr>
<tr>
<td>University of New South Wales Alumni Association</td>
<td>Statuette</td>
<td>Achievement for community benefit — students in their final or graduating year.</td>
</tr>
</tbody>
</table>

### Faculty of Applied Science

<table>
<thead>
<tr>
<th>Institution</th>
<th>Value</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institution of Engineers, Australia</td>
<td>Medal and 100.00</td>
<td>The most proficient final year (or last 2 years part-time) student in the Bachelor of Engineering (or Bachelor of Science (Engineering)) Degree courses offered by the following Schools: Civil Engineering, Electrical Engineering, Mechanical and Industrial Engineering, Chemical Engineering, Mining Engineering, Textile Technology (Engineering option only)</td>
</tr>
</tbody>
</table>

### School of Chemical Engineering

<table>
<thead>
<tr>
<th>Institution</th>
<th>Value</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<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>Borden Chemical Co (Aust) Pty Ltd</td>
<td>50.00</td>
<td>Best performance in Design and Process Reports in Year 3</td>
</tr>
<tr>
<td>Chamber of Manufacturers of New South Wales</td>
<td>15.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>Esso Australia Ltd</td>
<td>75.00</td>
<td>Best performance in Year 2 Chemical Engineering</td>
</tr>
<tr>
<td>Institution of Chemical Engineers</td>
<td>Medal and 100.00</td>
<td>Best performance for the thesis in the final year, or equivalent part-time stage, of the Bachelor of Engineering degree course</td>
</tr>
<tr>
<td>The North Shore Gas Co Ltd</td>
<td>40.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>The Shell Co of Aust Ltd</td>
<td>100.00</td>
<td>Best performance in Year 3 Chemical Engineering</td>
</tr>
<tr>
<td>Simon-Carves Australia</td>
<td>21.00</td>
<td>Best performance in Thermodynamics and Reaction Engineering in Year 3</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 (continued)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western Mining Corporation Ltd</td>
<td>150.00</td>
<td>Best overall performance in 3.036 Chemical Engineering Laboratory I in the Bachelor of Engineering degree course</td>
</tr>
<tr>
<td></td>
<td>150.00</td>
<td>Best overall performance in 3.044 Chemical Engineering Laboratory II in the Bachelor of Engineering degree course</td>
</tr>
<tr>
<td><strong>School of Chemical Technology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian Paper Manufacturers Ltd</td>
<td>21.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>Chemical Technology Society</td>
<td>30.00</td>
<td>Bachelor of Science degree course in Industrial Chemistry</td>
</tr>
<tr>
<td></td>
<td>20.00</td>
<td>Bachelor of Science degree course in Industrial Chemistry, Years 1 and 2 or Stages 1 to 4</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>Stauffer Australia Limited</td>
<td>50.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td><strong>School of Food Technology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wilfred B. S. Bishop</td>
<td>20.00</td>
<td>General proficiency throughout Bachelor of Science degree course in Food Technology</td>
</tr>
<tr>
<td><strong>Department of Fuel Technology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian Institute of Energy</td>
<td>50.00</td>
<td>For a fuel subject or allied course project</td>
</tr>
<tr>
<td>The Shell Co of Aust Ltd</td>
<td>100.00</td>
<td>Subject selected by Head of School</td>
</tr>
</tbody>
</table>
### Undergraduate University Prizes (continued)

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acan Australia Ltd</td>
<td>100.00</td>
</tr>
<tr>
<td>Austral Crane</td>
<td>100.00</td>
</tr>
<tr>
<td>Australian Institute of Metals</td>
<td>50.00</td>
</tr>
<tr>
<td>Australian Welding Institute</td>
<td>30.00</td>
</tr>
<tr>
<td>Chamber of Manufacturers of New South Wales</td>
<td>15.00</td>
</tr>
<tr>
<td>The Broken Hill Proprietary Co Ltd</td>
<td>50.00</td>
</tr>
<tr>
<td>The Eagle &amp; Globe Steel Co Ltd</td>
<td>50.00</td>
</tr>
<tr>
<td>The Electrolytic Refining and Smelting Co of Australia Ltd</td>
<td>20.00</td>
</tr>
<tr>
<td>Western Mining Corporation Ltd</td>
<td>150.00</td>
</tr>
<tr>
<td>Zinc Corp Ltd</td>
<td>40.00</td>
</tr>
</tbody>
</table>

