How to use this Handbook

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

General Information (the blue 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 alphabetically.

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

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

Staff list.

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

Applied Science

1979 Faculty Handbook
The address of the University of New South Wales is:

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

Telephone: (02) 6630351

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 11 September 1978, but may be amended without notice by the University Council.

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* Formerly the Department of Behavioural Science; new name effective from 1 January 1979.
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. The General Information Section is intended to help you put the Faculty into perspective with the University as a whole, to introduce you to some of the services available to students and to note some of the most important rules and procedures.

For fuller details about the University and its activities you should consult the University Calendar.

Now, see the following pages for other general information which may be of value to 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 Officer-in-Charge (Admissions and Higher Degrees Section), Mr Peter Wildblood, is located on the ground floor of the Chancellery. General enquiries should be directed to 3711.

The Officer-in-Charge (Examinations and Student Records Section) Mr Ross Woodham is located on the ground floor of the Chancellery. For particular inquiries regarding the Student Records Unit, including illness and other matters affecting 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, phone 2143.

Some people who can help you

Note: All phone numbers below are University extension numbers. If you are outside the University, dial 6630351 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.
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 on the ground floor of the Chancellery. Enquiries should be directed to 2086 (undergraduate scholarships), 2525 (graduate scholarships), and 3259 (employment).

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

The Student Health Unit is located in Hut E on College Road, 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. The Head is Mr George Gray. 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; Church of Christ—2683; The Uniting Church—2683; Seventh Day Adventist—2683; Jewish—3273; Baptist—398 4065.

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), AUS insurance (including health), 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.

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### Calendar of Dates

#### The Academic Year

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

---

#### 1979

**Session 1**

(14 weeks)

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<th>Date</th>
<th>Events</th>
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<td>5 March to 13 May</td>
<td>May Recess: 14 May to 20 May</td>
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<td>21 May to 17 June</td>
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<tr>
<td>Tuesday</td>
<td>Midyear recess: 18 June to 22 July</td>
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<tr>
<td>19 June</td>
<td>Examinations begin</td>
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<tr>
<td>Wednesday</td>
<td>Examinations end</td>
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<tr>
<td>4 July</td>
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**Session 2**

(14 weeks)

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<td>23 July to 26 August</td>
<td>August Recess: 27 August to 2 September</td>
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<td>3 September to 4 November</td>
<td>Study Recess: 5 November to 11 November</td>
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<tr>
<td>Monday</td>
<td>Examinations begin</td>
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<tr>
<td>12 November</td>
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<tr>
<td>Friday</td>
<td>Examinations end</td>
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**January**

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<td>Last day for application for review of results of annual examinations</td>
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<td>Friday</td>
<td>Last day for acceptance of applications by Admissions Office for transfer to another course within the University</td>
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<td>Monday</td>
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<td>Monday</td>
<td>Enrolment period begins for new students and students repeating first year</td>
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<tr>
<td>Monday</td>
<td>Enrolment period begins for second and later year students</td>
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March
Monday 5
Tuesday 6
Friday 30

Session 1 commences
List of graduands for April/May ceremonies published in daily press
Last day for acceptance of enrolment by students re-enrolling in second and later years (late fee payable)
Last day for students other than those attending the University for the first time to discontinue without failure subjects which extend over Session 1 only

April
Friday 6
Friday 13 to Monday 16
Friday 20
Wednesday 25
Friday 27

Confirmation of Enrolment forms despatched to all students
Easter
Last day for acceptance of corrected Confirmation of Enrolment forms
Anzac Day — Public Holiday
Last day for students attending the University for the first time to discontinue without failure subjects which extend over Session 1 only

May
Monday 7
Monday 14
Thursday 17
Friday 18
Sunday 20
Friday 25

Last day for students completing requirements for degrees or diplomas at the end of Session 1 to submit Application for Admission to Degree
May Recess begins
Publication of provisional timetable for June/July examinations
Last day for students other than those attending the University for the first time to discontinue without failure subjects which extend over the whole academic year
May Recess ends
Last day for students to advise of examination timetable clashes

June
Tuesday 5
Sunday 17
Monday 18
Tuesday 19

Publication of timetable for June/July examinations
Session 1 ends
Queen’s Birthday — Public Holiday
Midyear Recess begins
Examinations begin

Students to amend enrolment programs following receipt of June examination results
Midyear Recess ends
Session 2 begins
Last day for application for review of June examination results

August
Thursday 2
Friday 3
Friday 17
Monday 27

Foundation Day (No classes held)
Last day for students attending the University for the first time to discontinue without failure subjects which extend over the whole academic year
Last day for students, other than those attending University for the first time, to discontinue without failure subjects which extend over Session 2 only

September
Sunday 2
Monday 10
Wednesday 12
Friday 14

August Recess ends
Last day for applications from students completing requirements for degrees and diplomas at the end of Session 2 to submit Application for Admission to Degree
List of graduands for October graduation ceremony published in daily press
Last day for students attending the University for the first time to discontinue without failure subjects which extend over Session 2 only
Confirmation of Enrolment form forwarded to all students
Last day to notify intention of attending October graduation ceremony

October
Monday 1
Thursday 4
Thursday 11
Friday 12
Tuesday 23

Last day to apply to MUAC for transfer to another University in New South Wales
Eight Hour Day — Public Holiday
Last day to return corrected Confirmation of Enrolment forms
Publication of provisional examination timetable
Graduation ceremony
Last day for students to advise of examination timetable clashes

November
Sunday 4
Monday 5
Sunday 11
Monday 12

Session 2 ends
Study Recess begins
Study Recess ends
Examinations begin
Examinations end
Examination results mailed to students
Examination results displayed on University notice boards
Christmas Day — Public Holiday
Boxing Day — Public Holiday

1980

Session 1
3 March to 11 May
May Recess: 12 May to 18 May
19 May to 15 June
Tuesday 17 June
Examinations begin
Wednesday 2 July
Examinations end
Midyear Recess: 16 June to 20 July
21 July to 24 August
August Recess: 25 August to 30 August
1 September to 2 November
Study recess: 3 November to 9 November
Monday 10 November
Examinations begin
Saturday 29 November
Examinations end

January
Tuesday 1
Public Holiday
Friday 4
Last date for application for review of results of annual examinations
Friday 11
Last date for acceptance of applications by Admissions Office for transfer to another course within the University
Monday 28
Australia Day — Public Holiday

February
Monday 4
Enrolment period begins

In 1978 the University had 18,562 students and over 4,000 staff who worked in more than eighty buildings. These figures include staff and students at Broken Hill (W.S. and L.B. Robinson University College), Duntroon (the Faculty of Military Studies) and Jervis Bay.

Arms of the University of New South Wales
The 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 43 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.

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 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 different faculties have their own rules for the conduct of open meetings.

The Schools

Once courses of study have been approved they come under the control of the individual Schools (e.g. the School of Chemistry, the School of Mathematics). The Head of the School in which you are studying is the person in this academic structure with whom you will be most directly concerned.

Executive Officers

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

He is assisted in this task by three Pro-Vice-Chancellors, Professor John Thornton, Professor Rex Vowels and Professor Raymund Golding; the Deans and the three heads of the administrative divisions.

General Administration

The administration of general matters within the University comes mainly within the province of the Registrar, Mr 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.

Identification of Subjects by Numbers

For information concerning the identifying number of each subject taught in this 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 prior to the beginning of each session 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.
Student Services and Activities

The University Library

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

There are also library services at other centres:

The Water Reference Library situated at Manly Vale (phone 9480261) which is closely associated with the Physical Sciences Library.

The library at the Broken Hill Division in the W.S. and L.B. Robinson University College building. Phone Broken Hill (080) 6022.

The library at the Royal Military College, Duntroon, ACT, serving the Faculty of Military Studies. Phone (062) 730427.

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

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

Accommodation

Residential Colleges

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

The Kensington Colleges

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

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. 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 International Catholic lay association Opus Dei. Apply in writing to the Master, Warrane College, PO Box 123, Kensington, NSW 2033.

Creston Residence

Creston, associated with Warrane College, offers residence for 25 full-time undergraduate and graduate women students of all nationalities and denominations. It is directed by the Women’s Section of Opus Dei, a Catholic lay association. Further information: The Principal, 36 High Street, Randwick, NSW 2031.

Off-campus Accommodation

Students requiring other than College accommodation may contact the Housing Officer in the Student Amenities and Recreation Unit 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.
Student Employment and Scholarships

The Student Employment and Scholarships Unit offers assistance with career employment for final year students and graduates of the University. This service includes the mailing of regular job vacancy notices to registered students, and a 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, undergraduate and graduate scholarships is also available.

The service is located in Room G19 of 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.

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.

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 3881, 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.

Student Amenities and Recreation

In general the Student Amenities and Recreation Unit 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 Unit 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 Unit is located in Hut B 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 Unit provides a recreational program for students and staff at the Physical Education and Recreation Centre. The Centre consists of eight
squash courts and a main building, the latter containing a large gymnasium and practice rooms for fencing, table tennis, judo, weight-lifting, karate and jazz ballet, also a physical fitness testing room. The recreational program includes intramurals, teaching/coaching, camping, 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 $6 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 Hut G, near the bottom of Basser Steps, and the control of the Sports Association is vested in the General Committee. The Executive Officer of the Sports Association may be contacted on extension 2673.

Student Travel Concessions

The Student Amenities and Recreation Unit 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 SARU, Hut B, (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 $45 per year for all registered students and is open to all members of staff and graduates of the University.

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

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 two years at the University are eligible for election. The full-time President directs the entire administration of the Students' Union and its activities.

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

Membership is compulsory at $14 per annum for full-time students and $11 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.

* Subject to revision at time of publication.
The Students' Union is affiliated with the Australian Union of Students (AUS) which represents students on the national level. The Students' Union is located on the second floor, Stage 3, the Union.

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 diplomas
- 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 Department of Education.

1978 Higher School Certificate candidates and tertiary students receiving an allowance are sent forms in December/January. Other students may obtain forms from the Admissions Section, or Student Employment and Scholarships Unit, or from the Regional Director, Department of Education, 323 Castlereagh Street, Sydney, NSW 2000 (phone 218 8800).

Continuing students should submit application 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 1979, 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 School office.

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

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

Details of graduate awards are contained in the University Calendar.

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 Admission Office, located in the Chancellery on the upper campus, provides information for students on admission requirements, undergraduate and graduate courses and enrolment procedures. The Admission 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 Metropolitan Universities Admissions Centre.

New Undergraduate Enrolments

Persons who are applying for entry in 1979 must lodge an application for selection with the Metropolitan Universities Admissions Centre, PO Box 7049, GPO, Sydney 2001, by 3 October 1978.

Those who are selected will be required to complete enrolment at a specified appointment time before the start of Session 1. Compulsory fees must be paid on the day of the appointment. In special circumstances, however, and provided class places are still available, students may be allowed to complete enrolment after the prescribed week, subject to the payment of a penalty (see page 15).

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 Metropolitan Universities Admissions Centre, PO Box 7049, GPO, Sydney 2001, by 3 October 1978.

Restrictions Upon Re-enrolling

Students enrolled in the first year of any undergraduate course in the University who failed more than half their program in 1978; 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 Subject Enrolments

Students may be permitted to enrol for miscellaneous subjects (ie as students not proceeding to a degree or diploma) provided the Head of the School offering the subject considers it will be of benefit 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 in miscellaneous subjects which may be counted towards courses from which they have been excluded.

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

For details of the locations and hours for enrolment see Enrolment Procedures 1979, a free booklet obtainable from your School or Faculty Office or from the Admissions Office.
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 (16 March 1979) except with the express approval of the Deputy Registrar (Student Services) and the Heads of the Schools concerned; no later year enrolments for courses extending over the whole year or for Session 1 only will be accepted after the end of the fourth week of Session 1 (30 March 1979) 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 (3 August 1979) except with the express approval of the Deputy Registrar (Student Services) and the Heads of Schools concerned.

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 Head of the School responsible for the course on forms available from School offices or at the Enquiry Desk in the main entrance of the Chancellery. The Registrar will inform you of the decision. Application to enrol in additional subjects must be submitted by 30 March 1979 for Session 1 only and Whole Year subjects and by 17 August 1979 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.

For details see the Calendar.

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

Students enrolled in the University for the first time (in any undergraduate course):

1. for one session subjects, the end of the eighth week of that session (27 April or 14 September)
2. for whole year subjects the end of the second week of Session 2 (3 August)

Students who have been enrolled in the University prior to 1979:

1. for one session subjects, the end of the fourth week of that session (30 March or 17 August)
2. for whole year subjects, the end of the eleventh week of Session 1 (18 May)

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 17 January. If your application is successful you are required to comply with the enrolment procedures for the year/stage of the new course and, unless otherwise instructed, you should present the letter granting transfer to the enrolling officer. If you intend to transfer, you should also inform the enrolling officer of the school in which you were enrolled in 1978.

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 or more, then you should apply for admission to the course through the Metropolitan Universities Admission Centre before 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-enroll 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 University Calendar.
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-enroll 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-enroll 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 (1) of (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 Metropolitan Universities Admission 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.

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.

Applications for re-admission to a course or subject that are unsuccessful [see 9. (2) (a) and (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 and on the Notification of Examination Results. The forms are available from the Enquiry Counter at 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: It 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 for students completing at the end of Session 1, and 24 February 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 fees 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 $45
Sport Association, annual subscription $6
Students' Union
Students enrolling in full-time courses, annual subscription $14
Students enrolling in part-time courses and miscellaneous subjects, annual subscription $11
Miscellaneous annual fee $25

The 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 1979 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 1979, 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. 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.
4. 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 degrees or diplomas for which they are enrolled elsewhere are exempt from all Student Activities Fees and the University Union entrance fee.
5. Undergraduate students of a recognized university outside Australia who attend the University of New South Wales with the permission of the Dean of the appropriate faculty and of the Head of the appropriate school or department to take part as miscellaneous students in an academic program relevant to their regular studies and approved by the authorities of their own institution are exempt from all Student Activities Fees and the University Union entrance fee.
6. Graduate students not in attendance at the University and who are enrolling in a project only, other than for the first time, are exempt from all Student Activities Fees.
7. Graduate students resubmitting a thesis or project only are exempt from all Student Activities Fees.

8. 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.

Is exemption from membership possible?

The Registrar is empowered to grant exemption from membership of the Students’ Union and the Sports Association to students who have a genuine religious objection to such membership, subject to payment of the prescribed fees to the University.

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 second-hand bookshop. Information about special equipment costs, accommodation charges and cost of subsistence on excursions, field work, etc, and for hospital residence (medical students) are available from individual schools.

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 (27 April 1979). 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 (31 August 1979).

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

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

Can 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 by the dates printed on the reverse side of Notification of Results.

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.

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.

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, 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 10 minutes before the time for commencement.
3. No bag, writing paper, blotting paper, manuscript or book, other than a specified aid is to be brought into the examination room.
4. No candidate shall be admitted to an examination after 30 minutes from the time of commencement of the examination.
5. No candidate shall be permitted to leave the examination room before the expiry of 30 minutes from the time the examination commences.
6. No candidate shall be re-admitted to the examination room after he has left it unless during the full period of his absence he has been under approved supervision.

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

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

9. 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 on the Ground Floor of the Chancellery Building.
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 Submission 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, unsuspectingly. There is evidence that this is a technique used by commercial agents.

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

**How are student records kept up to date?**

Enrolment details forms will be sent to all students on 28 April and 15 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.

**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, Chancellery Building.

**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 notice boards 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 notice boards 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.

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**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:

- Monday 26 February 1979
  - 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:

- Tuesday 27 February 1979
  - 11 am in the Clancy Auditorium

**Part-time Students**

- Tuesday 27 February 1979
  - 6.30 pm in the Clancy Auditorium

**Meeting for Parents of New South Wales**

- Friday 2 March 1979
  - 7.30 pm in the Clancy Auditorium
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 Climatology, 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 (including an education option). 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, Assistant to the Dean, 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 2288.

Enrolment Procedures

All students re-enrolling in 1979 should obtain a copy of the free booklet Enrolment Procedures 1979 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 micro form 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

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.

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.

Undergraduate Librarian Pat Howard
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.

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.
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 degree of Bachelor of Science (Technology) or Bachelor of Science (Engineering).

Full-time Courses

Full-time courses of four years' duration leading to 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 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.

School of Applied Geology

Head of School
Professor F. C. Beavis

Administrative Officer
Mr G. J. Baldwin

The development of natural resources and national development necessitates a type of training for geologists which embraces basic geological instruction and various features of its application in practice. The structure and syllabus of the course in Applied Geology are designed to enable graduates to enter immediately into various aspects of applied geology and to play an effective part in associated engineering and technological practice.

In the early part of the course students receive instruction in the allied fundamental sciences, as well as in introductory geology. Later, geological instruction is developed and emphasis is placed progressively on engineering applications of geology, mineral exploration, global and exploration geophysics, and petroleum geology.

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. The second session of the fourth year is devoted essentially to work on a project.

A three-year course (full-time) is available to students in the Faculty of Science, and some provision is made for part-time study in geology within that Faculty. Selected students in the Faculty of Science may read for an honours degree in Geology. Master of Applied Science courses in Engineering Geology, Hydrogeology, Environmental Geology, in 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.

3000

Applied Geology—Full-time Course

Bachelor of Science
BSc

Year 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Subject</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.011</td>
<td>Geology*</td>
<td>6</td>
</tr>
<tr>
<td>1.001</td>
<td>Physics I or</td>
<td></td>
</tr>
<tr>
<td>1.011</td>
<td>Higher Physics I</td>
<td>6</td>
</tr>
<tr>
<td>2.121</td>
<td>Chemistry I A and</td>
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</tr>
<tr>
<td>2.131</td>
<td>Chemistry I B</td>
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<tr>
<td>10.001</td>
<td>Mathematics I or</td>
<td>6</td>
</tr>
<tr>
<td>10.011</td>
<td>Higher Mathematics I</td>
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* Three field tutorials, involving up to five days in all are an essential part of the subject. Attendance is compulsory.