**School of Metallurgy**

- Subject selected by Head of School
- Best overall performance in Year 3 full-time (or its equivalent part-time) in the Bachelor of Engineering (or Bachelor of Science (Technology)) degree course
- 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

### School of Mining Engineering

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint Coal Board</td>
<td>100.00</td>
</tr>
<tr>
<td></td>
<td>100.00</td>
</tr>
<tr>
<td></td>
<td>200.00</td>
</tr>
<tr>
<td>Western Mining Corporation Ltd</td>
<td>75.00</td>
</tr>
<tr>
<td></td>
<td>150.00</td>
</tr>
<tr>
<td></td>
<td>150.00</td>
</tr>
</tbody>
</table>

- Bachelor of Engineering degree course in Mining Engineering Year 2
- Bachelor of Engineering degree course in Mining Engineering Year 3
- Bachelor of Engineering degree course in Mining Engineering — general proficiency throughout the course
- Bachelor of Engineering degree course in Mining Engineering — general proficiency throughout the course
- Best overall performance in Year 3 of Bachelor of Engineering degree course
- Best overall performance in Year 4 of Bachelor of Engineering degree course
<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School of Textile Technology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J. B. Speakman</td>
<td>20.00</td>
<td>Undergraduate thesis</td>
</tr>
<tr>
<td>R. J. Webster</td>
<td>100.00</td>
<td>General proficiency throughout the Bachelor of Science degree course in Textile Technology</td>
</tr>
<tr>
<td><strong>School of Wool and Pastoral Sciences</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bayer Australia — Asuntol Sheep Dip</td>
<td>25.00</td>
<td>General proficiency — Wool and Pastoral Sciences degree course, Years 2 and 3</td>
</tr>
<tr>
<td>Parkes — Wool Promotion Committee</td>
<td></td>
<td>Bachelor of Science degree course in Wool and Pastoral Sciences, Year 3</td>
</tr>
<tr>
<td>A shield held in the School of Wool and Pastoral Sciences on which the successful student’s name is engraved each year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Samuel Clive Graham</td>
<td>50.00</td>
<td>Bachelor of Science degree course in Wool and Pastoral Sciences, Year 4 — Thesis</td>
</tr>
<tr>
<td>C. R. Lucock</td>
<td></td>
<td>Meat Science</td>
</tr>
<tr>
<td>A book or a voucher to the value of 50.00 payable to University Co-op Bookshop Limited</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. R. McMahon Memorial</td>
<td>100.00</td>
<td>Excellence in wool science</td>
</tr>
<tr>
<td><strong>W. S. and L. B. Robinson University College</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mining Managers Association Broken Hill</td>
<td>70.00</td>
<td>Best overall performance in a complete course</td>
</tr>
<tr>
<td>Mining Managers Association</td>
<td>40.00</td>
<td>Three prizes: one for each best pass in any complete stage of the degree courses in, Mechanical Engineering, Mining Engineering, Science respectively</td>
</tr>
<tr>
<td></td>
<td>30.00</td>
<td>Seven Prizes to be awarded in individual subjects selected by the Director</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>Western Mining Corporation Limited</td>
<td>150.00</td>
<td>Four prizes to be awarded for best performance in, 7.314R Mineral Process Technology, 7.313R Mineral Processing, 7.214R Mine Economics and Planning, 7.224R Operational Management</td>
</tr>
<tr>
<td>Broken Hill Women’s Auxiliary of the Austra/asian Institute of Mining and Metallurgy</td>
<td>30.00</td>
<td>Awarded for meritorious performance in a complete stage of a degree course</td>
</tr>
</tbody>
</table>

Graduate University Prizes

The following table summarizes the graduate prizes awarded by the University.

School of Chemical Engineering

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Clean Air Society of Australia and New Zealand</td>
<td>100.00</td>
<td>3.381G 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>
Faculty of Applied Science

Staff

Comprises Schools of Applied Geology, Chemical Engineering, Chemical Technology, Food Technology, Geography, Metallurgy, Mining Engineering, Textile Technology, and Wool and Pastoral Sciences.

School of Applied Geology

Professor of Geology and Head of School
Gerald James Spurgeon Govett, DSc Wales, PhD Lond., DIC, FIMM

Professor of Engineering Geology
Francis Clifford Beavis, MA Cant., BSc PhD Melb., FGS

Associate Professors
Laric Villier Hawkins, MSc Syd., FGS
Frederick Charles Loughnan, BSc Syd., PhD DSc N.S.W., AMAusIMM
John Roberts, BSc N.E., PhD W.Aust.
Bryce Leslie Wood, MSc DSc Otago, MAusIMM

Senior Lecturers
Alberto Albani, DrGeolSc Florence, MSc PhD N.S.W.
Alan Norval Carter, BSc PhD Melb., MSc Adel.
Phillip Richard Evans, BA Oxf., PhD Brist., FGS
Bastlaan Jan Hensen, MSc Ley., PhD A.N.U.
Michael Barry Katz, BS Mich. T.U., MSc McG., PhD Tor.
Peter Cyril Rickwood, BSc Lond., PhD Cape T., CChem, FGS, MRIC
Iftikhar Rasul Qureshi, MSc Panj., PhD Glas., FGS

Dean
Professor M. Chalkin

Chairman
Professor R. T. Fowler

Executive Officer
John David Collins, BSc PhD N.S.W., ATI

Senior Project Officer
Desmond Rokfalussy, BE Bud.

Professional Officers
Badan-Singh Deol, MSc Punj’l, PhD Syd.
Endel Nomm, BA Macq., MSc N.S.W.
Dante Simon Santea, DiplIng T.I. Assy

Electron Microscopist
Vivian Noel Edward Robinson, BSc PhD W.Aust.

Officer-in-charge, Drawing Office
Max Renner
Lecturers
John Craig Cameron, MA BSc Edin., DIC, MAAPG, AMAusIMM
Alistair Chisholm Dunlop, BSc N.E., PhD Lond., DIC, MIMM
Michael John Knight, BSc PhD Melb.
Robert James Whiteley, MSc Syd.

Senior Tutor
Maren Krysko von Tryst, BSc GradDip N.S.W., AMAusIMM

Honorary Associate
John Ringis, BE PhD N.S.W., MGSA

Administrative Officer
Graham John Baldwin, BA A.N.U.

Professional Officers
Peter Richard Atherden, BSc N.S.W., MSc Macq.
Frederick Ivor Roberts, BSc N.S.W.

Department of Biological Process Engineering

Senior Lecturer
Peter Munro Linklater, RDA, BAgSc Adel., MAgSc N.Z.,
PhD Wls.

Senior Lecturer
Robert James Hall, BSc PhD N.S.W.

Department of Chemical Engineering

Associate Professors
Ian Dracup Dolg, BSc(Eng) Lond., PhD N.S.W., CEng,
MIMechE, MIChemE
Peter Craig Farrell, BE Syd., SM M.i.T., PhD Wash., MASAIO
Christopher Joseph Dalzell Fell, BSc N.S.W., PhD Camb.,
CEng, MIChemE
Robert George Robins, MSc PhD N.S.W., MAMerlChE, ARACI,
AMAusIMM

Senior Lecturers
John Buchanan, ME Syd., PhD N.S.W.
Douglas Christopher Dixon, BE MEngSc Syd., PhD N.S.W.,
MIEAust
Anthony Gordon Fane, BSc PhD Lond., CEng, MIChemE
Phillip Souter, MSc Syd., ARACI
Robert Maraden Wood, BSc Leeds, PhD Camb., CEng,
FAIPet, MIChemE

Lecturers
Franklin Owen Howard, BE Syd., CEng
Val Wolf Pinczewski, BE N’cle.(N.S.W.), PhD N.S.W.

Professional Officers
Eric Alan Vincent Durbin, MAppSc N.S.W., CEng, MIChemE,
MIEAust
Orest Dworjanyn, MSc N.S.W., ASTC, ARACI
Cyril Leslie Samways, BSc Syd., MSc N.S.W.