Year 2

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>25.012</td>
<td>Geology 2A†</td>
<td>6</td>
</tr>
<tr>
<td>25.022</td>
<td>Geology 2B†</td>
<td>3</td>
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<tr>
<td>2.002A</td>
<td>Physical Chemistry and</td>
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</tr>
<tr>
<td>2.002C</td>
<td>Analytical/Inorganic Chemistry</td>
<td>7  5</td>
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<tr>
<td></td>
<td>General Studies Electve</td>
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</tr>
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† Prerequisites: 25.011 Geology I.

Students are required to take one of the following groups of subjects. In certain cases these electives may be varied with the approval of the Head of the School.

Group A

<table>
<thead>
<tr>
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<th>Subject</th>
<th>Hours per week</th>
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</thead>
<tbody>
<tr>
<td>1.022</td>
<td>Electromagnetism and Modern Physics</td>
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<td>1.012</td>
<td>Thermal Physics and Mechanics</td>
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<td>10.2111</td>
<td>Vector Calculus</td>
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<td>10.2112</td>
<td>Mathematical Methods for Differential Equations</td>
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or

Group B

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<tr>
<td>1.922</td>
<td>Electronics</td>
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<tr>
<td>1.932</td>
<td>Introduction to Solids</td>
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<tr>
<td>10.111A</td>
<td>Linear Algebra and</td>
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<tr>
<td>10.1113</td>
<td>Multivariable Calculus</td>
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<td>Complex Analysis</td>
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or

Group C

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<th>Subject</th>
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<td>Introduction to Solids</td>
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<td>Engineering A and</td>
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or

Group D

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<tr>
<td>1.932</td>
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<tr>
<td>17.031</td>
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<tr>
<td>17.021</td>
<td>Biology of Higher Organisms</td>
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Head of School
Professor F. C. Beavis

Administrative Officer
Mr G. J. Baldwin
Year 3

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Hours</th>
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<td>25.013</td>
<td>Geology IIIA†</td>
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<tr>
<td>25.023</td>
<td>Geology IIIB**†</td>
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<tr>
<td>25.033</td>
<td>Geology IIIC‡</td>
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</table>

Two General Studies Electives 3 *

† Prerequisites: 25.012, 25.022, 25.031 Chemistry IA and 2.131 Chemistry IB.
** A geological survey camp of 10 days' duration is a compulsory part of this subject.
‡ Field tutorials constitute an essential part of this subject.
§ Co-requisites: 25.013, 25.023.

Year 4

<table>
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<tr>
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<td>Principles of Mining</td>
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<tr>
<td>7.023</td>
<td>Mineral Process Engineering</td>
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or

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

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>25.014</td>
<td>Geology IV: Advanced Applied Geology†</td>
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<td>25.024</td>
<td>Geology IV: Project†</td>
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One General Studies Elective 3

Plus one of the following subjects:

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<th>Course Title</th>
<th>Hours</th>
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<tr>
<td>25.034</td>
<td>Geology IV: Engineering Geology†</td>
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<tr>
<td>25.044</td>
<td>Geology IV: Mineral Exploration‡</td>
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<tr>
<td>25.054</td>
<td>Geology IV: Sedimentary Basins‡</td>
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<tr>
<td>25.064</td>
<td>Geology IV: Applied Geophysics†</td>
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</table>

* Field work up to seven days' duration is a compulsory part of this course.
† Prerequisites: 25.013, 25.023 and 25.033.
‡ Students taking this option must take 7.023.

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.

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Hours per week</th>
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<tr>
<td></td>
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<tr>
<td>1.001</td>
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<tr>
<td>or 1.011 Higher Physics I</td>
<td>6</td>
</tr>
<tr>
<td>2.121</td>
<td>6</td>
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<td>2.131</td>
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<td>5.010</td>
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</tr>
<tr>
<td>5.030</td>
<td>0</td>
</tr>
<tr>
<td>(includes 3.001 Introduction to Chemical Engineering)</td>
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<tr>
<td>10.001</td>
<td>6</td>
</tr>
<tr>
<td>or 10.011 Higher Mathematics I</td>
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</table>

24 24
### Chemical Engineering—Subjects and Units

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hrs</th>
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<th>S2</th>
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<tbody>
<tr>
<td><strong>Year 2</strong></td>
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<tr>
<td>2.002A Physical Chemistry</td>
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<td>2.002C Inorganic/Analytical Chemistry</td>
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<td></td>
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<td>3.111 Chemical Engineering IA</td>
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<tr>
<td>3.112 Chemical Engineering IB</td>
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<tr>
<td>3.311 Fuel Engineering II</td>
<td>2</td>
<td>2</td>
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<tr>
<td>4.961 Materials and Corrosion</td>
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<tr>
<td>6.832 Electrical Machines</td>
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<td>8.112 Structures</td>
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<td>10.031 Mathematics</td>
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<tr>
<td>10.331 Statistics SS</td>
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<tr>
<td>Two General Study Electives</td>
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<td><strong>Total</strong></td>
<td>25</td>
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*In certain cases this subject may be replaced by another elective with approval of the Head of School.*

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hrs</th>
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<th>S2</th>
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<tr>
<td><strong>Year 3</strong></td>
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<td>2.002B Organic Chemistry</td>
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<td>3.121 Chemical Engineering IIA</td>
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<td>3.122 Chemical Engineering IIB</td>
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<tr>
<td>3.123 Chemical Engineering IIC</td>
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</tr>
<tr>
<td>3.124 Chemical Engineering IID</td>
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<tr>
<td>3.125 Chemical Engineering IIE</td>
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<tr>
<td>3.126 Chemical Engineering</td>
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<td>3</td>
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<tr>
<td>Laboratory IA and IB</td>
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<tr>
<td>10.032 Mathematics</td>
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<tr>
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<td><strong>Total</strong></td>
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Plus one of the following electives:

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<thead>
<tr>
<th>Subject</th>
<th>Hrs</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.321 Fuel Engineering II</td>
<td>3</td>
<td>3</td>
<td></td>
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<tr>
<td>7.313 Minerals Engineering Processes</td>
<td>3</td>
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<tr>
<td>18.121 Production Management</td>
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<tr>
<td>22.113 Industrial Chemistry Processes</td>
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<td>3</td>
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<td>44.111 Microbiology</td>
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Any other elective approved by Head of School

### Chemical Engineering—Science I

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hrs</th>
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<th>S2</th>
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<tbody>
<tr>
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<td>3.132 Chemical Engineering IIB</td>
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<td>3.133 Chemical Engineering IIC</td>
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</tr>
<tr>
<td>3.134 Chemical Engineering Laboratory II</td>
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<tr>
<td>3.135 Advanced Chemical Engineering Electives</td>
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<td>Project*</td>
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<tr>
<td>General Study Elective</td>
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<td><strong>Total</strong></td>
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*The project is to be selected from:

<table>
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<th>Hrs</th>
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<td>3.150 Chemical Engineering Experimental Project</td>
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<td>6</td>
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<td>3.240 Biological Process Engineering Project</td>
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<td>3.340 Fuel Engineering Project</td>
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### Year 4

<table>
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<td>3.133 Chemical Engineering IIC</td>
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<tr>
<td>3.134 Chemical Engineering Laboratory II</td>
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<td>3.135 Advanced Chemical Engineering Electives</td>
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<td>Project*</td>
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<td><strong>Total</strong></td>
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Plus one or more of the following to a total of 6 hrs/week for 28 weeks:

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<tr>
<th>Subject</th>
<th>Hrs</th>
<th>S1</th>
<th>S2</th>
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<tbody>
<tr>
<td>3.135 Advanced Chemical Engineering Electives</td>
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<td>6</td>
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</table>
### Undergraduate Study: Course Outlines

#### 3.121 Chemical Engineering IIA
- **Unit 1**: Mass Transfer (theory) - 2
- **Heat Transfer II** (theory) - 1
- **Thermodynamics II** - 2

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#### 3.122 Chemical Engineering IIB
- **Unit 1**: Reaction Engineering I - 1
- **Plant Layout I** - 1
- **Process Engineering I** - 1
- **Economics I** - 1
- **Process Report** - 1

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#### 3.123 Chemical Engineering IIC
- **Unit 1**: Fluid-Particle Systems I - 0
- **Multicomponent Separation** - 0
- **Thermodynamics III** - 0
- **Solids Handling** - 0

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#### 3.124 Chemical Engineering IID
- **Unit 1**: Reaction Engineering II - 0
- **Process Dynamics I** - 0
- **Instrumentation** - 0
- **Computations II** - 0

<table>
<thead>
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<th>S2</th>
</tr>
</thead>
<tbody>
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#### 3.125 Chemical Engineering IIE
- **Unit 1**: Mass Transfer Design - 0
- **Heat Transfer II** (Design) - 0
- **Process Vessels** - 0
- **Design Report** - 0

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#### 3.126 Chemical Engineering Laboratory I A and IB
- **Unit 1**: Plant Layout - 0
- **Chemical and Phase Equilibria** - 0
- **Control II** - 0
- **Reactor Engineering** - 0

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#### 3.127 Chemical Engineering Science II (applicable to Science programs)
- **Consists of**:
  - 3.121 Chemical Engineering IIA,
  - Unit 1 of 3.122 Chemical Engineering IIB,
  - Units 1, 2 and 3 of 3.123 Chemical Engineering IIC
  - Units 1 and 4 of 3.124 Chemical Engineering IID

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#### 3.129 Chemical Engineering IIIA
- **Unit 1**: Convective Mass Transfer - 1
- **Simultaneous Heat and Mass Transfer** - 2
- **Surface Separation Processes** - 3
- **Transport Phenomena** - 1

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#### 3.130 Chemical Engineering IIIB
- **Unit 1**: Process Dynamics II
- **Control I** - 2
- **Optimization** - 1

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#### 3.131 Chemical Engineering IIIIC
- **Unit 1**: Safety and Failure Engineering - 1
- **Economics II** - 2
- **Atmospheric Pollution Control** - 3
- **Water Pollution Control** - 1

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#### 3.132 Chemical Engineering Laboratory II
- **Advanced Chemical Engineering Electives**
  - **Unit 1**: Plant Layout - 0
  - **Chemical and Phase Equilibria** - 0
  - **Control II** - 0
  - **Reactor Engineering** - 0

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

3.136 Oil and Gas Engineering 3 3

3.211 Biological Process Engineering 6 6

Fuel Engineering — Subjects and Units

3.311 Fuel Engineering I
Unit 1 Fuels and Energy
   Sources and Properties 1 0
   Energy Conversion 0 1
   Fuel Processing 1 0
   Fuel Plant Technology 0 1
   — 2 2

3.321 Fuel Engineering II
Unit 1 Combustion — Fundamentals and Science 0 1
   Principles of Gasification 0 1
   Radiation Heat Transfer and Application 1 0
   Measurements in Flames and Furnaces 1 0
   Laboratory — Fuel Testing 1 1
   — 3 3

NB Two units each session, but are interchangeable.

3.331 Fuel Engineering III
Unit 1 Combustion — Engineering 1 0
   Furnace Design 1 0
   Fuel Plant Design 0 1
   Fuel Conservation and Efficiency 0 1
   Liquid Fuels 0 1
   Coal and its Evaluation 1 0
   Laboratory 3 3
   — 6 6

3.340 Fuel Engineering Project 1 11

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.

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<td>10.011 Higher Mathematics I</td>
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Undergraduate Study: Course Outlines

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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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Hpw

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Stage 5

<table>
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Stage 6

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Plus one of the following electives:

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<th>Course</th>
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<tr>
<td>7.313 Minerals Engineering Processes</td>
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<tr>
<td>18.121 Production Management</td>
<td>3</td>
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<td>22.113 Industrial Chemistry Processes</td>
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<tr>
<td>44.111 Microbiology</td>
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Stage 7

As per Year 4 of full-time course.

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.
3040
Chemical Engineering with Fuel Electives
—Full-time Course

Bachelor of Engineering
BE

Fuel Engineering is essentially a course in Chemical Engineering with an orientation to the fuel and energy conversion and utilization industries. This course is available as an elective strand in the Chemical Engineering BE degree course. Years 1 and 2 are the same as for the Chemical Engineering course, and all students take the subject 3.311 Fuel Engineering I in their second year; Years 3 and 4 are also the same as for the corresponding years in Chemical Engineering, but in Year 3 the appropriate elective is 3.321 Fuel Engineering II, and in Year 4, 3.331 Fuel Engineering III, and 3.340 the Fuel Engineering Project.

The final year electives are devoted to professional subjects covering the broad areas of constitution, processing, and utilization of fossil fuels. Topics include studies of the design and performance evaluation of furnaces and boilers, radiation, flames, air pollution, carbonization, refractories, and progress in fuel science and fuel processing.

3100
Industrial Chemistry—Full-time Course

Bachelor of Science
BSc

Year 1

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<td>5.030 Engineering C*†</td>
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<tr>
<td>17.031 Cell Biology* and</td>
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<tr>
<td>17.021 Biology of Higher Organisms*</td>
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* One session only.
† Chemical Technology students take 22.101 Introduction to Chemical Technology in 5.030.

Year 2

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<td>2.042C Inorganic Chemistry</td>
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<td>2.002B Organic Chemistry</td>
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23 23

Year 3

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<td>3.115 Chemical Engineering for Chemical Technologists</td>
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<td>22.123 Chemical Thermodynamics and Kinetics</td>
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<td>22.133 Data Processing</td>
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<td>22.183 Instrumentation and Process Control</td>
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<td>22.303 Polymer Science</td>
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23½ 24½

† Laboratories operate for 4 hour periods in alternate weeks.
§ Laboratories operate for 3 hour periods in alternate weeks.

School of Chemical Technology

Head of School
Professor D. L. Trimm

Senior Administrative Officer
Mr J. R. Gatenby

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 not less than twelve months prior to the award of the degree.
## Undergraduate Study: Course Outlines

### Year 4

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<td>Processes</td>
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<td>Applied Kinetics</td>
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<td>22.134</td>
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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.

### Stage 4

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<td>Industrial Chemistry Processes</td>
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<td>22.303</td>
<td>Polymer Science</td>
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</table>

### 3110

**Industrial Chemistry—Part-time Course**

**Bachelor of Science (Technology)**

**BSc(Tech)**

**Stages 1 and 2**

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1.001</td>
<td>Physics I</td>
</tr>
<tr>
<td>6</td>
<td>2.121</td>
<td>Chemistry IA and</td>
</tr>
<tr>
<td>6</td>
<td>2.131</td>
<td>Chemistry IB</td>
</tr>
<tr>
<td>6</td>
<td>10.001</td>
<td>Mathematics I or</td>
</tr>
<tr>
<td>6</td>
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<td>Higher Mathematics I</td>
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**Plus:**

<table>
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<th>Course Title</th>
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<tbody>
<tr>
<td>6</td>
<td>25.011</td>
<td>Geology I</td>
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<tr>
<td></td>
<td>or any two of</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>5.010</td>
<td>Engineering A† and</td>
</tr>
<tr>
<td>6</td>
<td>5.030</td>
<td>Engineering C‡§</td>
</tr>
<tr>
<td>6</td>
<td>17.031</td>
<td>Cell Biology† and</td>
</tr>
<tr>
<td>6</td>
<td>17.021</td>
<td>Biology of Higher Organisms†</td>
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</tbody>
</table>

* Two of the first four subjects listed are taken in the first year, the other two in second year (as directed).
† One session only.
‡ Chemical Technology students take 22.101 Introduction to Chemical Technology in 5.030.

### 3020

**Ceramic Engineering—Full-time Course**

**Bachelor of Science**

**BSc**

**Stage 3**

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>Course Code</th>
<th>Course Title</th>
<th>S1</th>
<th>S2</th>
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</thead>
<tbody>
<tr>
<td>6</td>
<td>2.002B</td>
<td>Organic Chemistry</td>
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<td>8.851</td>
<td>Electronics and Instrumentation</td>
<td>3</td>
<td>0</td>
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<td>10.031</td>
<td>Mathematics</td>
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<td>10.301</td>
<td>Statistics SA</td>
<td>2</td>
<td>2</td>
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<tr>
<td>22.112</td>
<td>Chemical Process Equipment</td>
<td>1</td>
<td>1</td>
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<td>General Studies Elective</td>
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<td>1½</td>
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† Ceramic Engineering students take 22.231 Introductory Ceramic Engineering in 5.030.
## Applied Science

### Year 2

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<tr>
<th>Course</th>
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<tr>
<td>1.932 Physics (Introduction to Solids)</td>
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<tr>
<td>2.002A Physical Chemistry</td>
<td>6</td>
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</tr>
<tr>
<td>2.042C Inorganic Chemistry</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>2.002D Analytical Chemistry</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>4.961 Materials and Corrosion</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>6.851 Electronics and Instrumentation</td>
<td>3</td>
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<tr>
<td>8.112/2 Structures</td>
<td>3</td>
<td>0</td>
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<td>10.031 Statistics SA</td>
<td>2</td>
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<td>2</td>
<td>2</td>
</tr>
<tr>
<td>22.232 Ceramic Engineering I</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
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<td>1½</td>
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### Year 3

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<tr>
<th>Course</th>
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<tbody>
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<td>3.115 Chemical Engineering for Chemical Technologists</td>
<td>3</td>
<td>3</td>
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<td>3.311 Fuel Engineering I</td>
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<td>2</td>
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<td>7.023 Mineral Process Engineering</td>
<td>2</td>
<td>0</td>
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<tr>
<td>22.123A Chemical Thermodynamics</td>
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<td>2</td>
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<tr>
<td>22.153 Material and Energy Balances</td>
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<td>0</td>
</tr>
<tr>
<td>22.163 Instrumentation and Process Control</td>
<td>0</td>
<td>3†</td>
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<tr>
<td>22.213 Chemical Ceramics</td>
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<td>5</td>
</tr>
<tr>
<td>22.233 Ceramic Process Principles</td>
<td>3½</td>
<td>3½</td>
</tr>
<tr>
<td>25.201 Mineralogy</td>
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<td>2</td>
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<tr>
<td>General Studies Elective</td>
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<td>1½</td>
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<tr>
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† Laboratories operate for 3 hour periods in alternate weeks.