Department of Fuel Technology

Associate Professor
Geoffrey David Sergeant, BSc PhD Wales, CEng, FInstF, FAIE

Senior Lecturers
Denis Barrett, MSc Leeds, PhD N.S.W., CEng, FInstF, FAIE
Kenneth Spencer Basden, BSc PhD N.S.W., ASTC, CEng,
FInstF, FAIE, MIEAust, ARACI, AMAusIMM
Staff

School of Chemical Technology

Professor of Chemical Technology and Head of School
David Lawrence Trimm, BSc PhD Exe., DIC

Senior Administrative Officer
John Robin Gatenby, ASTC

Professional Officers
Raymond George Anthony, BSc N.S.W., PhD Tas., ARACI
Robert Edmund Brand, BSc N.S.W., ASTC, ARACI
William Wal-Lam Ching, MSc N.S.W., ARACI
David John Kelly, BSc BE Syd.
John Walton Sharp, BSc(Tech) N.S.W.

Department of Industrial Chemistry

Associate Professor
Barry John Welch, MSc PhD N.Z., FNZIC, FRACI

Senior Lecturers
Barry George Madden, BSc PhD N.S.W., ASTC, FIEREAust
Mark Sebastian Wainwright, MAppSc Adel., PhD McM., ARACI

Lecturer
Michael Paul Brungs, BSc PhD N.S.W.

Department of Polymer Science

Associate Professor
John Kingsford Haken, MSc PhD N.S.W., ASTC, FRACI

Senior Lecturer
Rodney Phillip Chaplin, BSc PhD Adel., ARACI

Lecturer
Robert Paul Burford, BSc PhD Adel., ARACI

School of Food Technology

Professor of Food Technology and Head of School
Ronald Alexander Edwards, BSc PhD N.S.W., ASTC, FAIFST

Associate Professors
Terence Henderson Lee, BSc PhD N.S.W., FAIFST
Ronald Baden Howe Wills, BSc N.S.W., PhD Macq., ASTC, AAIFST

Senior Lecturers
Ronald Graham Bowrey, BE PhD N.S.W., AAIFST
Kenneth Alan Buckie, BSc PhD N.S.W., AAIFST, AFCIA
Michael Wootton, BSc PhD N.S.W., AAIFST, ARACI, MAGI

Department of Ceramic Engineering

Associate Professor
Eric Robert McCartney, BSc Syd., PhD N.S.W., FICeram, MIEAust, ARACI

Lecturers
Sviatoslav Antonovich Prokopovich, MSc N.S.W., ASTC
David John Young, BSc PhD Melb.
Lecturers
Graham Harold Fleet, MSc Qld., PhD Calif., AAIFST
Heather Greenfield, BSc PhD Lond., AAIFST

Tutors
Vera Szopen, BSc N.S.W.
Annesley Jean Watson, BSc N.S.W.

Administrative Assistant
Richard John Greenwood, BA N.S.W.

Professional Officers
Maxwell Robert Bell, BSc N.S.W., ASTC
Brigitte Mary Cox, BSc N.S.W., AAIFST, AFCIA

Honorary Visiting Fellow
Kevin Joseph Scott, BScAgr DipEd Syd.

School of Geography
Professor of Geography and Head of School
Jack Alan Mabbutt, MA Camb.

School of Metallurgy
Professor of Physical Metallurgy and Head of School
Hugh Muir, BMetE Melb., ScD M.I.T., CEng, FIM, MAusIMM

Professor of Chemical and Extraction Metallurgy
Vacant

Senior Administrative Officer
Reginald Arthur Ball, ASTC, MAusIMM, ARACI, AFAIM

Senior Project Scientist
Anthony Samuel Malin, MSc PhD N.S.W., CEng, MIM
Staff

Professional Officers
Edda Risoti, ASTC, ARACI
UIC Joasoo, MSc N.S.W., ASTC, AMAusIMM
John Milton Newburn, MSc N.S.W., ASTC, MIM
Frederick Henry Scott, BSc N.S.W., MAIP
John Armitage Taylor, ASTC, FAISS, MIEAust, AMAusIMM

School of Mining Engineering

Professor of Mining Engineering and Head of School
Frank Ferdinand Roxborough, BSc PhD Durh., CEng, FIMInE, FIMM, AMAusIMM

Professor of Mining Engineering
John Phillip Morgan, BE Adel., ASTC, FSASM, FIEAust, FAIM, AMAusIMM, MAIME, CertMineManager

Senior Lecturer and Director of Undergraduate Studies
Donald Read Cooley, BE N.S.W., DIC, MIEAust, AMAusIMM

Administrative Assistant
Wolter Cornelis Huisman, BA N.S.W.