### Year 4

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<thead>
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<th>Course</th>
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<td>18.131 Operations Research</td>
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<td>22.224 Physical Ceramics</td>
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<td>22.294 Project</td>
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### Year 5

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<tr>
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<tr>
<td>3.115 Chemical Engineering for Chemical Technologists</td>
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<td>3</td>
</tr>
<tr>
<td>7.023 Mineral Process Engineering</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>22.153 Material and Energy Balances</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>22.163 Instrumentation and Process Control</td>
<td>0</td>
<td>3†</td>
</tr>
<tr>
<td>22.233 Ceramic Process Principles</td>
<td>3½</td>
<td>3½</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>1½</td>
<td>1½</td>
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<tr>
<td><strong>Total</strong></td>
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<td>11</td>
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</table>

† Laboratories operate for 3 hour periods in alternate weeks.

---

### 3030 Ceramics — Part-time Course

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

#### Stages 1 and 2*

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.001 Physics I</td>
<td>6</td>
</tr>
<tr>
<td>2.121 Chemistry IA and IB</td>
<td>6</td>
</tr>
<tr>
<td>2.131 Chemistry IB</td>
<td>6</td>
</tr>
<tr>
<td>5.010 Engineering A**</td>
<td>6</td>
</tr>
<tr>
<td>5.030 Engineering C**</td>
<td>6</td>
</tr>
<tr>
<td>10.001 Mathematics I or II</td>
<td>6</td>
</tr>
<tr>
<td>10.011 Higher Mathematics I†</td>
<td>6</td>
</tr>
</tbody>
</table>

* Two subjects are taken in the first year and the other two in the second year (as directed).

** One session only.

† Ceramics students take 22.231 Introductory Ceramic Engineering in 5.030.

† There are no evening lectures in this subject.

---

#### Stage 3

<table>
<thead>
<tr>
<th>Course</th>
<th>S1</th>
<th>S2</th>
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<tbody>
<tr>
<td>1.932 Physics (Introduction to Solids)</td>
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</tr>
<tr>
<td>2.002A Physical Chemistry</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>6.851 Electronics and Instrumentation</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>10.031 Mathematics</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>10.301 Statistics SA</td>
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<td>2</td>
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#### Stage 4

<table>
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<tr>
<th>Course</th>
<th>S1</th>
<th>S2</th>
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<tbody>
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<td>2.042C Inorganic Chemistry</td>
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<td>6</td>
</tr>
<tr>
<td>2.002D Analytical Chemistry</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>4.961 Materials and Corrosion</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>8.112/2 Structures</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>22.132 Ceramic Engineering I</td>
<td>0</td>
<td>2</td>
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<tr>
<td>General Studies Elective</td>
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<td>1½</td>
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<tr>
<td><strong>Total</strong></td>
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<td>11½</td>
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#### Stage 5

<table>
<thead>
<tr>
<th>Course</th>
<th>S1</th>
<th>S2</th>
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<tbody>
<tr>
<td>3.115 Chemical Engineering for Chemical Technologists</td>
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<td>3</td>
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<td>7.023 Mineral Process Engineering</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>22.153 Material and Energy Balances</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>22.163 Instrumentation and Process Control</td>
<td>0</td>
<td>3†</td>
</tr>
<tr>
<td>22.233 Ceramic Process Principles</td>
<td>3½</td>
<td>3½</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>1½</td>
<td>1½</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>13</td>
<td>11</td>
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</tbody>
</table>

† Laboratories operate for 3 hour periods in alternate weeks.
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>Course Code</th>
<th>Course Name</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>1.001</td>
<td>Physics I or</td>
<td>S1  S2</td>
</tr>
<tr>
<td>1.021</td>
<td>Introductory Physics I</td>
<td>6  6</td>
</tr>
<tr>
<td>2.121</td>
<td>Chemistry IA and</td>
<td></td>
</tr>
<tr>
<td>2.131</td>
<td>Chemistry IB</td>
<td>6  6</td>
</tr>
<tr>
<td>10.001</td>
<td>Mathematics I or</td>
<td></td>
</tr>
<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  6</td>
</tr>
<tr>
<td>10.021C</td>
<td>General Mathematics IC</td>
<td>0  6</td>
</tr>
<tr>
<td>17.021</td>
<td>Biology of Higher Organisms</td>
<td>0  6</td>
</tr>
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<td>17.031</td>
<td>Cell Biology</td>
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Year 2

<table>
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<th>Course Name</th>
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<td>2.002A</td>
<td>Physical Chemistry</td>
<td>3  3</td>
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<td>2.002B</td>
<td>Organic Chemistry</td>
<td>0  6</td>
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<tr>
<td>2.002D</td>
<td>Analytical Chemistry</td>
<td>0  6</td>
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<td>38.121</td>
<td>Food and Man</td>
<td>0  6</td>
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<tr>
<td>41.101</td>
<td>Introductory Biochemistry</td>
<td>12 0</td>
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<tr>
<td>44.143</td>
<td>Microbiology AS</td>
<td>10 0</td>
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Year 3

<table>
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<th>Course Name</th>
<th>Hours per week</th>
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<tr>
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<td>Chemistry and Enzymology of Foods</td>
<td>6  6</td>
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<tr>
<td>10.301</td>
<td>Statistics SA</td>
<td>2  2</td>
</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>
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<td>0  2</td>
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<td>38.134</td>
<td>Food Science Laboratory</td>
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</tr>
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<td>38.331</td>
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<td>38.431</td>
<td>Food Engineering I</td>
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<td>38.531</td>
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<tr>
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</table>

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

Students who have completed the requirements of this course and have qualified for the award of the degree of Bachelor of Science (Technology) may proceed to the award of the degree of Bachelor of Science by attending for one full-time year and completing the subjects listed in 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 is completed.

### Stages 1 and 2*

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
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</thead>
<tbody>
<tr>
<td>1.001 Physics I or Chemistry IA and Introductory Physics I</td>
<td>6</td>
<td>6</td>
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<tr>
<td>2.121 Chemistry IB</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>2.131 Mathematics I or Higher Mathematics</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>10.001 Mathematics IB and Introductory Biochemistry</td>
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<td>10.021C General Mathematics IC</td>
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<td>6</td>
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<tr>
<td>17.021 Biology of Higher Organisms</td>
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<td>17.031 Cell Biology</td>
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<td>0</td>
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</table>

* Two of the subjects listed will be taken in first year and the other two in second year (as directed).
† There are no evening lectures in this subject.

### Stage 3

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
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<tbody>
<tr>
<td>2.002B Organic Chemistry</td>
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<td>2.002D Analytical Chemistry</td>
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### Stage 4

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</thead>
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<td>2.002A Physical Chemistry</td>
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<tr>
<td>44.143 Microbiology AS</td>
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<td>1½</td>
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</table>

### 3070

**Food Technology—Part-time Course**

**Bachelor of Science (Technology)**

**BSc(Tech)**

This course is designed for students who are employed in the food processing industries. It extends over six part-time years of study, and leads to the award of the degree of Bachelor of Science (Technology). Students are required to complete an approved program of industrial training of not less than twelve months prior to the award of the degree. Industrial training should normally be completed concurrently with attendance in the course, but with the approval of the Head of School may be completed after completion of the prescribed course of study.
Stage 5

<table>
<thead>
<tr>
<th>Course</th>
<th>Hpw</th>
<th>S1</th>
<th>S2</th>
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<tbody>
<tr>
<td>2.043L Chemistry and Enzymology of Foods</td>
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</tr>
<tr>
<td>10.301 Statistics SA</td>
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</tr>
<tr>
<td>38.431 Food Engineering I</td>
<td></td>
<td>3</td>
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</tr>
<tr>
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<td>1½</td>
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Stage 6

<table>
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<th>S2</th>
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<tbody>
<tr>
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<tr>
<td>38.132 Plant Food Science</td>
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<td>0</td>
</tr>
<tr>
<td>38.133 Animal Food Science</td>
<td></td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>38.134 Food Science Laboratory</td>
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<td>6</td>
<td>6</td>
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<td>38.531 Nutrition</td>
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Applied Geography—Full-time Courses Bachelor of Science

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

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.

School of Geography

Head of School
Professor J. A. Mabbutt

Administrative Assistant
Mr B. McClennagh

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.

3010

Applied Geography—Full-time Course Bachelor of Science

Biogeography and Bioclimatology

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<th>Hpw</th>
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* Up to 3 days’ field work, equivalent to 24 tutorial hours, is an essential part of the subject.
Applied Science

Year 2

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Year 3

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Geomorphology and Pedology

Year 1

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Year 2

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<td>27.173 Remote Sensing Applications †</td>
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Year 3

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<td>** Up to 5 days' field work, equivalent to 40 tutorial hours, is an essential part of the subject.</td>
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† Offering subject to availability of staff.

‡ Up to 5 days field work, equivalent to 40 tutorial hours, is an essential part of the subject.
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† Offering subject to availability of staff.

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

Applied Economic Geography

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

Year 3

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<td>27.723 Transport Geography*†</td>
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<td>27.753 Social Welfare and Urban Development†</td>
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<td>27.763 Rural Resource Problems†</td>
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<td>27.783 Spatial Impacts and Opportunities†</td>
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<td>27.793 Models of Spatial Systems†</td>
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* Three days’ field work, equivalent to 24 tutorial hours, is an essential part of the subject.

† Subject to the availability of staff in 1979.
‡ By arrangement with Heads of Schools.

Year 2

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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.

The graduate metallurgist has a wide choice of type of employment and location. He 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 Pilbara; 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 men. If the graduate is inclined towards research and development, he 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 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 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.

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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

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Plus one of:

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Year 2

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<th>Course Title</th>
<th>Hours per week</th>
</tr>
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<tbody>
<tr>
<td>2.002A</td>
<td>Physical Chemistry</td>
<td>6</td>
</tr>
<tr>
<td>4.302</td>
<td>Chemical and Extraction Metallurgy I</td>
<td>3</td>
</tr>
<tr>
<td>4.402</td>
<td>Physical Metallurgy I</td>
<td>6</td>
</tr>
<tr>
<td>4.502</td>
<td>Mechanical Properties of Solids</td>
<td>6</td>
</tr>
<tr>
<td>4.602</td>
<td>Metallurgical Engineering I</td>
<td>5</td>
</tr>
<tr>
<td>4.902</td>
<td>Metallurgical Physics</td>
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</tr>
<tr>
<td>10.031</td>
<td>Mathematics</td>
<td>2</td>
</tr>
<tr>
<td>5.010</td>
<td>Engineering A† and</td>
<td>2</td>
</tr>
<tr>
<td>5.030</td>
<td>Engineering C† or</td>
<td>2</td>
</tr>
<tr>
<td>25.201</td>
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General Studies Elective

<table>
<thead>
<tr>
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</table>

1½ 1½

† Part only.

25½ 20½
### Undergraduate Study: Course Outlines

#### Year 3

<table>
<thead>
<tr>
<th>Course/Topic</th>
<th>Hpw</th>
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<th>S2</th>
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<tr>
<td>4.303 Chemical and Extraction Metallurgy II</td>
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<tr>
<td>4.403 Physical Metallurgy II</td>
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<td>4.503 Mechanical Metallurgy</td>
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<td>4.613 Metallurgical Engineering IIA</td>
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<td>4.703 Materials Science</td>
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<td>0</td>
</tr>
<tr>
<td>6.851 Electronics and Instrumentation and</td>
<td></td>
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<td>0</td>
</tr>
<tr>
<td>6.852 Electrical Machinery and Supply</td>
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<td>0</td>
<td>3</td>
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<tr>
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<tr>
<td>Two General Studies Electives</td>
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#### Year 2

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<th>S2</th>
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<tbody>
<tr>
<td>2.002A Physical Chemistry</td>
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<td>0</td>
</tr>
<tr>
<td>4.302 Chemical and Extraction Metallurgy I</td>
<td></td>
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<tr>
<td>4.402 Physical Metallurgy I</td>
<td></td>
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<td>6</td>
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<tr>
<td>4.502 Mechanical Properties of Solids</td>
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<td>0</td>
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<td>1½</td>
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#### Year 4

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<th>S2</th>
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<tbody>
<tr>
<td>4.024 Metallurgy Project*</td>
<td></td>
<td>6</td>
<td>3</td>
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<tr>
<td>4.054 Metallurgy Seminar</td>
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<td>2</td>
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<tr>
<td>4.314 Chemical and Extraction Metallurgy IIIA</td>
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<td>4.404 Physical Metallurgy III</td>
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<td>4½</td>
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<td>4.504 Mechanical and Industrial Metallurgy</td>
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<td>9</td>
</tr>
<tr>
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<td></td>
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<td>1½</td>
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<tr>
<td><strong>Total</strong></td>
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</tbody>
</table>

* Project includes three weeks' laboratory work during Midyear Recess.

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

**Bachelor of Engineering BE**

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

#### Year 1

<table>
<thead>
<tr>
<th>Course/Topic</th>
<th>Hours per week</th>
</tr>
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<tbody>
<tr>
<td>1.001 Physics I or</td>
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<tr>
<td>1.011 Higher Physics I</td>
<td>6</td>
</tr>
<tr>
<td>2.121 Chemistry IA and</td>
<td>6</td>
</tr>
<tr>
<td>2.131 Chemistry IB</td>
<td></td>
</tr>
<tr>
<td>5.010 Engineering A and</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></td>
</tr>
<tr>
<td><strong>Total</strong></td>
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</tbody>
</table>

Plus one of the following electives:

- 3.133 Chemical Engineering IIIC — Units 1 and 2 *and*
- 3.135 Advanced Chemical Engineering Electives — Unit 5
- 4.414 Physical Metallurgy IIIA 4½ | 0
- 7.314 Mineral Process Technology 3 | 3

* Project includes three weeks' laboratory work during Midyear Recess.
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>Hours per week</th>
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</thead>
<tbody>
<tr>
<td>1.001 Physics I</td>
<td>6</td>
</tr>
<tr>
<td>2.121 Chemistry IA and IB</td>
<td>6</td>
</tr>
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<td>2.131 Chemistry IB</td>
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<tr>
<td>5.010 Engineering A and B</td>
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<td>5.030 Engineering C</td>
<td>6</td>
</tr>
<tr>
<td>10.001 Mathematics I or II</td>
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<tr>
<td>10.011 Higher Mathematics III</td>
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* Two of the four subjects listed are taken in Year 1 and the other two in Year 2.
† There are no evening lectures in this subject.

Stage 3

<table>
<thead>
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<tr>
<td>2.002A Physical Chemistry</td>
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<tr>
<td>4.312 Chemical and Extraction Metallurgy I</td>
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</tr>
<tr>
<td>4.602 Metallurgical Physics</td>
<td>2</td>
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<td>10.031 Mathematics</td>
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<td>Two General Studies Electives</td>
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</table>

| 12 | 12 |

Stage 4

<table>
<thead>
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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>
<td>4</td>
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<td>4.602 Metallurgical Engineering I</td>
<td>0</td>
</tr>
<tr>
<td>25.201 Mineralogy</td>
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| 13 | 12 |

Stage 5

<table>
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<td>4.433 Physical Metallurgy IIC</td>
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<td>6.851 Electronics and Instrumentation</td>
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<tr>
<td>General Studies Elective</td>
<td>1½</td>
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</tbody>
</table>

| 13½ | 12½ |

School of Mining Engineering

Head of School
Professor F. F. Roxborough

Administrative Assistant
Mr W. C. Husman

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. The mining engineer is now a front-line executive; planning, coordinating and controlling the many activities which comprise the operations of a mine. He is in control of all phases of the mining project from the initial planning and development to mineral extraction and processing and final restoration of the land.

To prepare the graduate 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 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 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 and in Mineral Processing leading to the award of the BSc(Tech). It is also possible to take the BE degree course at Broken Hill as a full-time student.
After graduation, the mining engineer is equipped to enter any sector of the mining industry such as coal mining, metalliferous mining, petroleum production, sea-floor mining, quarrying or mineral processing. If he chooses to develop a career in production management, he will be required to gain further practical experience before obtaining his 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.

The graduate mining engineer is 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 his 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 the student, if he so wishes, to concentrate his studies on a particular sector of the industry, such as coal mining or metalliferous mining. An important fourth year requirement is for the student to undertake a personal research or study project in mining or minerals engineering and on which he is 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.

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.001</td>
<td>Physics I</td>
</tr>
<tr>
<td>2.121</td>
<td>Chemistry IA</td>
</tr>
<tr>
<td>5.010</td>
<td>Engineering IA</td>
</tr>
<tr>
<td>5.020</td>
<td>Engineering IB</td>
</tr>
<tr>
<td>5.030</td>
<td>Engineering IC†</td>
</tr>
<tr>
<td>10.001</td>
<td>Mathematics I or</td>
</tr>
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<td>10.011</td>
<td>Higher Mathematics I</td>
</tr>
<tr>
<td></td>
<td>S1</td>
</tr>
<tr>
<td></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>6</td>
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<td></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>24</td>
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</table>

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

<table>
<thead>
<tr>
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<tbody>
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<td>4.972</td>
<td>Materials for Mining Engineers</td>
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<tr>
<td>5.611</td>
<td>Fluid Mechanics and Thermodynamics</td>
</tr>
<tr>
<td>6.851</td>
<td>Electronics and Instrumentation</td>
</tr>
<tr>
<td>6.852</td>
<td>Electrical Machinery and Supply</td>
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<tr>
<td>7.112</td>
<td>Mineral Resources</td>
</tr>
<tr>
<td>7.122</td>
<td>Mine Development ‡</td>
</tr>
<tr>
<td>8.172</td>
<td>Mechanics of Solids II</td>
</tr>
<tr>
<td>8.250</td>
<td>Properties of Materials</td>
</tr>
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<td>10.022</td>
<td>Engineering Mathematics II</td>
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<td>25.101</td>
<td>Geology for Mining Engineers †</td>
</tr>
<tr>
<td>10.341</td>
<td>Statistics SU</td>
</tr>
<tr>
<td>29.441</td>
<td>Surveying for Engineers</td>
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<tr>
<td>29.491</td>
<td>General Studies Elective</td>
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<tr>
<td></td>
<td>Survey Camp</td>
</tr>
<tr>
<td></td>
<td>24½</td>
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</table>

† Visits to mines and related undertakings are a requirement of this subject. ‡ Includes two compulsory field tutorials.

<table>
<thead>
<tr>
<th>Year 3</th>
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</thead>
<tbody>
<tr>
<td>7.113</td>
<td>Mining Methods †</td>
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<tr>
<td>7.123</td>
<td>Geomechanics</td>
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<tr>
<td>7.133</td>
<td>Mine Transport</td>
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<tr>
<td>7.143</td>
<td>Mine Environment and Safety Engineering ‡</td>
</tr>
<tr>
<td>7.153</td>
<td>Power Supply in Mines</td>
</tr>
<tr>
<td>7.163</td>
<td>Excavation Engineering</td>
</tr>
<tr>
<td>7.173</td>
<td>Computer Applications in Mining</td>
</tr>
<tr>
<td>7.213</td>
<td>Mine Surveying</td>
</tr>
<tr>
<td>7.313</td>
<td>Minerals Engineering Processes</td>
</tr>
<tr>
<td>25.102</td>
<td>Geology for Mining Engineers ‡</td>
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<tr>
<td></td>
<td>General Studies Elective</td>
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<tr>
<td></td>
<td>22</td>
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</table>

† 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.
### 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-year 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 years.

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

A minimum of three years' concurrent industrial training in approved industries is required before graduation.

---

### Stage 1

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.121 Chemistry IA</td>
<td>6</td>
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<td>5.030 Engineering IC</td>
<td>6</td>
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<tr>
<td>10.001 Mathematics I or IIA</td>
<td>6</td>
</tr>
<tr>
<td>10.011 Higher Mathematics I</td>
<td>6</td>
</tr>
<tr>
<td>7.112R Mineral Resources</td>
<td>1</td>
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</tbody>
</table>

Note: Not all options are offered in Engineering IA, IB and IC. Subject to enrolments in any one year it 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.

---

### Stage 2

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
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<td>1.001 Physics I</td>
<td>6</td>
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<tr>
<td>5.010 Engineering IA</td>
<td>6</td>
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<tr>
<td>5.020 Engineering IB</td>
<td>6</td>
</tr>
<tr>
<td>7.122R Mine Development</td>
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### Stage 3

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>7.113R Mining Methods</td>
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<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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### Stage 4

<table>
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<th>Hours per week</th>
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<tbody>
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<td>6.851 Electronics and Instrumentation</td>
<td>3</td>
</tr>
<tr>
<td>6.852 Electrical Machinery and Supply</td>
<td>0</td>
</tr>
<tr>
<td>5.611 Fluid Mechanics/Thermodynamics</td>
<td>4</td>
</tr>
<tr>
<td>10.351 Statistics SM</td>
<td>1½</td>
</tr>
<tr>
<td>25.101 Geology for Mining Engineers</td>
<td>2</td>
</tr>
<tr>
<td>29.441 Surveying for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>29.491 Survey Camp†</td>
<td>40 contact hours</td>
</tr>
</tbody>
</table>

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

<table>
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<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>7.123R</td>
<td>Geomechanics</td>
<td>3</td>
</tr>
<tr>
<td>7.133R</td>
<td>Mine Transport</td>
<td>0</td>
</tr>
<tr>
<td>7.153R</td>
<td>Power Supply in Mines</td>
<td>2½</td>
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<tr>
<td>7.163R</td>
<td>Excavation Engineering</td>
<td>1½</td>
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<tr>
<td>7.213R</td>
<td>Mine Surveying</td>
<td>1</td>
</tr>
<tr>
<td>7.224R</td>
<td>Operational Management</td>
<td>1½</td>
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<tr>
<td>25.801R</td>
<td>Geology for Mining Engineers II (Part 1)</td>
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<tr>
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<td>General Studies Elective</td>
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</tbody>
</table>

**Total Hours:** 13

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

### Stage 6

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>7.114R</td>
<td>Geotechnical Engineering</td>
<td>2</td>
</tr>
<tr>
<td>7.143R</td>
<td>Mine Environment and Safety Engineering</td>
<td>2½</td>
</tr>
<tr>
<td>7.313R</td>
<td>Mineral Processing</td>
<td>5</td>
</tr>
<tr>
<td>25.802R</td>
<td>Geology for Mining Engineers II (Part 2)</td>
<td>2</td>
</tr>
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**Total Hours:** 13

### Stage 7

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<td>7.214R</td>
<td>Mine Economics and Planning</td>
<td>3</td>
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<tr>
<td>7.424R</td>
<td>Feasibility Studies and Seminars</td>
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<td>Minerals Industry Project</td>
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</table>

**Total Hours:** 12

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### 4210 Mining Engineering—Six Year Part-time Course

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

A minimum of three years' concurrent industrial training in approved industries is required before graduation.

### Stage 1

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**Total Hours:** 13

Note: Not all options are offered in Engineering IA, IB, and IC. 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.
### Applied Science

#### Stage 6

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<th>Hours</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>7.114R</td>
<td>Geotechnical Engineering</td>
<td>2</td>
<td>S1 6, S2 6</td>
</tr>
<tr>
<td>7.143R</td>
<td>Mine Environment and Safety Engineering</td>
<td>2½</td>
<td>S1 1½, S2 1½</td>
</tr>
<tr>
<td>7.313R</td>
<td>Mineral Processing</td>
<td>5</td>
<td>S1 5</td>
</tr>
<tr>
<td>25.802R</td>
<td>Geology for Mining Engineers II (Part II)</td>
<td>2</td>
<td>S1 2</td>
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<td>7.416R</td>
<td>Minerals Industry Project</td>
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<td>S1 2</td>
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<td>Physics I</td>
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<td>5.031R</td>
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<th>Hours per week</th>
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<td>Materials for Mining Engineers</td>
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<td>Mining Methods</td>
<td>3</td>
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<td>Mechanics of Solids</td>
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<td>Properties of Materials</td>
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<td>S1 2, S2 2</td>
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<td>Physical Chemistry</td>
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<td>S1 3, S2 3</td>
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<td>2.042C</td>
<td>Inorganic Chemistry</td>
<td>6</td>
<td>S1 6, S2 6</td>
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<td>Analytical Chemistry</td>
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<td>S1 0, S2 0</td>
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<td>5.324</td>
<td>Automatic Control Engineering</td>
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<td>S1 3, S2 3</td>
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<td>25.201R</td>
<td>Mineragraphic Laboratory Work</td>
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<td>S1 1, S2 1</td>
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<td>S1 0, S2 0</td>
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<td></td>
<td>14½</td>
<td>S1 14½, S2 13½</td>
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### 4190

**Mining Engineering—Full-time Program**

**Bachelor of Engineering BE**

**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.

#### Stage 1

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<th>Course Title</th>
<th>Hours</th>
<th>Hours per week</th>
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<tbody>
<tr>
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<td>Chemistry IA</td>
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<td>S1 6, S2 0</td>
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<td>2.131</td>
<td>Chemistry IB</td>
<td>0</td>
<td>S1 0, S2 6</td>
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<td>10.001</td>
<td>Mathematics I</td>
<td>6</td>
<td>S1 6, S2 6</td>
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<tr>
<td>7.112R</td>
<td>Mineral Resources</td>
<td>1</td>
<td>S1 1, S2 0</td>
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#### Stage 5

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<td>6.651/2</td>
<td>Electrical Engineering</td>
<td>3</td>
<td>S1 3, S2 3</td>
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<td>5.611</td>
<td>Fluid Mechanics/Thermodynamics</td>
<td>4</td>
<td>S1 4, S2 4</td>
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<tr>
<td>10.331</td>
<td>Statistics SS</td>
<td>2</td>
<td>S1 2, S2 2</td>
</tr>
<tr>
<td>7.313R</td>
<td>Mineral Processing</td>
<td>5</td>
<td>S1 5</td>
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<td></td>
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<td>14</td>
<td>S1 14, S2 14</td>
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#### Stage 6

<table>
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<td>7.153R</td>
<td>Power Supply in Mines</td>
<td>2½</td>
<td>S1 2½, S2 0</td>
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<td>7.224R</td>
<td>Operational Management</td>
<td>1½</td>
<td>S1 1½, S2 1½</td>
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<td>Mineral Process Technology</td>
<td>3</td>
<td>S1 3, S2 3</td>
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<td>7.414R</td>
<td>Mineral Industry Project</td>
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<td>3</td>
<td>S1 3</td>
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<td>14</td>
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</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 degree of Bachelor of Science (Technology). A minimum of three years’ concurrent industrial training in approved industries is required before graduation.

#### Stage 1

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Hours</th>
<th>Hours per week</th>
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<tr>
<td>6.651/2</td>
<td>Electrical Engineering</td>
<td>3</td>
<td>S1 3, S2 3</td>
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<tr>
<td>5.611</td>
<td>Fluid Mechanics/Thermodynamics</td>
<td>4</td>
<td>S1 4, S2 4</td>
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<td>10.331</td>
<td>Statistics SS</td>
<td>2</td>
<td>S1 2, S2 2</td>
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<tr>
<td>7.313R</td>
<td>Mineral Processing</td>
<td>5</td>
<td>S1 5</td>
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<td></td>
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<td>14</td>
<td>S1 14, S2 14</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.

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.

### Textile Chemistry

**Year 2**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>2.002A</td>
<td>Physical Chemistry</td>
<td>9</td>
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<tr>
<td>2.002B</td>
<td>Organic Chemistry</td>
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<td>2.002D</td>
<td>Analytical Chemistry</td>
<td>2</td>
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<td>10.031</td>
<td>Mathematics</td>
<td></td>
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<td>10.301</td>
<td>Statistics SA</td>
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<tr>
<td>13.111</td>
<td>Textile Technology I</td>
<td>8</td>
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<tr>
<td>13.211</td>
<td>Textile Science I</td>
<td>3</td>
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<tr>
<td></td>
<td>General Studies Elective</td>
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<td><strong>Total</strong></td>
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**Year 3**

<table>
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<td>Molecular Spectroscopy and Structure</td>
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<td>13.212</td>
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<td>Textile Engineering I</td>
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### Textile Physics

**Year 2**

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<td>10.1113</td>
<td>Multivariable Calculus and</td>
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<tr>
<td></td>
<td>Complex Analysis or</td>
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<td>10.1114</td>
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**Year 3**

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<td>Two General Studies Electives</td>
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### Textile Engineering

<table>
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<td>Engineering Dynamics</td>
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<td>Fluid Mechanics</td>
<td>2</td>
<td>2</td>
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<td>13.211</td>
<td>Textile Science I</td>
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<td>General Studies Elective</td>
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<td>1½</td>
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<th>S2</th>
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<td>Mechanical Engineering Design</td>
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<td>4</td>
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<td>5.331</td>
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<td>6.851</td>
<td>Electronics and Instrumentation</td>
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<td>13.212</td>
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* Optional Subjects
- 13.223 Advanced Textile Chemistry
- 13.323 Advanced Textile Physics
- 13.313 Advanced Textile Engineering
- 14.602 Information Systems

### Textile Manufacture

<table>
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<th>Year 2</th>
<th>Hours per week</th>
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<th>S2</th>
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<td>Statistics SA</td>
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<tr>
<td>13.111</td>
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<td>6</td>
<td>10</td>
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<tr>
<td>13.211</td>
<td>Textile Science I</td>
<td>3</td>
<td>3</td>
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<tr>
<td>14.501</td>
<td>Accounting and Financial Management IA</td>
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<tr>
<td>14.511</td>
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<td>15.001</td>
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<td>Economics IB</td>
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<table>
<thead>
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<tr>
<td>13.212</td>
<td>Textile Science II</td>
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<tr>
<td>13.311</td>
<td>Textile Engineering I</td>
</tr>
<tr>
<td>14.081</td>
<td>Introduction to Financial Analysis</td>
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<tr>
<td>28.012</td>
<td>Marketing Systems</td>
</tr>
<tr>
<td>28.022</td>
<td>Marketing Models</td>
</tr>
<tr>
<td></td>
<td>Two General Studies Electives*</td>
</tr>
</tbody>
</table>

* Not to include Economics.

### School of Wool and Pastoral Sciences

**Head of School**
Associate Professor J. P. Kennedy

**Administrative Assistant**
Mr J. E. Lawrence

Motivated by strong competition from cheaply-produced man-made fibres, wool producers, by the implementation of the Wool Use Promotion Act of 1945 and subsequent legislation, have undertaken a program to improve efficiency through research, increased extension services, and adequate publicity for wool. The full development of this program requires specialist personnel trained to give service to the pastoral industry.

To meet this need the School of Wool and Pastoral Sciences offers a full-time course in Wool and Pastoral Sciences, leading to the award of the degree of Bachelor of Science (pass or honours).

From 1972 the School has provided a course in Wool and Pastoral Sciences (Education Option), to provide training at the tertiary level for teachers of sheep husbandry and wool science in the Department of Technical Education and in the Agricultural High Schools and Colleges. Students who complete the course successfully will be eligible to become certificated teachers. Graduates could proceed to higher degrees in the field of Rural Extension or of certain scientific aspects of the pastoral industry.

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.

The Wool and Pastoral Sciences courses aim to provide a pool of graduates with a liberal scientific outlook, and the habit of exact and logical thought. These graduates will be familiar with the latest developments in the various fields relating to Wool and Pastoral Sciences and the utilization of the products stemming from the industry. Graduates of the School are keenly sought after for positions as research workers, teachers, extension workers, agricultural journalists, valuers, and managers of estates, and for other professional occupations in the pastoral industry.

The first year of the BSc degree course consists of a basic training in general science; vocational subjects essential to all branches of the wool industry are given in the second, third and fourth years. The fourth year work includes a project which will give each student an opportunity to express initiative and originality. By association with lecturers, and teachers who are all engaged in research, we aim to provoke both curiosity and interest in students who will themselves endeavour to contribute to the advance of efficiency.

In Years 3 and 4 provision is made for students who wish to specialize in Plant Sciences, Animal Production, Wool Technology, Farm Management and Economics or in the appropriate scientific areas of Genetics and Biostatistics, Physiology, Nutrition and Biochemistry, Rural Extension, Agricultural Chemistry or Parasitology.

From time to time compulsory field excursions, farm tours and consolidated courses on University field stations are arranged for students.

### 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**

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
</tr>
<tr>
<td>2.121</td>
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<tr>
<td>2.131</td>
<td>Chemistry IB</td>
</tr>
<tr>
<td>9.101</td>
<td>Biology of Grazing Sheep and Cattle</td>
</tr>
<tr>
<td>10.001</td>
<td>Mathematics I or</td>
</tr>
<tr>
<td>10.011</td>
<td>Higher Mathematics I or</td>
</tr>
<tr>
<td>10.021B</td>
<td>General Mathematics IB and</td>
</tr>
<tr>
<td>10.021C</td>
<td>General Mathematics IC</td>
</tr>
<tr>
<td>17.021</td>
<td>Biology of Higher Organisms</td>
</tr>
<tr>
<td>27.001</td>
<td>Applied Physical Geography*</td>
</tr>
</tbody>
</table>

* Students wishing to specialize in Wool Science may with the approval of the Head of the School substitute 1.011 Higher Physics I or 1.001 Physics I or 1.021 Physics IT for 27.001 Applied Physical Geography.

<table>
<thead>
<tr>
<th>Year 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
</tr>
<tr>
<td>9.111</td>
<td>Livestock Production I*</td>
</tr>
<tr>
<td>9.201</td>
<td>Agronomy</td>
</tr>
<tr>
<td>9.411</td>
<td>Agricultural Chemistry I</td>
</tr>
<tr>
<td>9.501</td>
<td>Wool Science I</td>
</tr>
<tr>
<td>9.601</td>
<td>Animal Physiology I</td>
</tr>
<tr>
<td>45.101</td>
<td>Biometry</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
</tr>
</tbody>
</table>

Total: 25½ 25½

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

<table>
<thead>
<tr>
<th>Year 3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
</tr>
<tr>
<td>9.131</td>
<td>Animal Health I</td>
</tr>
<tr>
<td>9.202</td>
<td>Pastoral Agronomy</td>
</tr>
<tr>
<td>9.301</td>
<td>Agricultural Economics and Management I</td>
</tr>
<tr>
<td>9.421</td>
<td>Animal Nutrition</td>
</tr>
<tr>
<td>9.801</td>
<td>Genetics I</td>
</tr>
<tr>
<td>41.101</td>
<td>Introductory Biochemistry</td>
</tr>
<tr>
<td></td>
<td>Two General Studies Electives</td>
</tr>
</tbody>
</table>

Total: 22 20

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.
Applied Science

**Year 4**

**Group A**

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
<th>Hpw</th>
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<th>S2</th>
</tr>
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<tbody>
<tr>
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<td>Project</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>9.002</td>
<td>Seminar</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
<td>1½</td>
<td></td>
<td>1½</td>
</tr>
</tbody>
</table>

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

**Optional subjects**

**Group A**

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
<th>Hpw</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.113</td>
<td>Livestock Production III</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>9.132</td>
<td>Animal Health II</td>
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<td>0</td>
<td></td>
</tr>
<tr>
<td>9.204</td>
<td>Range Management†</td>
<td>0</td>
<td>3</td>
<td></td>
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<tr>
<td>9.503</td>
<td>Wool Science III</td>
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<td>4</td>
<td></td>
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<tr>
<td>9.602</td>
<td>Genetics II</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>9.811</td>
<td>Biostatistics I</td>
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<td></td>
</tr>
<tr>
<td>9.812</td>
<td>Biostatistics II</td>
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<td>4</td>
<td></td>
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</tbody>
</table>

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

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

---

### Table of Progression in Subjects

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>27.001 Geography I</td>
<td>9.201 Agronomy</td>
<td>9.202 Pastoral Agronomy</td>
<td>9.203 Crop Agronomy*</td>
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<td></td>
<td></td>
<td></td>
<td>43.121 Plant Physiology</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>43.142 Environmental Botany</td>
</tr>
<tr>
<td></td>
<td>9.131 Animal Health</td>
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<td>Anim. Health</td>
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<td>2.121 Chemistry IA</td>
<td>9.411 Agricultural Chemistry I</td>
<td>41.101 Biochemistry I</td>
<td>9.412 Agric. Chemistry II</td>
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<td></td>
<td></td>
</tr>
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<td>10.001 Mathematics I</td>
<td></td>
<td>9.801 Genetics I</td>
<td>9.811 Biostatistics I</td>
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<td>10.011 Mathematics II</td>
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<td>9.812 Biostatistics II</td>
<td>9.802 Genetics II</td>
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<tr>
<td>and 10.021C Mathematics II</td>
<td></td>
<td>9.901 Rural Extension</td>
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</table>

**Note:**

1. Students may take either Geography I or Physics I.
2. Subjects in italics are compulsory.
#### Year 1

<table>
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<th>Hours per week</th>
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<tr>
<td>1.011 Higher Physics I</td>
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<tr>
<td>10.001 Mathematics I or</td>
<td>6</td>
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<tr>
<td>10.011 Higher Mathematics I or</td>
<td>6</td>
</tr>
<tr>
<td>10.021B General Mathematics IB and</td>
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</tr>
<tr>
<td>10.021C General Mathematics IC</td>
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#### Year 2

<table>
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<tr>
<td>9.411 Agricultural Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>9.501 Wool Science I</td>
<td>7</td>
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<tr>
<td>9.601 Animal Physiology I*</td>
<td>6</td>
</tr>
<tr>
<td>58.512 Introduction to Education</td>
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#### Year 3

<table>
<thead>
<tr>
<th>Courses</th>
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<tr>
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<td>9.301 Agricultural Economics I</td>
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<td>9.502 Wool Science III</td>
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<td>9.801 Genetics I</td>
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<tr>
<td>58.513 Education IA</td>
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<td>58.061 Methods of Teaching*</td>
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<tr>
<td>Two General Studies Electives</td>
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</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 1979* 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.