Department of Chemical and Process Metallurgy

Senior Lecturers
Sidney Blair, BSc PhD Manc.
Bruce Harris, BSc Syd., MSc N.S.W., AMAusIMM
Alan Philip Prosser, BSc PhD Lond., DIC, ARCS, ARACI, AMAusIMM
David Ronald Young, BSc(Eng), PhD Lond., ARSM, AMAusIMM

Department of Materials

Associate Professor
Lewis Henry Keys, MSc PhD N.S.W., ASTC, CEng, FIM

Senior Lecturer
Keith Robin Lee Thompson, BSc Wales, PhD N.S.W., CEng, MIM

Lecturer
Peter Kraukiis, BSc PhD N.S.W., CEng, MIM

Department of Physical and Industrial Metallurgy

Associate Professors
Max Hatherly, MSc PhD N.S.W., ASTC, CEng, FIM
Greig Richard Wallwork, BSc PhD DSc N.S.W., ASTC, CEng, FIM

Senior Lecturers
David John Haviland Corderoy, BSc N.S.W., PhD Sheff., CEng, FIM, MWeld(Lond), MIEAust, AMAusIMM
Peter George McDougall, BSc PhD N.S.W., ASTC, CEng, MIM
Michael Bernard McGirr, BSc Syd., PhD N.S.W.
Roy Thomas Southin, PhD Camb., CEng, FIM, MIBF

Department of Mining Engineering

Senior Lecturers
Ross Leslie Blackwood, BE Syd., PhD Me dq., MIEAust, AMAusIMM
Edward George Thomas, BE PhD Qld., AMAusIMM

Lecturers
Amal Krishna Bhattacharya, BSc Glas., MSc Durh., PhD N'cle.(U.K.), CEng, PEng, MiMinE, MCIIM
Huw Ronald Phillips, MSc Brist., PhD N'cle.(U.K.), CEng, MIMInE, MIEE

Tutor
Victor Rudenno, BE PhD N.S.W.
Department of Mineral Processing

Senior Lecturer and Head of Department
Russell George Burdon, ME PhD N.S.W., CEng, FIInstF, FAIE, MIMM, MAIME, ASASM, AMAusIMM

Lecturer
Anthony Charles Partridge, BSc Leeds, MSc PhD McG., CEng, MCIM, MIMM, AMAusIMM, AMAIME

School of Wool and Pastoral Sciences

Associate Professor and Head of School
John Patrick Kennedy, MSc N.S.W., BSc Oxf., MAIAS

Professor of Pastoral Sciences
Haydn Lloyd Davies, PhD W.Aust., BSc Wales, MAIAS

Associate Professors
John William James, BA Qld., DSc N.S.W.
Walter Ragnnall McManus, BScAgr Syd., PhD N.S.W., MAIAS
Euan Maurice Roberts, M AgrSc N.Z., PhD N.S.W., MAIAS
Kenneth James Whiteley, BSc N.S.W., PhD Leeds, FTI, MAIAS

Administrative Assistant
John Edward Lawrence

School of Textile Technology

Professor of Textile Technology and Head of School
Malcolm Chaikin, OBE, BSc PhD Leeds, DipEng L.I.T.(Shanghai), FTI, FTS

Professor of Textile Physics
Max Feughelman, BSc DSc Syd., FAIP, ASTC

Associate Professors
Arved Datyner, BSc PhD Lond., FTI, FRIC, FSDC
Colin Herbert Nicholls, BSc Adel., PhD Leeds, FRACI, FTI
Ronald Postle, BSc N.S.W., PhD Leeds, FTI, FAIP

Senior Administrative Officer
Jan Gerstel, Dip TextInd Leeds, ATI

Senior Lecturers
Alexander Douglas Dircks, BE Syd., MSc PhD N.S.W., DipTextInd Leeds
Ross Ernest Griffith, BSc N.S.W., ATI
Thomas Stanislaus Hickie, BSc PhD N.S.W., ASTC
Mstislav Stephen Nossar, DiplIng Harbin, PhD N.S.W., FIEAust
Michael Thomas Palthorpe, BSc PhD N.S.W.