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.

Numbers of 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.
School of Applied Geology

8020
Engineering Geology-Hydrogeology-Environmental Geology

Master of Applied Science MAppSc

The course consists of a Project (Group A) and six subjects chosen from Group B, at least one of which must be 25.402G 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>Group</th>
<th>Subjects</th>
<th>Hours per week</th>
</tr>
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<tbody>
<tr>
<td>Group A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.403G</td>
<td>Project</td>
<td>0 18</td>
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<tr>
<td>Group B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.402G</td>
<td>Hydrogeology</td>
<td>3 0</td>
</tr>
<tr>
<td>25.404G</td>
<td>Environmental Geology</td>
<td>3 0</td>
</tr>
<tr>
<td>25.405G</td>
<td>Engineering Geophysics</td>
<td>3 0</td>
</tr>
<tr>
<td>25.406G</td>
<td>Geological Basis of Geomechanics</td>
<td>3 0</td>
</tr>
<tr>
<td>25.407G</td>
<td>Geopolllution Management</td>
<td>3 0</td>
</tr>
<tr>
<td>25.408G</td>
<td>Engineering Geology</td>
<td>3 0</td>
</tr>
<tr>
<td>25.409G</td>
<td>Foundation Geology</td>
<td>3 0</td>
</tr>
<tr>
<td>25.410G</td>
<td>Coastal Environmental Geology</td>
<td>3 0</td>
</tr>
<tr>
<td>27.904G</td>
<td>Geomorphology for Engineering Geologists</td>
<td>3 0</td>
</tr>
</tbody>
</table>

8070
Applied Geophysics Graduate Course

Master of Applied Science MAppSc

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.

A student may be admitted to the MAppSc degree course in Applied Geophysics provided that he is a four-year graduate in Science, Applied Science or Engineering, or has an equivalent qualification, and provided further that he has 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 IIA
- 25.335G Applied Geophysics Project

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

8090
Mineral Exploration Graduate Course

Master of Applied Science MAppSc

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:

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

School of Chemical Engineering

Formal courses in the School of Chemical Engineering lead to the Master of Applied Science or to 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
- 8050 Fuel Technology
- 8080 Industrial Pollution Control

Master of Applied Science MAppSc

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 a minimum of prerequisite or co-requisite requirements 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>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.281G</td>
<td>Design of Microbial Reactors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unit 1: Rate Processes</td>
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</tr>
<tr>
<td></td>
<td>Unit 2: Fundamentals of Microbial Stoichiometry</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Unit 3: Design of Microbial Reactors</td>
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</tr>
<tr>
<td>3.282G</td>
<td>Microbial Kinetics and Energetics</td>
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<tr>
<td></td>
<td>Unit 1: Microbial Kinetics</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Unit 2: Microbial Energetics</td>
<td>2</td>
</tr>
<tr>
<td>3.283G</td>
<td>Bioprocess Unit Operations and Equipment Design</td>
<td>3</td>
</tr>
<tr>
<td>3.284G</td>
<td>Heat, Mass and Momentum Transport</td>
<td>1</td>
</tr>
<tr>
<td>3.285G</td>
<td>Bioprocess Laboratory</td>
<td>3</td>
</tr>
</tbody>
</table>

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

As the material in this course will be of interest to graduates from a wide range of disciplines, the suggested course outlines consist of a central core selected from the subjects above and a range of background material. This background material can be designed to suit graduates from either of the two groups consisting of firstly Applied Science, Engineering or Science with principal interests in Chemistry, Mathematics, or Physics, or, secondly, Agriculture or Science graduates with principal interests in Biochemistry, Chemistry, and/or Microbiology. Graduates with an inadequate background in Mathematics and/or rate processes 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.

* For additional information on the MAppSc degree course see 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

- 42.211G Principles of Biology
- 42.212G Principles of Biochemistry
- 44.111 Microbiology

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

- 44.111 Microbiology
- 3.281G Unit 2—Fundamentals of Microbial Stoichiometry

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></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>3.284G</td>
<td>Heat, Mass and Momentum Transport</td>
<td>1</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. 3.163G Industrial Water and Wastewater Engineering
2. 38.159G Treatment and Utilization of Biological Effluents
3. 3.396G Unit Operations in Waste Management

Reading List (Mathematics)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.162G</td>
<td>Urban Planning</td>
<td>½</td>
</tr>
<tr>
<td>3.164G</td>
<td>Medical Aspects</td>
<td>1</td>
</tr>
<tr>
<td>3.166G</td>
<td>Legislative Aspects</td>
<td>1</td>
</tr>
<tr>
<td>27.902G</td>
<td>Meteorological and Hydrological Principles</td>
<td>1</td>
</tr>
<tr>
<td>44.111</td>
<td>Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>3.163G</td>
<td>Industrial Water and Wastewater Engineering</td>
<td>2</td>
</tr>
<tr>
<td>3.381G</td>
<td>Atmospheric Pollution and Control</td>
<td>2</td>
</tr>
<tr>
<td>3.386G</td>
<td>Unit Operations in Waste Management</td>
<td>1½</td>
</tr>
<tr>
<td>11.908G</td>
<td>Community Noise Control</td>
<td>1</td>
</tr>
<tr>
<td>38.159G</td>
<td>Treatment and Utilization of Biological Effluents</td>
<td>½</td>
</tr>
<tr>
<td>3.901G</td>
<td>Minor Project or</td>
<td>3</td>
</tr>
<tr>
<td>3.900G</td>
<td>Project</td>
<td>6</td>
</tr>
</tbody>
</table>

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 in Chemical Engineering and Industrial Chemistry who have completed a four year degree program, 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.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.170G</td>
<td>Process Principles or Graduate Elective</td>
<td>2</td>
</tr>
<tr>
<td>3.162G</td>
<td>Urban Planning</td>
<td>½</td>
</tr>
<tr>
<td>3.164G</td>
<td>Medical Aspects</td>
<td>1</td>
</tr>
<tr>
<td>3.166G</td>
<td>Legislative Aspects</td>
<td>1</td>
</tr>
<tr>
<td>27.902G</td>
<td>Meteorological and Hydrological Principles</td>
<td>1</td>
</tr>
<tr>
<td>44.111</td>
<td>Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>3.163G</td>
<td>Industrial Water and Wastewater Engineering</td>
<td>2</td>
</tr>
<tr>
<td>3.381G</td>
<td>Atmospheric Pollution and Control</td>
<td>2</td>
</tr>
<tr>
<td>3.386G</td>
<td>Unit Operations in Waste Management</td>
<td>1½</td>
</tr>
<tr>
<td>11.908G</td>
<td>Community Noise Control</td>
<td>1</td>
</tr>
<tr>
<td>38.159G</td>
<td>Treatment and Utilization of Biological Effluents</td>
<td>½</td>
</tr>
<tr>
<td>3.901G</td>
<td>Minor Project or</td>
<td>3</td>
</tr>
<tr>
<td>3.900G</td>
<td>Project</td>
<td>6</td>
</tr>
</tbody>
</table>

* For additional information on the MAppSc degree course see above.
3.170G Process Principles is a bridging course 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.

8060 Fuel Technology Graduate Course*

Master of Applied Science MAppSc

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

The course is based on the general formula for a MAppSc degree program, whereby the subjects 3.311 and 3.321 can comprise the 25% undergraduate component, the project (15 or 30% of the program) is 3.900G, and the remainder of the hours can be taken from the units offered in the 3.38-G series of subjects. There are also compulsory seminar and laboratory practice subjects.

The course allows reasonable flexibility with a choice of subjects, and units within subjects, subject to the availability of staff.

Provision is made for courses 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 to the graduate level of certain subjects. For this purpose the subject, 3.170G Process Principles, is specified.

The first year of the course introduces elementary aspects of corrosion technology and suitably orients 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 3.172G Corrosion Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>3.171G Corrosion Technology I</td>
<td>3</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.

* For additional information on the MAppSc degree course see above.
Graduate subjects in Chemical Technology may be selected from:

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

† 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.
In addition, the School welcomes enquiries from graduates in Chemistry, Biochemistry, Microbiology, Applied Science and Agriculture who are interested in pursuing research in food science and technology for 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 Courses

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 and/or Microbiology.

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

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

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

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

Graduate subjects in Food Technology may be selected from:

<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>38.155G</td>
<td>Dairy Technology</td>
<td>2</td>
</tr>
<tr>
<td>38.156G</td>
<td>Oenology</td>
<td>1</td>
</tr>
<tr>
<td>38.157G</td>
<td>Technology of Cereal Products</td>
<td>1</td>
</tr>
<tr>
<td>38.158G</td>
<td>Marine Products</td>
<td>1</td>
</tr>
<tr>
<td>38.159G</td>
<td>Food Process Wastes</td>
<td>½</td>
</tr>
<tr>
<td>38.160G</td>
<td>Food Quality Assessment</td>
<td>1</td>
</tr>
<tr>
<td>38.161G</td>
<td>Food Additives and Toxicology</td>
<td>1</td>
</tr>
<tr>
<td>38.162G</td>
<td>Postharvest Physiology and Handling of Fruit and Vegetables</td>
<td>3</td>
</tr>
<tr>
<td>38.351G</td>
<td>The Microbial Ecology of Foods</td>
<td>3</td>
</tr>
<tr>
<td>38.551G</td>
<td>Advanced Nutrition</td>
<td>1½</td>
</tr>
<tr>
<td>38.552G</td>
<td>Methods in Food and Nutrition Education</td>
<td>1½</td>
</tr>
<tr>
<td>38.553G</td>
<td>Methods in Nutritional Assessment and Analysis</td>
<td>1½</td>
</tr>
<tr>
<td>38.900G</td>
<td>Major Project</td>
<td>6</td>
</tr>
<tr>
<td>38.901G</td>
<td>Minor Project</td>
<td>3</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 prerequisite or co-requisites. A particular subject may not necessarily be conducted in any one year.

5020 Food Technology Graduate Diploma Course

Graduate Diploma GradDip

The graduate diploma course is designed to provide professional training at an advanced level for graduates in science, applied science or engineering who have not had previous training in Food Technology.

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

The course is a blend of formal lectures and laboratory work at the undergraduate and graduate levels. The Graduate Diploma in 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>38.155G</td>
<td>Dairy Technology</td>
<td>2</td>
</tr>
<tr>
<td>38.156G</td>
<td>Oenology</td>
<td>1</td>
</tr>
<tr>
<td>38.157G</td>
<td>Technology of Cereal Products</td>
<td>1</td>
</tr>
<tr>
<td>38.158G</td>
<td>Marine Products</td>
<td>1</td>
</tr>
<tr>
<td>38.159G</td>
<td>Food Process Wastes</td>
<td>½</td>
</tr>
<tr>
<td>38.160G</td>
<td>Food Quality Assessment</td>
<td>1</td>
</tr>
<tr>
<td>38.161G</td>
<td>Food Additives and Toxicology</td>
<td>1</td>
</tr>
<tr>
<td>38.162G</td>
<td>Postharvest Physiology and Handling of Fruit and Vegetables</td>
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<td>38.900G</td>
<td>Major Project</td>
<td>6</td>
</tr>
<tr>
<td>38.901G</td>
<td>Minor Project</td>
<td>3</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.

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

2.271G Chemistry and Analysis of Foods  3
38.431 Food Engineering I  3
38.442 Food Engineering II  3
38.142 Oenology  3
38.144 Treatment and Utilization of Food Processing Wastes  1½
38.157G Technology of Cereal Products  1
38.158G Marine Products  1
38.162G Postharvest Physiology and Handling of Fruit and Vegetables  3
38.163G Methods in Food and Nutrition Education  1½
38.341 Food Microbiology II  3
38.342 Yeast Technology  1½
38.542 Special Topics in Nutrition  1½
38.551G Advanced Nutrition  1½
38.552G Methods of Nutritional Assessment and Analysis  1½
42.102A Biotechnology A  3
42.211G Principles of Biology  1½
42.212G Principles of Biochemistry  1½
42.213G Biochemical Methods  1½
42.214G Biotechnology  1½
44.111 Microbiology  3
44.143 Microbiology AS  5

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

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.

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

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

Graduate Subjects

<table>
<thead>
<tr>
<th>Graduate Subjects</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.241G Graduate Metallurgy Project</td>
<td>Not less than 4</td>
</tr>
<tr>
<td>4.211G Metallurgical Practice</td>
<td>4 to 8</td>
</tr>
<tr>
<td>Detailed studies relating to one or more of the following:</td>
<td></td>
</tr>
<tr>
<td>1. Extractive Metallurgy</td>
<td></td>
</tr>
<tr>
<td>2. Metal working and forming</td>
<td></td>
</tr>
<tr>
<td>3. Foundry practice</td>
<td></td>
</tr>
<tr>
<td>4. Welding and metal fabrication</td>
<td></td>
</tr>
<tr>
<td>5. Metal finishing and corrosion protection</td>
<td></td>
</tr>
<tr>
<td>4.221G Advanced Metallurgical Techniques</td>
<td>1 to 2</td>
</tr>
<tr>
<td>4.231G 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 Advanced Materials Technology</td>
<td>3</td>
</tr>
</tbody>
</table>

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

School of Metallurgy

The School of Metallurgy conducts courses which may 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 for the degrees of Master of Science, Master of Engineering and Doctor of Philosophy.

The Head of the School will be 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.
Undergraduate Subjects

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

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</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.

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.

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. Normally, the program will be arranged so that it may be completed in one year full-time or two years part-time. It should be noted that some degree of specialization will be possible in the laboratory investigations.

Year 1—Part-time

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</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>0</td>
</tr>
<tr>
<td>7.033</td>
<td>Mineralogical Assessment</td>
<td>0</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>
</tbody>
</table>

Year 2—Part-time

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</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>
</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.
Recently the course was made more flexible to permit prospective students to specialize in particular graduate aspects of Wool and Pastoral Sciences, and at the same time, to do supporting work in related undergraduate fields which they may not have covered in their undergraduate training, or which they may have covered and wish to revise.

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 in the basic disciplines of the undergraduate BSc degree course, viz General and Human Biology, Agronomy and/or Livestock Production. 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 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.

### 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.

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**Full-time Course**

<table>
<thead>
<tr>
<th>Code</th>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.105G</td>
<td>Advanced Livestock Production</td>
<td>4</td>
</tr>
<tr>
<td>9.503G</td>
<td>Wool Study</td>
<td>6</td>
</tr>
<tr>
<td>9.711G</td>
<td>Advanced Wool Technology</td>
<td>4</td>
</tr>
<tr>
<td>9.902G</td>
<td>Techniques of Laboratory and Field Investigation</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Approved undergraduate subjects</td>
<td>8</td>
</tr>
</tbody>
</table>

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

Conditions for the Award of Higher Degrees

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

<table>
<thead>
<tr>
<th>Title</th>
<th>Abbreviation</th>
<th>Calendar/Handbook</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor of Science</td>
<td>DSc</td>
<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</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>Master of Arts</td>
<td>MA(Hons)</td>
<td>Arts</td>
</tr>
<tr>
<td></td>
<td>MA</td>
<td>Military Studies</td>
</tr>
<tr>
<td></td>
<td>MBiomedE</td>
<td>Engineering</td>
</tr>
<tr>
<td>Master of Biomedical Engineering</td>
<td>MBA</td>
<td>Architecture</td>
</tr>
<tr>
<td>Master of Building</td>
<td>MBuild</td>
<td>AGSM</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 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>ME</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</td>
</tr>
<tr>
<td>Master of Engineering without Supervision</td>
<td>ME</td>
<td>Engineering</td>
</tr>
<tr>
<td>Master of Engineering Science</td>
<td>MEngSc</td>
<td>Engineering</td>
</tr>
<tr>
<td>Master of General Studies</td>
<td>MGenStud</td>
<td>General 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 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</td>
</tr>
<tr>
<td>Master of Science without Supervision</td>
<td>MSc</td>
<td>Architecture</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>MSurvSc</td>
<td>Engineering</td>
</tr>
<tr>
<td>Master of Surveying Science</td>
<td>MTP</td>
<td>Architecture</td>
</tr>
</tbody>
</table>

**Graduate Diplomas**

<table>
<thead>
<tr>
<th>Title</th>
<th>Abbreviation</th>
<th>GradDip</th>
<th>Applied Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate Diploma</td>
<td>GradDip</td>
<td>Applied Science</td>
<td></td>
</tr>
<tr>
<td>Graduate Diploma in the Faculty of Professional Studies</td>
<td>DipArchivAdmin</td>
<td>Architecture</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DipEd</td>
<td>Engineering</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DipLib</td>
<td>Sciences ‡</td>
<td></td>
</tr>
</tbody>
</table>

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

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

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

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

   (3) if he holds a degree without honours from the University of New South Wales or other approved university, have achieved by subsequent work and study a standard recognised by the appropriate Faculty or Board of Studies 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 Faculty or Board of Studies.

3. When the Faculty or Board of Studies is not satisfied with the qualifications submitted by a candidate, the Faculty or Board of Studies may require him, before he is permitted to register, to undergo such examination or carry out such work as the Faculty or Board of Studies may prescribe.

4. A candidate for registration for a course of study leading to the degree of Doctor of Philosophy shall:

   (1) apply to the Registrar on the prescribed form at least one calendar month before the commencement of the session in which he desires to register; and

   (2) submit with his application a certificate from the head of the University school in which he proposes to study stating that the candidate is a fit person to undertake a course of study and research leading to the degree of Doctor of Philosophy and that the school is willing to undertake the responsibility of supervising the work of the candidate and of reporting to the Faculty or Board of Studies at the end of the course on the merits of the candidate's performance in the prescribed course.

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 his degree, who before registration was engaged upon research to the satisfaction of the Faculty or Board of Studies, may be exempted from not more than two academic sessions;

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

   (3) in exceptional cases, the Professorial Board on the recommendation of the Faculty or Board of Studies 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 himself for examination not later than ten academic sessions from the date of his 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 Faculty or Board of Studies.

7. The candidate shall be required to devote his whole time to advanced study and research, save that:

   (1) the Faculty or Board of Studies may permit a candidate on application to undertake a limited amount of University teaching or outside work which in its judgment will not interfere with the continuous pursuit of the proposed course of advanced study and research;
(2) a member of the full-time staff of the University may be accepted as a part-time candidate for the degree, in which case the Faculty or Board of Studies shall prescribe a minimum period for the duration of the program;

(3) in special circumstances, the Faculty or Board of Studies 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 his program in a school of the University. In such a case the Faculty or Board of Studies shall prescribe for the duration of his program a minimum period which, in its opinion, having regard to the proportion of his time which he 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 his program under the direction of a supervisor appointed by the Faculty or Board of Studies 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 Faculty or Board of Studies may permit candidates to conduct their 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 his research for approval by the Faculty or Board of Studies. After the topic has been approved it may not be changed except with the permission of the Faculty or Board of Studies.

10. A candidate may be required by the Faculty or Board of Studies to attend a formal course of study appropriate to his work.

11. On completing his 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 his research. In special cases work done conjointly with other persons may be accepted, provided the Faculty or Board of Studies is satisfied on the candidate's part in the joint research.

13. Every candidate shall be required to submit with his 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 his thesis any work or material which he has previously submitted for a university degree or other similar award.
15. The candidate shall give in writing two months' notice of his intention to submit his thesis and such notice shall be accompanied by the appropriate fee.

16. Four copies of the thesis shall be submitted together with a certificate from the supervisor that the candidate has completed the course of study prescribed in his case. The 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 he has 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 Faculty or Board of Studies, at least one of whom shall be an external examiner.

19. After examining the thesis the examiners may:

(1) decide that the thesis reaches a satisfactory standard; or

(2) recommend that the candidate be required to re-submit his thesis in revised form after a further period of study and/or research; or

(3) recommend without further test that the candidate be not awarded the degree of Doctor of Philosophy.

20. If the thesis reaches the required standard, the examiners shall arrange for the candidate to be examined orally, and, at their discretion, by written papers and/or practical examinations on the subject of the thesis and/or subjects relevant thereto, save that on the recommendation of the examiners the Faculty or Board of Studies may dispense with the oral examination.

21. If the thesis is of satisfactory standard but the candidate fails to satisfy the examiners at the oral or other examinations, the examiners may recommend the University to permit the candidate to represent the same thesis and submit to a further oral, practical or written examination within a period specified by them but not exceeding eighteen months.

22. At the conclusion of the examination, the examiners will submit to the Faculty or Board of Studies a concise report on the merits of the thesis and on the examination results, and the Faculty or Board of Studies shall recommend whether or not the candidate may be admitted to the degree.

23. A candidate shall be required to pay such fees as may be determined from time to time by the Council.

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**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.

* See Conditions for the Award of Degrees in the Calendar.
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 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.

(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.
(2) For each candidate there shall be at least two examiners, appointed by the Professorial Board on the recommendation of the Committee, one of whom, if possible, shall be external to the University.

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

Recommendation for Admission to Degree

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

Fees

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

Master of Science (MSc) and Master of Engineering (ME) without Supervision

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:

Qualifications

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

Registration

3. (1) An application to register as an external candidate for the degree of Master of Science, Master of Engineering or Master of Surveying without supervision shall be lodged with the Registrar for recommendation by the Head of School and consideration by the Higher Degree Committee of the appropriate Faculty (hereinafter referred to as the Committee) not less than six months before the intended date of submission of the thesis. A graduate who intends to apply in this way 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 original 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.
(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.

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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 or 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 HSC Examination.

Candidates for enrolment who obtained the HSC in previous years or held 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); C (Credit).
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* Subjects also offered for courses in this handbook.

** Formerly the Department of Behavioural Science; new name effective from 1 January 1979.

Page numbers correspond to the page numbers mentioned in the text.
School of Accountancy

Undergraduate Study

14.081 Introduction to Financial Analysis  S2 LT4
Prerequisite: Nil.

The aims of this course are to provide students with a comprehensive introduction to financial management. The course covers the nature of financial management, the business environment, the principles necessary to make effective financial management decisions, and the specific industry studies.

14.501 Accounting and Financial Management IA  S1 or S2 LT4½
Prerequisite: Nil.

This course introduces 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.

14.511 Accounting and Financial Management IB  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.

School of Applied Geology

Undergraduate Study

25.011 Geology I
Prerequisite: Nil.

HSC Exam
Percentile Range
Required.

2 unit Science (any strand)
31-100.

4 unit Science (multistrand)
31-100.

Physical Geology: The origins, structure and main surface features of the earth; geological cycle; processes of erosion, transportation, sedimentation and lithification. Surface and sub-surface water. Weathering, lakes, rivers, glacial phenomena. Vulcanism, earthquakes, orogenesis and epeirogenesis, integrated theory of plate tectonics and continental drift.


Petrology: Field occurrence, lithological characteristics and structural relationships of igneous, sedimentary and metamorphic rocks. Coal, oil and ore deposits.

Stratigraphy and Palaeontology: Basic principles of stratigraphy; introductory palaeontology. The geological time scale. The geological history of the Australian continent and more specifically that of New South Wales in introductory outline.

Practical Work: Preparation and interpretation of geological maps and sections. Map reading and use of simple geological instruments. Study of simple crystal forms and symmetry. Applied stereoscopic projection. Identification and description of common minerals and rocks in hand specimen. Recognition and description of examples of important fossil groups. Supplemented by four field tutorials, attendance at which is compulsory.

25.012 Geology IIA


Photogeology: The use of air photos for geological mapping and geomorphological evaluation of land. Techniques and principles of photo interpretation, multi-band photography; landscape genesis and photo interpretation of folds, faults, joints, bedding, limestone, intrusive igneous rocks, volcanics, alluvial fans and terraces, slopes, landslides, coastal and tropical landforms; relations between geology, drainage, soil and vegetation; orebody expression, gossans, colouration halos.

25.022 Geology IIB

Stratigraphy and Palaeontology

Stratigraphy: Flow regime and bedding forms including flume experiments, sedimentary structures. Modern and ancient environments of deposition: fluvial, deltaic coastal, shelf, slope and deep sea environments. The facies concept. Stratigraphic principles. Fold belts, geosynclines and their interpretation by plate tectonics models. Stratigraphic and structural development of a fold belt (Lachlan Fold Belt) and an intracontinental basin (Sydney Basin).

Palaeontology: Morphology and stratigraphic distribution of the Protozoa, Porifera, Coelenterata, Bryozoa, Brachiopoda and Mollusca. Practical examination of representative fossils from each phyla.
Subject Descriptions

25.013 Geology IIIA


**Laboratory:** Hand specimen study of ores and associated features; introductory mineralogy.

**Mineralogy and Petrology**


Igneous Petrology: Igneous activity at convergent and divergent plate boundaries. High pressure and low pressure fractionation. Influence of H₂O, CO₂, and O₂ on melting relationships. Primary magmas, Magmatic lineages. Mantle inhomogeneity. Significance of trace element and isotope studies.

**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

**Geophysics**

Global Geophysics: The physics, shape, structure and constitution of the earth: seismology, gravity, geology, geothermy, geomagnetism, palaeomagnetism, geo-electricity and geochronology. Geotectonics 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.

**Stratigraphy and Palaeontology**


Field Mapping

Geological mapping in a complicated geological terrain with emphasis on stratigraphical and structural interpretation. Geological report writing and cartography.

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 kaolinites, 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.


**Practical:** 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**


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, Mineralogy, 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—isocte studies, trace elements, phase equilibria, inclusions in minerals.

Mineralogy: Reflective light optics: orthoscopic and conoscopic rotation phenomena, determinative methods, textural interpretation of ores.

25.014 Geology IV: Advanced Applied Geology

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

An individual field assignment carried out under supervision and consisting essentially of geological mapping plus supporting laboratory work.

25.034 Geology IV: Engineering Geology

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 rocks. Hydrogeological mapping and maps. Pollution of groundwater. And 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

Lectures, tutorials and a laboratory project in Advanced Sedimentology, Palaeontology, Palaeoecology and Petroleum Geology.

25.064 Geology IV: Applied Geophysics

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.

25.0303 Geology for Geomorphologists and Pedologists

Prerequisites: Geosciences II A and B.

Clay Mineralogy: The structure and properties of clay minerals. Techniques for their recognition. Clay-water systems and ion exchange. Some applied aspects of clay mineralogy. Laboratory work to illustrate the above course.

Sedimentary Petrology: The chemistry of rock weathering. The chemically formed sedimentary rocks including the phosphates, zeolites, evaporates, ferruginous and siliceous deposits. The distribution of trace elements in sedimentary rocks.

Sedimentology: Methods of sediment analysis and sediment parameters. Laboratory flume experiments. Selected stratigraphic topics.

25.101 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 rock-forming 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.

25.102 Geology for Mining Engineers II


Structural Geology: Elements of structural geology. Stereographic projection and fracture analysis applied to mining operations.


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 will be held at the end of Session 1. Attendance is compulsory.

25.102R Geology for Mining Engineers IIA

Prerequisite: 25.101.


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.

25.102R Geology for Mining Engineers IIB

Prerequisite: 25.101.


Laboratory Work: Exercises in structural analysis including the analysis of structure of an ore deposit. Hand specimen examination of nonmetallic economic minerals. Exercises in groundwater hydrology.

25.141 Advanced Engineering Geology

Prerequisite or co-requisite: 8.272.

The fabric of rocks at various scales; fabric analysis at the mesoscopic scale; 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. Petrography of rock and earth construction materials; fabric changes with weathering; soil fabrics; engineering aspects, and engineering classification of weathered rocks.

25.201 Mineralogy (Applied Science Course)

Crystallography, crystalline state and crystal growth of minerals. Fundamentals of the atomic structure of minerals, with examples of Bravais lattices and introduction to space lattice group theory. Physical properties of crystals; cleavage, gliding, secondary twinning, elasticity. Elements of crystal optics in polarized light. Classification, descriptive mineralogy and occurrence of primary and secondary minerals with special emphasis on economic metallic and non-metallic minerals. Introduction to petrology. Mode of formation of minerals and ores in the igneous, sedimentary and metamorphic cycles. Examples of principal types of economic mineral deposits, their mode of formation, paragenesis, textures and intergrowths. Elements of fuel geology, construction and refractory materials. Laboratory: Crystallography — Examination of crystals and crystal models for symmetry. Stereographic projection of crystals. Optical Mineralogy — Examination of minerals and rocks in transmitted and incident light using the polarizing microscope. Determination of refractive indices of crystal fragments by the immersion method. Descriptive and Determinative Mineralogy — Macroscopic examination of common minerals with emphasis on economic minerals. Study of texture and intergrowths of common mineral parageneses including the principal rock types in which they occur.

25.201R Mineragraphic Laboratory Work

Comprises the mineralogy and Introductory Mineragraphy topics from 25.801R Geology for Mining Engineers IIA.

Graduate Study

25.331G Applied Geophysics I


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 inhomogeneous 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 the course is directed particularly, but not exclusively, toward the Field Project.

25.402G Hydrogeology

Surface and sub-surface methods of geological and geophysical investigation; groundwater 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

The project will be a research investigation consisting of field and laboratory work in any of the disciplines: Engineering Geology, Hydrogeology, Environmental Geology.
25.404G Environmental Geology  


25.405G Engineering Geophysics  


Field tutorials. Short field tutorials included in course.

25.406G Geological Basis of Geomechanics  


25.407G Geopollution Management  


25.408G Engineering Geology  

Co-requisite: 25.406G.


Several field tutorials will form part of this course.

25.409G Foundation Geology  

Co-requisite: 25.406G.


25.410G Coastal Environmental Geology  


Graduate School of the Built Environment

Graduate Study

39.908G Community Noise Control

Introduction; sound and sound propagation; sound power, sound pressure, decibels; sound perception, psychoacoustics; loudness, annoyance, phones and dBA; hearing conservation; acoustic measuring and analysing instruments — sound level meters, filters, analysers, recorders; sound sources; community noise assessment; the NSW Noise Control Act; practical exercises in sound recording, analysis and assessment; noise control — source noise reduction, use of barriers, enclosures, distance, sound absorbing materials; sound transmission through building elements; noise components of environmental impact statements.

Department of Behavioural Science

See Department of Organisational Behaviour on page 121.

School of Biochemistry

Undergraduate Study

41.101 Introductory Biochemistry

Prerequisites: 17.021, 2.121 and 2.131.

The chemical properties of amino acids, peptides and proteins, carbo-
The relationship between structure and function of enzymes, selected protein systems and hormones. Metabolic networks and control mechanisms. Practical work to amplify the lecture course.

41.102A Biochemistry of Macromolecules

Prerequisites: 41.101 and 2.002B.

Polysaccharides and glycoproteins including bacterial cell walls. Chemistry and biology of polymers and nucleic acids. Methods of amino acid and nucleic acid sequence analysis. Protein structure and function. Active centres of some proteins. Sub-unit organization of proteins. Enzyme kinetics. Practical work to illustrate the lecture course and to provide experience in modern biochemical techniques.

41.102B Physiological Biochemistry

Prerequisites: 41.101 and 2.002B.


41.102C Plant Biochemistry

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 course will utilize radioactive isotopes and a number of newer techniques.

41.102D Biosynthesis of Plant Metabolites

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 materials, eg. alkaloids and cyanogenic glycosides; aromatic ring formation and the isoprene pathway as a source of rubber, steroids, carotenoids and essential oils. Flower pigments and phytoalexins will be discussed briefly.

Practical work, combined with 41.102C illustrates and amplifies the course and includes a wide range of the latest techniques.

41.111 Biochemical Control

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 lecture course.

17.021 Biology of Higher Organisms

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.

17.031 Cell Biology

Prerequisite: HSC Exam

2 unit Science (any strand) 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, linked, recombination, mutation, selection and evolution; information transfer and protein synthesis.

School of Biological Technology

Undergraduate Study

42.102A Biotechnology A

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.


**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; caloric, anabolic, amphibolic and anaplerotic processes, with emphasis on hydrolysis and synthesis of polymers, glycolysis and gluconeogenesis of glucose, β-oxidation and synthesis of fatty acids, deamination and decarboxylation of amino acids, the tricarboxylic acid cycle, electron transport and oxidative phosphorylation; metabolic regulation and integration.

**42.213G Biochemical Methods**
A laboratory program in practical biochemistry. The basic instrumentation and methodology of the biochemist will be introduced by practical exercises and demonstrations. A comprehensive treatment of the relevance and applicability of biochemical techniques will be 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 will be selected from: antibiotic and enzyme production, alcoholic beverages, single cell protein (SCP), microbial waste disposal and bacterial leaching.

Tutorials/practical sessions include: problem solving, instrumentation, continuous culture techniques, and mathematical modeling and simulation of industrial processes.

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**School of Botany**

**Undergraduate Study**

**43.101 Introductory Genetics**
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 variations, 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**
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. Fieldwork is part of the course.

**43.112 Plant Taxonomy**
Prerequisites: 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. Fieldwork is part of the course.

**43.121 Plant Physiology**
Prerequisites: 17.001 or 17.011 and 17.021 or 17.031 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**
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 $**
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. Fieldwork will be part of the course.

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Note: 1. The Unit 43.112 Plant Taxonomy, alternates with 43.162 The Plant Kingdom. (43.162 will be given in 1979.)

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 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

3.001 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.

3.101 Computation and Modelling in Applied Chemistry

Simple computer models for ecological systems, based on chemical data and physico-chemical properties. A familiarity with elementary computer programming and differential equations is presupposed.

3.111 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 modelling.

3.112 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: 3.111 Unit 1.


Unit 3 Thermodynamics I S2 L1T1

Prerequisite: 2.002A.

Basic thermodynamic principles leading to 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 3.111 and 3.112.

3.115 Chemical Engineering for Chemical Technologists

Consists of Units 1 and 2 of 3.111 and Units 1 and 2 of 3.112.

3.121 Chemical Engineering IIA

Unit 1 Mass Transfer (Theory) S1 L1T1

Prerequisites: 2.002A, 3.111.

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: 3.112, Unit 1. Co-requisite: 10.032.

An extension of the work covered in 3.112, Unit 1, with an emphasis on the fundamentals of conduction, convection and unsteady state heat transfer.
Unit 3 Thermodynamics II

Prerequisite: 3.112 Unit 3.

The thermodynamic properties of pure fluids and homogeneous mixtures; an introduction to phase equilibrium; chemical reaction equilibrium.

3.122 Chemical Engineering IIB

Unit 1 Reaction Engineering I

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

Factory Layout: Factors governing location of processing plant. Typical dispositions of process batteries, central utilities, laboratories, workshops, amenities, storage areas, effluent treatments. Distribution of electricity, steam, process and reticulated cooling water. Boiler plants and cooling towers, steam turbine versus electric motors, local versus central location of particular utilities. Provision for expansion.