Senior Project Scientist
John Raymond McCracken, BE MSc PhD N.S.W.

Professional Officers
Nicholas Buchsbaum, BSc Haila, MSc N.S.W.
Barry William Edenborough, BE PhD N.S.W.
Michael David Young, BSc PhD N.S.W., ATI
Oto Zubzanda, DiplIng T.U. Bratislava
Staff

Director
Professor J. E. Andersen

W.S. and L.B. Robinson University College

Head of Department of Science
Professor John Everard Andersen, BE Melb., PhD N.S.W., FIEAust, MAusIMM, ARACI

Head of Department of Mining and Mineral Sciences
Professor Leon John Thomas, BSc PhD Birm., CEng, FIEAust, MAusIMM, MIMInE

Department of Mining and Mineral Sciences

Professional Officer
Kenneth James Murray, BSc Syd., MSc N.S.W., AMAusIMM

Mechanical Engineering

Lecturers
Llewellyn Ramsay Jones, BSc N.Z., DipAm MEng Sheff., PhD Wales, MIEAust, MIMechE
Ian Lechlan Maclaine-cross, BE Melb., PhD Monash, MIEAust, MAIRAH, MSES
Chakravarti Varadachar Madhusudana, BE Mys., ME I.I.Sc., PhD Monash, MIEAust

Mining Engineering

Senior Lecturer
Venkata Satyanarayana Vutukuri, BSc(Eng) Ban., MS Wis., MMGI, AIME, AMAusIMM
Staff:

**Mineral Science**
Senior Lecturer
Barenya Kumar Banerji, MSc Patna, PhD Leeds, MAusIMM

**Physics**
Senior Lecturer
Robert John Stening, MSc Syd., PhD Qld., DipTertEd N.E., MAIP
Lecturer
Kenneth Reid Vost, BSc Glas., MSc N.S.W., AMAusIMM

**Geology**
Senior Lecturer
Gerrit Neef, BSc Lond., PhD Well., FGS
Lecturers
Ian Rutherford Plimer, BSc N.S.W., PhD Macq., AMAusIMM, AMIMM
Kevin David Tuckwell, BSc PhD N.S.W., AMAusIMM

**Fowlers Gap Research Station**
Officer-in-Charge
John Alfred Reynolds, BSc PhD N.S.W.

**Department of Science**

**Chemistry**
Lecturer
Derek Richard Smith, BSc PhD Wales

**Senior Tutor**
Robert Edward Byrne, MSc N.S.W., ARACI, AMAusIMM

**Mathematics**
Senior Lecturer
Zdenek Kviz, DipPhys Brno, CSc RerNatDr Charles, PhD Prague

Lecturers
David Charles Guiney, BSc PhD Adel.
Dennis William Trenerry, BSc PhD Adel.
The University of New South Wales

Kensington Campus 1980

Theatres

Biomedical Lecture Theatres E27
Central Lecture Block E19
Classroom Block (Western Grounds) H3
Electrical Engineering Theatre F17
Keith Burrows Lecture Theatre J14
Mathews Theatres D23
Old Main Theatre K14
Parade Theatre E3
Science Theatre F13
Sir John Clancy Auditorium C24

Buildings

Affiliated Residential Colleges
New (Anglican) L6
Shalom (Jewish) N9
Warrane (Roman Catholic) M7

Applied Science F10
Architecture H14
Arts (Morven Brown) C20
Banks F22
Barker Street Gatehouse N11
Basser College C18
Biological Sciences D26
Central Store B13
Chancellery C22
Chemistry

Dalton F12

Robert Heffron E12

Civil Engineering H20

Commerce (John Goodsell) F20
Dalton (Chemistry) F12
Electrical Engineering G17
Geography and Surveying K17
Goldstein College D16
Golf House A27
Gymnasium B5
House at Pooh Corner N8
International House C6
John Goodsell (Commerce) F20
Kensington Colleges C17
Basser C18
Goldstein D16
Philip Baxter D14
Main Building K15