Piping & 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


Unit 4 Economics I


Unit 5 Process Report

The process report is a compilation of recent information on a process for 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 products and processes.

3.123 Chemical Engineering IIC

Unit 1 Fluid-particle Systems I

Prerequisite: 3.111 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: 3.121 Unit 1, 3.121 Unit 3


Unit 3 Thermodynamics III

Applications of thermodynamics, including power cycles, refrigeration and liquefaction. Thermodynamic analysis of processes.

Unit 4 Solids Handling

Prerequisite: 3.111 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: host 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.

3.124 Chemical Engineering IID

Unit 1 Reaction Engineering II

A course of 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

for solving algebraic equations, and other computer techniques. Application to the analysis and solution of selected chemical engineering problems.

**Analogue computation:** An introduction to the theory and programming of analogue computers, with application to the solution of differential equations and the simulation of dynamic systems.

### 3.125 Chemical Engineering IIIE

**Unit 1** Mass Transfer (Design)  
Prerequisite: 3.121 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: 3.112 Unit 1.

Thermal design procedures for shell and tube heat exchangers and finned 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: 3.122 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.

### 3.126 Chemical Engineering Laboratory IA and IB

**Units 1 and 2**  
Prerequisites: 3.111, 3.112, 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.

### 3.131 Chemical Engineering IIIA

**Prerequisite:** 3.121.

**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.

### 3.132 Chemical Engineering IIIB

**Prerequisite:** 10.032.

**Unit 1** Process Dynamics II  
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  

**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.

### 3.133 Chemical Engineering IIIC

**Unit 1** Safety and Failure Tolerance  
Safe practices. Safety equipment. Handling and storage of hazardous materials. Disaster propagation, implications for plant and storage lay-

Unit 2  Economics II  S1 L2
Prerequisite: 3.122 Unit 4.


Unit 3  Atmospheric Pollution Control  S1 L1

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

Unit 4  Water Pollution Control  S1 L1


3.134  Chemical Engineering Laboratory II  S1 T3
Prerequisite: 3.126.

An integrated chemical engineering laboratory at a more advanced level than the 3.126 laboratory and with an emphasis on open-ended experiments.

3.135  Advanced Chemical Engineering Electives

Unit 1  Plant Layout II  S1 or S2 L1T1
Prerequisite: 3.122 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.

Unit 2  Advanced Chemical and Phase Equilibria  S1 or S2 L1T2
Prerequisite: 3.121 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.

Unit 3  Control II  S1 or S2 L1T1
Prerequisite: 3.132 Unit 2.

In this course, the material covered in Control I will be applied during tutorials to selected case studies, and will be illustrated by laboratory work, and by analogue and digital computation. Lecture material will complement the laboratory work, and will introduce selected topics such as multi-loop system control, system identification and estimation, and sequencing control.

Unit 4  Reactor Engineering  S1 or S2 L1T1

Differential balances with reaction, non-ideal homogeneous 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.

Unit 5  Fluid Particle Systems II  S2 L2
Prerequisite: 3.121 Units 3 and 7.

This is a lecture/demonstration course dealing with fluidized and spouted bed techniques.

Introduction: the history and application of fluidization.


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

Unit 6  Process Engineering II  S1 or S2 L1T1
Prerequisites: 3.121, 3.122, 3.123, 3.124, 3.125, 3.133.


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, on-stream 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.

3.136 Oil and Gas Engineering F L1T2

Prerequisite: 3.311.


3.140 Chemical Engineering Design Project S1 T1 S2 T11 or S1 T6 S2 T6

The design of plant for the production of chemicals and the estimation of product costs.

3.150 Chemical Engineering Experimental Project S1 T1 S2 T11 or S1 T6 S2 T6

An experimental investigation of some aspects of chemical engineering.

Servicing Subjects

3.113 Chemical Engineering Science I
3.114 Chemical Engineering Principles I
3.127 Chemical Engineering Science II
3.128 Chemical Engineering Science II

Department of Fuel Technology

3.301 Fuel Engineering (for Mining Engineers) F L2T1

An elective introductory course 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).

3.311 Fuel Engineering I

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 T1
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.

Servicing Subjects
3.302  Fuels and Energy  S2 L3T1

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 antagonism; photosynthesis and phytotoxicity, metabolic mechanisms; morbidity and mortality surveys, exposure indices. Particular pollutants: aldehydes, nitro-olefins, carbon monoxide, sulphur dioxide, oxides of nitrogen, hydrocarbons, ozone and oxidants, particulates, carcinogens.
3.166G Legislative Aspects


3.170G Process Principles


3.171G Corrosion Technology I


3.172G Corrosion Laboratory

Not offered in 1979.

A number of 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

Not offered in 1979.


3.175G Corrosion Seminar

Not offered in 1979.

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

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

3.176G Corrosion Literature Review

Not offered in 1979.

Students will be 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

Not offered in 1979.

Candidates will undertake a project involving the design/evaluation of corrosion testing equipment/techniques. A comprehensive report will be 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 lnE/pH, potential/pH, temperature/pH and concentration/pH will be 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.
Subject Descriptions

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
Not offered in 1979.

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

3.411G Mass Transfer In Medicine
Not offered in 1979.
Material/energy balances and kinetics as applied to artificial organs and the body. Diffusion, convection, hydraulic permeability in biologic and synthetic membranes.

3.421G Fluid Mechanics for Artificial Organs
An appreciation of the fundamentals of fluid flow and the governing equations, friction and viscosity, streamline and turbulent flow. Flow of fluids in artificial organs.

3.431G Biocompatibility
Interaction of biological fluids with foreign surfaces, in vitro tests to assess thrombogenicity and material compatibility with tissue. Hemofiltration. Current status of biocompatibility as applied to hemodialysis, membrane oxygenation and prosthetic devices.

3.184G System Simulation and Control
This is a participatory course in which case studies, discussion 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 modeling; 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
Not offered in 1979.
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
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, e.g., valves, fittings, pumps, safety devices. Economic aspects.

3.188G Advanced Process Engineering Economics
Not offered in 1979.
Department of Biological Process Engineering

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 3.135 Unit 6 Reactor Engineering.

Covers process rates and rates of change, generalized definition of a process rate. Material balances with reaction - integral balances and balances differential with respect to time, space, and both time and space.

Measurement, interpretation and correlation of process rates. Heterogenous 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 floccs and microbial films. Design for microbial flocc 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 eg sterilization and air purification, dehydration drying at reduced pressure, reduced temperature preservation, radiation, product isolation, sedimentation, filtration, centrifugation, extraction, absorption, chromatography 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 MAppSc (Fuel Engineering) degree course. Content bias to choice of G subjects.

3.381G  Atmospheric Pollution and Control

Unit 1 (2 SU) Causes, properties, dispersion, monitoring control and legislation.

Unit 2 (2 SU) Advanced atmospheric pollution (extension for EPC, IPC courses only)
School of Chemical Technology

Undergraduate Study

22.101 Introduction to Chemical Technology  S2 L2


22.112 Chemical Process Equipment  F L1

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.

22.113 Industrial Chemistry Processes  F L1½T2

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 uranyl resins, acetic acid, polymers based on ethylene and acetylene, elastomers.

Laboratory: Students will be 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  S2 L2

Prerequisite: 22.113.

Topics selected from the following will be studied in depth: refractometers, 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.

22.122 Instrumental Analysis  F L1T3

Prerequisites: 1.001, 2.121, 2.131. Co- or prerequisite: 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 S1 L2T2 S2 L1½T1½

Thermodynamics: the laws of thermodynamics, power cycles, thermodynamics of fluids, heterogeneous equilibrium, chemical reaction equilibrium, irreversible thermodynamics.


22.124 Applied Kinetics S1 L2T1
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 F L1T1
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 experimentation; analytical methods. Development of algorithms for the solution of selected examples relevant to the process chemical industry.

22.133 Data Processing S1 L2T1 S2 L2T2
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 χ² 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 S1 L1T1
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 S1 L1T2
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 S2 L2T2
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 S2 L1½T1½
Prerequisites: 1.922, 10.031, 22.122 or 2.0020. 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, feed-back, transfer functions, final control elements and characteristics, introduction to controllers, empirical timing of controllers.

22.164 Instrumentation and Process Control II S1 L2T3
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 F T3
Co- or prerequisite: 22.184.
Students will be required to deliver two lecturelets 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 will be taken, where appropriate, to arrange for guest lecturers.
22.184 Process Analysis  
F T2  
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  
S1 T6 S2 T8  
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  
F L2T3  
Structural principles: crystal chemistry, structure of glasses, defect solid state: phase equilibria and transformations; diffusion; solid state reactions. A systematic treatment of the chemistry of ceramic products.  
Students are required to take part in a series of factory inspections.

22.224 Physical Ceramics  
F L2T4  
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.

22.234 Ceramic Engineering II  
F L2T2  
Prerequisites: 3.111, 8.112, 22.233, 22.232.  
Advanced treatment of fluid flow and heat transfer; non-Newtonian fluids and unsteady-state heat transfer. A detailed study of ceramic engineering unit operations; filtration, forming, drying and firing. Ceramic engineering design including design of dryers, kilns and glass tanks. Design of simple steel structures. Pollution control equipment.  
Students are required to take part in a series of factory inspections.

22.294 Project  
S1 T6 S2 T9  
An experimental or technical investigation or design related to some aspect of ceramic engineering. Prerequisites and/or co-requisites are determined depending on the nature of the project.

22.303 Polymer Science  
S1 L2 S2 L2T2  


22.314 Polymer Chemistry  
S2 L1  
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  
S2 L1  
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, polyacrylates.

22.334 Polymer Physics II  
S2 L2  
Prerequisite: 22.303.  
Rubber elasticity, extrusion plastometry, rheological aspects of polymer processing operations.
Applied Science

22.341 Statistical Techniques S1 L1T1
Prerequisite: 10.331.

The application in the Polymer industry of the z test, t test, \( x^2 \) 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.

Polymer Materials: Introduction to the chemistry, industrial processing, physical and chemical properties and uses 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, physico-chemical 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 dynamic 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 feedback. 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 fuels; solid state electrolytes; biodegradation of rocks and minerals. Chemical strengthening of ceramics.

**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 produced 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).

**22.221G Refractory Technology II**  
S1 or S2 L4T2

Engineering Properties and Application: This subject deals with the philosophy and methods of development of refractories, the thermodynamic stability and volatility of high temperature materials and the manufacture and testing of refractory materials in industry. A detailed consideration is given to the composition, structure, and properties of typical refractory materials such as silica, alumina silicate, high alumina, basic and zirconia materials and special single and mixed oxides, carbide, nitrides and oxynitrides. Furnace and kiln design is studied with respect to limitations imposed by the refractories used. Laboratory experiments and demonstrations will form part of the course.

Candidates are expected to have a background knowledge equivalent to that expressed in the syllabus for 22.233 Ceramic Engineering I.

**22.230G 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 polymers, polyamides, phenolic condensation resins, vinyl polymers, synthetic elastomers. Natural polymers.

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.

Polymer 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.

**22.330G Polymer Engineering**  
S1 or S2 L4T2


**22.340G Polymer Physics**  
S1 or S2 L4T2


**22.900G Major Project**

A substantial experimental project on some aspect of industrial chemistry, ceramic engineering or polymer science involving at least 6 hours study per week for one year or its part-time equivalent.

**22.901G Minor Project**

A minor experimental or technical investigation on some aspects of industrial chemistry, ceramic engineering or polymer science involving attendance for not less than 3 hours per week for one year or its part-time equivalent.
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.

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

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

2.002B Organic Chemistry 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, nitrile compounds, amines, and sulphonic acids.

2.002C Chemistry II (Inorganic/Analytical 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 and 10.011 or 10.001 or 10.021B and 10.021C.

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.


2.003 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 stereochemical 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, thiophen. 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 antioxidative origin, antioxidants — 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, S, N, P, S, Se, Te, halogens, and noble gases. Chemistry of the metals of groups IA, IIA, and IA. Typical ionic, giant molecule and closed 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
Classification of matter and the language of chemistry. The gas laws and the Ideal Gas Equation, gas mixtures and partial pressure. The structure of atoms, cations and anions, chemical bonding, properties of ionic and covalent compounds. The periodic classification of elements, oxides, hydrides, halides of selected elements. Acids, bases, salts, neutralization. Stoichiometry, the mole concept. Electron transfer 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
Prerequisite: 2.111 or 2.121.

2.131 Chemistry IB S1 or S2 L2T4
Prerequisite: 2.111 or 2.121.

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 SS L2T2

8.259 Properties of Materials F L1T2
As for 8.250 Properties of Materials, plus the structure and properties of binary alloys; control of structure and properties, commercial alloys, materials selection.

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.

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

Undergraduate Study

15.001 Economics IA
Prerequisite: Nil
Microeconomic analysis as related to some aspects of the Australian economy, including the concept of market demand, the theory of costs and production, supply and demand analysis, the determination of exchange rates, the effects of taxes, tariffs, subsidies and quotas, price and output determination under competitive and other market structures, an introduction to distribution theory and the application of economic analysis to contemporary problems.

15.002 Economics IIA
Prerequisites: 15.011 plus
Microeconomic theory, including consumer theory, production theory, types of competition, market stability and general equilibrium.

15.003 Economics IIIA
Prerequisite: 15.002.
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 Economics IB
Prerequisite: 15.001.
Macroeconomic analysis as related to some aspects of the Australian economy, including national income and product, money and banking, consumption, investment, liquidity preference, the Keynesian model of income determination and economic growth.

15.022 Economics IIB
Prerequisite: 15.002.
General equilibrium theory and welfare economics.

15.023 Economics IIIB
Prerequisite: 15.022.
International trade and investment, tariffs and other restrictions, the balance of payments, external balance, the international monetary system.

15.042 Economics IIC
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.
Not offered in 1979.
A study of how basic economic problems are solved in the contemporary Soviet economy within a socialist institutional framework. The emphasis is on an 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 stated goals. For comparative, illustrative and analytical purposes reference is also made to other East European socialist countries, including Yugoslavia.

15.053 Economic Development
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 Resource Economics
Prerequisite: 15.022.
Nature of natural resources and rents, optimization of natural resource use in space and time, decision criteria in natural resource policy, natural resources and the intangible qualities of life.
15.093 Public Sector Economics  
Prerequisite: 15.002 or 15.042.

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.

15.501 Introduction to Industrial Relations  
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 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  
Prerequisite: Nil.

An analysis of the forces that have determined the pattern and course of economic development in the twentieth century. Focus is on the historical background to the contemporary economic world. A basic scheme is provided as the framework within which a variety of material is analyzed. Such major economies as Japan, America and Britain are considered in some detail. Emphasis is on the economic history of Australia and its present position in the world economy and the relationship between successful development and the process of underdevelopment. Students are expected to use a variety of material as the basis of their understanding of present day economic society.

15.611 Economic History IB — Australian Economic Development in the Twentieth Century  
Prerequisite: 15.601.

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.

School of Education

58.061 Methods of Teaching I  
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  
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

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

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 the 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 training 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 a wide range of 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 a right to argue for a religious or atheistic 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.
School of Electrical Engineering

Undergraduate Study

6.832 Industrial Electrical Machinery  S2 L1T2
Prerequisite: 1.001 or equivalent.

An applications-oriented introduction to the usage of electrical machinery in industry. Provides a basis of circuit theory and elementary electronics and then considers the characteristics and selection of electrical machinery, their interface with the prime power supply, protection and electrical safety. Included in the course is a project illustrating the application of electrical engineering to other disciplines.

6.851 Electronics and Instrumentation  S1 L1T2
Prerequisite: 1.001 or equivalent.

An applications-oriented introduction to electronics. Provides a basis of circuit theory and elementary electronics and then treats filters, frequency response, general amplifier characteristics, operational amplifiers and their use in instrumentation, power supplies, analog computers and their use in modeling non-electrical systems. Included in the course is a project illustrating the application of electrical engineering to other disciplines.

6.852 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 in the course is an applications-oriented interdisciplinary project.

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: 38.121.

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 use 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, shortenings; use with other foods. Proteins: sources, extraction procedures, nutritional and toxicological factors, texturizing processes, use with other foods.
38.133 Animal Food Science S2 L2

Prerequisites: 2.002A, 2.002B, 2.002D.


Marine Products: Nature and distribution of world resources; harvesting of teleostian 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 T6

An integrated program of laboratory and pilot plant exercises designed to illustrate the principles and procedures presented in the subjects 38.131, 38.132, 38.331 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 NSW and Queensland.

38.140 Food Technology Project T8

The student will undertake 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 S1 L4

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.

38.142 Oenology L1T2

Prerequisite: 38.132.

History and nature of grape wines; grape and wine statistics; concept of cultivation of 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 S2 L2T4

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 S2 L1T2

Prerequisite: 38.131.

Aspects of water pollution; ecological effects of waste discharges into the marine environment. Purification of water for domestic and industrial applications; water re-use; process modifications for effluent reduction. Origin, composition, treatment, disposal and utilization of wastes from food processing operations. Sewage treatment. Legal and economic aspects of waste disposal. Inspections of water and waste treatment plants. Seminars, assignments.

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  
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  
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  
Prerequisite: 44.143 or other equivalent introductory Microbiology course.
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  
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 slimies.

38.341 Food Microbiology II  
Prerequisite: 38.331.
A detailed theoretical and practical treatment of the ecology, taxonomy and biochemistry of bacteria, yeasts, fungi and viruses involved in food spoilage, food-borne disease and food fermentations. Emphasis on specific methodologies for the detection, enumeration and identification of food associated bacteria, yeasts and fungi. Problems of enumerating microorganisms in foods: techniques of food and surface sampling; formulation, performance and evaluation of selective-differential media; sublethal injury, the value of indicator organisms. Rapid methods for microbial enumeration and identification. Control of microorganisms in foods: microbiological quality control in food production, sanitation and disinfection; food legislation and microbiological standards.