Maintenance Workshop B13
Mathews F23
Mechanical and Industrial Engineering J17
Medicine (Administration) B27
Menzies Library E21
Metallurgy E8
Morven Brown (Arts) C20
New College (Anglican) L6
Newton J12
Parking Station H25
Philip Baxter College D14
Robert Heffron (Chemistry) E12
Sam Cracknell Pavilion H8
Shalom College (Jewish) N9
Sir Robert Webster (Textile Technology) G14
Squash Courts B7
Swimming Pool B4
Unisearch House L5
University Regiment J2
University Union
(Roundhouse) — Stage I E6
University Union
(Blockhouse) — Stage II G6
University Union
(Squarehouse) — Stage III E4
Wallace Wurth School of Medicine C27
Warrane College (Roman Catholic) M7
Wool and Pastoral Sciences B8

Biological Technology D26
Biomedical Library F23
Bookshop G17
Botany D26
Building H14
Cashier's Office C22
Centre for Medical Education
Research and Development C27
Chaplains E15a
Chemical Engineering F10
Chemical Technology F10
Chemistry E12
Child Care Centre N8
Civil Engineering H20

Closed Circuit Television Centre F20

Committee in Postgraduate Medical Education B27
Community Medicine D26
Computing Services Unit E21

Dracula D9
Economics F20
Education G2
Electrical Engineering G17

Engineering (Faculty Office) K17

English C20
Examinations and Student Records C22

Fees Office C22
Food Technology F10
French C20

General Studies C20

Graduate School of the Built Environment H14
Health Administration C22
History C20

History and Philosophy of Science C20

Industrial Arts C1
Industrial Engineering J17
Institute of Languages G14
Institute of Rural Technology B6
Kindergarten (House at Pooh Corner/Child Care Centre) N9

Landscape Architecture H14
Law (Faculty Office) E21

Law Library E21
Librarianship B10

Library E21
Lost Property F20
Marketing F20
Mathematics F23
Mechanical Engineering J17
Medicine (Faculty Office) B27
Metallurgy E8
Microbiology D26
Mining Engineering K15

Music B11
National Institute of Dramatic Art C15
Nuclear Engineering G17
Optometry J12
Organizational Behaviour F20
Pathology C27
Patrol and Cleaning Services F20
Philosophy C20
Physiology K15
Physics K15
Physical Education and Recreation Centre (PERC) B5

Philosophy and Pharmacology C27
Political Science C20
Postgraduate Extension Studies (Closed Circuit Television) F20
Postgraduate Extension Studies (Radio Station and Administration) F23

Psychology F23
Public Affairs Unit C22
Regional Teacher Training Centre C27

Russian C20
Science and Mathematics Course Office F23
Social Work E1
Sociology C20
Spanish and Latin American Studies C20
Student Amenities and Recreation E15c
Student Counselling and Research E15c
Student Employment C22

Student Health E15
Students' Union E4
Surveying K17

Teachers' College Liaison Office F18
Tertiary Education Research Centre E15d
Textile Technology G14

Town Planning K15
Univision (Blockhouse) G6
Wool and Pastoral Sciences B8
Zoology D26
MAX SPEED 26 Kph
PARKING PERMITTED
ONLY IN AREAS MARKED (P)
This Handbook has been specially designed as a source of reference for you and will prove useful for consultation throughout the year.

For fuller details about the University – its organization, staff membership, description of disciplines, scholarships, prizes, and so on, you should consult the Calendar.

The Calendar and Handbooks also contain a summary list of higher degrees as well as the conditions for their award applicable to each volume.

For detailed information about courses, subjects and requirements of a particular faculty you should consult the relevant Faculty Handbook.

Separate Handbooks are published for the Faculties of Applied Science, Architecture, Arts, Commerce, Engineering, Law, Medicine, Professional Studies, Science (including Biological Sciences and the Board of Studies in Science and Mathematics), the Australian Graduate School of Management (AGSM) and the Board of Studies in General Education.

The Calendar and Handbooks are available from the Cashier’s Office. The Calendar costs $3.50 (plus postage and packing, 90 cents). The Handbooks vary in cost. Applied Science, Arts, Commerce, Engineering and Sciences are $2.50. Architecture, Law, Medicine, Professional Studies and AGSM are $1.50. Postage is 40c in each case. The exception is General Studies, which is free.