38.344 Yeast Technology  
Prerequisite: 38.331.
The ecological, taxonomic and biochemical fundamentals of yeasts. The role of yeasts in alcoholic fermentations; beer, wine, cider, distilled spirits. Baker's yeast production and the role of yeasts in baking. Yeast fermented foods. The spoilage of foods by yeasts. Yeasts and yeast extracts as food for animals and humans. Yeast enzymes in the food industry.

38.431 Food Engineering I  
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.

38.440 Food Technology Project  
Prerequisite: 38.331.
Project in Food Technology for students in Chemical Engineering.

38.441 Food Technology (Chemical Engineering)  

38.442 Food Engineering II  
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 hyperkinesia, 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  
**S1 T6**

An integrated series of laboratory and pilot plant exercises illustrating the principles and procedures involved in processing of foods.

38.153G Food Technology Seminar  
**T1**

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  
**L6**

Introduction to food technology. Principles of food preservation. The science and technology of foods of plant and animal origin, their derived products, with reference to biochemical and microbiological aspects. Food spoilage, foods in relation to disease, food additives, food packaging, waste disposal.

38.155G Dairy Technology  
**L1T1**

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  
**L1**

History of wine production, statistics and classification. Viticulture and wine chemistry. Technology and biochemistry of production of table wines, sparkling wines, vermouths, sherries, quality control procedures. Legal, cultural, climatic factors in French, Spanish, Portuguese, Italian, German, Californian and Australian wine production. Principles of sensory testing and evaluation of wines.

38.157G Technology of Cereal Products  
**L1**

**Prerequisite:** 38.132 or cereal strand of 38.154G.


38.158G Marine Products  
**L1**

**Prerequisite:** 38.133 or marine strand of 38.154G.


38.159G Food Process Wastes  
**S1 L1**

**Prerequisite or co-requisite:** 3.163G.


38.160G Food Quality Assessment  
**L1**

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 L1
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 S2 L2T4
Biochemistry and physiology of metabolism in fresh fruits and vegetables; respiration measurements as an index of metabolism, maturation and senescence; concept of climacteric and non-climacteric product; 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 issue; 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 S1 L1T2
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 S2 L2T4
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 S2 L2T1
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 S2 L1T2
Co-requisite: 38.551G.
Nutrient assay of foods including bench and instrumental techniques. Human nutritional assessment by anthropometric, dietary and biochemical methods.

38.900G Master of Applied Science Major Project T6
38.901G Master of Applied Science Minor Project T3

School of Geography

Undergraduate Study

27.111 Applied Physical Geography I F L2T4
Prerequisites:
HSC Exam
Percentile Range
Required
2 unit Geography 71-100
or 3 unit Geography 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 wings. Evaluation of climatic elements affecting weathering and erosion potential. Topographic controls of local climate. Drainage basin morphology, 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.
27.114 Land Resources Management S1 L2T2
Methods of assessment of resources and of natural and man-made environments. Land capability and conservational management. Assessment of risk from natural hazards and investigational procedures relating to community and governmental perception and response. Assessment of man-made environmental problems. Remote sensing and other data sources for resource management. Emphasis will be placed on case studies, the preparation of assessment statements and reports, and to the significance of cost-benefit analysis for such investigations.

27.133 Pedology S1 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 L1T1
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 L1T1

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 S2 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

† Offered subject to availability of staff.
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 vegetation 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: HSC Exam Per centile Range Required
2 unit Geography 71-100 or 3 unit Geography 31-100 or 2 unit Economics 71-100 or 3 unit Economics 31-100 or 2 unit Mathematics 71-100 or 3 unit Mathematics 31-100 or 4 unit Mathematics 11-100

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 II A S1 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.

27.614 Applied Economic Geography II B S2 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 the HP30 digitizer and plotter and BASIC language.

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; optimisation methods — constraint maximisation; 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 orientated 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 transportation 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; review 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 estimation for regions in adjacent Third World countries. The population forecasting is handled within the framework of demography: theory and component analysis; migration analysis is given particular attention because of the importance of mobility in Australia. The derivation of regional and local social indicators in the context of population change and service provision in Australia.

27.753 Social Welfare and Urban Development*  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.

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
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

* Offered subject to availability of staff.
27.902G Meteorological and Hydrological Principles S2 L3T0


27.904G Geomorphology for Engineering Geologists S1 L1L1T1


School of Mathematics

Undergraduate Study

10.001 Mathematics I F L4T2

Prerequisite: HSC Exam

Percentile Range Required

2 unit Mathematics 71-100
or 3 unit Mathematics 11-100 #
or 4 unit Mathematics 1-100 #

Excluded**: 10.011, 10.021A, 10.021B, 10.021C.

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

10.011 Higher Mathematics F L4T2

Prerequisite: HSC Exam

Percentile Range Required

3 unit Mathematics 71-100
or 4 unit Mathematics 1-100 #

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; concept of the function; trigonometric functions, logarithmic and indical functions and their laws of operation; introduction to differentiation and integration with simple applications.

† Offered subject to availability of staff.

* 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.

# Results in the percentile range 1-10 at a standard acceptable to the Professional Board.

# Results in the percentile range 11-30 at a standard acceptable to the Professional Board.

Note: The half units 10.1113 (10.1213) and 10.1114 (10.1214) together replace the unit 10.111B (10.121B). The half units 10.2111 (10.2211) and 10.2112 (10.2212) together replace the unit 10.211A (10.221A). The half units 10.2113 (10.2213) and 10.2214 (10.2214) together replace the unit 10.211D (10.221D).

School of Marketing

Undergraduate Study

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, coordination 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.

28.042 Consumer Behaviour

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.
10.021B General Mathematics IB S1 or S2 L4T2
Prerequisite: HSC Exam
Percentile Range Required
2 unit Mathematics
or 3 unit Mathematics
or 4 unit Mathematics
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; introduction to numerical methods; matrices and their application to theory of linear equations, eigenvalues; introduction to vector field theory.

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 L1½T½
Prerequisite: 10.001. Excluded: 10.121A.


10.1113 Pure Mathematics II—Multivariable Calculus S1 L1½T1
Prerequisite: 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 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
Prerequisite: 10.001. Excluded: 10.111A, 10.1111.


10.1213 Higher Pure Mathematics II—Multivariable Calculus S1 L2T½
Prerequisite: 10.001. As for 10.1113 but in greater depth.

10.1214 Higher Pure Mathematics II—Complex Analysis S2 L2T½
Prerequisite: 10.1213. As for 10.1114 but in greater depth.

10.2111 Applied Mathematics II—Vector Calculus S1 L1½T1
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 coordinates.

10.2112 Applied Mathematics II—Mathematical Methods for Differential Equations S2 L1½T1
Prerequisite: 10.001. Excluded: 10.2212, 4.813.


** 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.
# Results in the percentile range 1-10 at a standard acceptable to the Professional Board.
## Results in the percentile range 31-70 at a standard acceptable to the Professional Board.
10.2211 Higher Applied Mathematics II—Vector Analysis S1 L1T1
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 S2 L1T1
Prerequisite: 10.2211. Excluded: 10.2112.
As for 10.2112 but in greater depth.

10.331 Statistics SS F L1T1
Prerequisite: 10.001 or 10.021C (Cr). Excluded: 10.311A, 10.311B, 10.321A, 10.321B, 10.301, 10.311B.

10.301 Statistics SA F L1T1
Prerequisite: 10.001 or 10.021C (Cr). Excluded: 10.331, 10.311A, 10.311B, 10.321A, 10.321B, 10.301, 10.311B.

An introduction to the theory of probability, with finite, discrete and continuous sample spaces. The standard elementary univariate distributions: binomial, Poisson and normal; an introduction to multivariate distributions. Standard sampling distributions, including those of \( \chi^2 \), t and F. Estimation by moments and maximum likelihood (including sampling variance formulae, and regression); confidence interval estimation. The standard tests of significance based on the above distributions, with a discussion of power where appropriate. An introduction to experimental design: fixed, random and mixed models, involving multiple comparisons and estimation of variance components.

10.2211 Higher Applied Mathematics II—Vector Analysis
10.2212 Higher Applied Mathematics II—Mathematical Methods for Differential Equations
10.331 Statistics SS
10.301 Statistics SA

School of Mechanical and Industrial Engineering

Undergraduate Study

5.010 Engineering A SS L4T2
Prerequisite:

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<th>HSC Exam</th>
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- 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.

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

The origin, classification, physical properties and uses of clay minerals and other non-clay raw materials.

Principal unit operations used in the ceramic industry. Drying and firing of ceramics, melt forming, pot forming and other forming procedures.

Prerequisites: 5.010. Co- or prerequisites: 5.311 or 5.330, 5.611, 5.411 of ceramics, melt forming, pot forming and other forming procedures. Drying and firing and other non-clay raw materials.

Introduction to Chemical Technology (Compulsory for Industrial Chemistry students): Introduction to computation in chemical technology; process flow diagrams, information flow diagrams, flow charts in computer programming, development of algorithms.


5.111 Mechanical Engineering Design I

Prerequisite: 5.010. Co- or prerequisites: 5.311 or 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 1.951, 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: 5.311 or 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 1.951, 5.010, 6.020, 10.001. Co- or prerequisites: 5.330, 10.022.


5.611 Fluid Mechanics

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

Subject Descriptions

School of Metallurgy

Undergraduate Study

4.001  Introduction to Materials Science  S1 or S2 L1
Forms part of 5.010 Engineering A.

The structure and properties of the main types of engineering materials, with emphasis on the way in which properties may be controlled by controlling structure.

4.002  Introduction to Metallurgical Engineering  S2 L2
Forms part of 5.030 Engineering C.

History and significance of the exploitation of metals. Ores, mineral economics, mineral processing, and metal extraction and processing methods illustrated by reference to the Australian mineral and metal industries. Properties, uses, and applications of metallic materials. The role of the metallurgist in industry and in processing and materials research, and in relation to conservation and the environment.

4.024  Metallurgy Project  S1 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
A course of 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.

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, aluminium 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 L3T1½
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

Applications of dislocation theory to work hardening and annealing processes. Phase transformations in alloys. Mathematical crystallography, reciprocal lattice, diffraction. Electron and X-ray metallography. Selection of advanced topics in physical metallurgy including radiation damage, martensitic transformations, neutron diffraction, internal friction, sintering, creep, superelasticity, fracture.

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 L0T3 S2 L3T1½

Prerequisite: 4.403.

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

4.433 Physical Metallurgy IIC S1 L4T5 S2 L3T3

Prerequisite: 4.402.


4.502 Mechanical Properties of Solids S2 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. Metallographic 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 S1 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 3.132 Chemical Engineering IIIB, Unit 3 Atmospheric Pollution Control: As for 3.133 Chemical Engineering III C, Unit 3. Water Pollution Control: As for 3.133 Chemical Engineering III C, 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.
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 will be paid to the structure property relationships that determine the design of materials. The topics covered will 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.
Development of physical principles for application in metallurgy — theory of metal models, Sommerfeld Theory, zone theory; interaction of radiation with matter; solid state devices, instrumentation.

4.813 Mathematical Methods  L2T1
Prerequisites: 10.031 or 10.211A.
1. 10.351 Statistics SM (see Engineering Handbook).

4.911 Materials Science  L1T½
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  L2T1


4.921 Materials Science  L1T0
(For students in Electrical Engineering) This subject forms part of 8.111 Civil Engineering.

4.931 Metallurgy  L1½T½
For students of Civil Engineering. Part of 8.272 Civil Engineering Materials I.

4.941 Metallurgy for Engineers  L1T0

4.951 Materials Technology  L2T2
The structure, properties and technology of wood.

4.961 Materials and Corrosion  S1 L2
A short course covering the theory of corrosion and materials of construction.

4.972 Materials for Mining Engineers  L1T½
**Specilicalion and selection of materials. Structural and constructional materials** for buildings and plant; plain carbon, low and medium alloy steels, non ferrous alloys; repair and maintenance problems. Materials for mining and minerals processing plant; corrosion and heat-resistant alloys; wear-resistant materials; repair and maintenance. Failure analysis, fracture and corrosion failures. Corrosion prevention.

**Graduate Study**

**4.211G Metallurgical Practice**

Detailed studies relating to one or more specialized areas of metallurgical practice, such as founding, welding, mineral treatment.

**4.221G Advanced Metallurgical Techniques**

Lectures and laboratory instruction will be offered in advanced techniques including the following: X-ray metallography; electron microscopy; electron probe microanalysis; quantitative metallography; stress and strain analysis; fracture toughness testing; metal melting and casting; mechanical testing; electrochemical technique; research techniques — physical; research techniques — chemical; mineral investigation techniques.

**4.231G Advanced Theoretical Metallurgy**

Covers a wide range of theoretical topics drawn from physical metallurgy, chemical and extractive metallurgy, mineral chemistry, physics of metals and mechanical metallurgy.

**4.241G Graduate Metallurgy Project**

An experimental or technical investigation or design related to a branch of metallurgy.

**4.251G Advanced Materials Technology**


**4.261G Modern Microscopy of Materials**

Descriptions of light optical and electron optical instruments from the point of resolution, depth-of-field, contrast and additional data obtainable from the specimen as well as the application of these instruments to the study of materials.

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**Undergraduate Study**

**4.974 Mining Materials**


**4.211G Metallurgical Practice**

Detailed studies relating to one or more specialized areas of metallurgical practice, such as founding, welding, mineral treatment.

**4.221G Advanced Metallurgical Techniques**

Lectures and laboratory instruction will be offered in advanced techniques including the following: X-ray metallography; electron microscopy; electron probe microanalysis; quantitative metallography; stress and strain analysis; fracture toughness testing; metal melting and casting; mechanical testing; electrochemical technique; research techniques — physical; research techniques — chemical; mineral investigation techniques.

**4.231G Advanced Theoretical Metallurgy**

Covers a wide range of theoretical topics drawn from physical metallurgy, chemical and extractive metallurgy, mineral chemistry, physics of metals and mechanical metallurgy.

**4.241G Graduate Metallurgy Project**

An experimental or technical investigation or design related to a branch of metallurgy.

**4.251G Advanced Materials Technology**


**4.261G Modern Microscopy of Materials**

Descriptions of light optical and electron optical instruments from the point of resolution, depth-of-field, contrast and additional data obtainable from the specimen as well as the application of these instruments to the study of materials.

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**School of Mining Engineering**

**Undergraduate Study**

**7.013 Principles of Mining**

7.023 Mineral Process Engineering S1 L1T1 and 7.023R F L1

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 core cores. Factors influencing effective comminution and liberation.

7.111 Introduction to Mining Engineering S2 L2
Forms part of 5.030 Engineering C.

7.112 Mineral Resources and 7.112R S1 L1

7.113 Mining Methods F L2
Prerequisite: 7.122.

7.113R Mining Methods F L2T1

7.114 Geotechnical Engineering F L2T1 and 7.114R F L2T2

7.122 and 7.122R Mine Development S2 L1

7.123 and 7.123R Geomechanics F L1T2
Prerequisites for 7.123: 8.172, 8.250, 10.341, 10.002.

7.125R Introduction to Geotechnical Engineering S1 L1T1

7.124 Coal Face Mechanisation F L2T1
7.133 and 7.133R Mine Transport  
*Prerequisite:* 7.113.


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.


7.164 Tunnel Engineering  
*Prerequisite:* 10.022.


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  
*Prerequisite:* 7.113.

A program of tutorials and laboratory work as the alternative to concurrent industrial experience. The student will be given reading and technical assignments to complement the study of third year subjects in a full-time course.

7.194R Mine Design Practice  
*Prerequisite:* 7.113.

The student will be 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  
*Prerequisite:* 7.213: 10.341 and 29.441.

Surveying methods applied to the development and extraction of

7.214 Mine Economics and Planning F L2T2
and 7.214R F L3T3
Prerequisite for 7.214: 7.113.

7.224 Operational Management F L1T1
and 7.224R F L1T½

7.234 Mineral Economics F L1T2

7.313 Minerals Engineering Processes F L1T2
Prerequisites: 25.101 or 25.201, 5.030.

7.313R Mineral Processing F L2T3
A combination of 7.313, with selected topics from 4.374.
7.314 and 7.314R Mineral Process Technology F L2T1
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 F L1T2

7.326R Mineral Industry Processes F L1T2
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 F L1T2

7.414 Minerals Industry Project F L1T2
Candidates will be 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 student 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 his 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 L1T2
A shorter version of 7.414R above.

7.424 Industrial and Research Seminars F L1T2
The program will include two types of seminar. One will deal with research work being undertaken or recently completed by members of the School of Mining Engineering. The other will involve engineers and scientists from industry, other University Schools and research establishments discussing projects of special or topical interest in mining and allied fields.
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 aluvial, 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, flowing film, fluidized beds. 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. Sulphide mineral flotation, xanthate chemistry, oxide mineral flotation, salt mineral flotation. Coal preparation, coal constitution, core core evaluation, selective preparation, blending for utilization. 4. Process design. Feasibility studies, extraction processes and environmental conditions. Selection and lo-
cation 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

This subject involves 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 Nuclear Engineering

Undergraduate Study

23.051 Nuclear Power Technology

Nuclear processes, reaction rates, fission and energy release. Neutron multiplication, slowing down and diffusion. Nuclear reactor criticality and burnup, neutron kinetics and reactor control.

Thermal and fast reactor types, operation, environmental and safety aspects. Nuclear fuel enrichment and utilization, nuclear power costing and economics.

Heat generation and removal, fluid dynamics and heat transfer aspects of gas and liquid coolants, boiling, two phase flow and burnout. Structural mechanics in reactor technology, thermomechanical performance of fuel pins and pressure vessels.
Applied Science

1.011 Higher Physics I  S2 L3T3

Prerequisites: 1.001 or 1.011, 10.001. Excluded: 1.922.

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 mechanic Schrödinger’s equation, simple solutions, hydrogen atom, spectra, electron spin, selection rules, exclusion principle, Zeeman effect molecules.

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

1.022 Electromagnetism and Modern Physics  S2 L3T2

Prerequisites: 1.001, 1.011, 10.001. Excluded: 1.922.

An introductory subject in physics designed principally for students majoring in the life and health science disciplines. Discusses the following topics at an introductory level:

- The methods of physics, describing motion, the dynamics of a particle, conservation of energy, kinetic theory of gases, properties of liquids, vibrations and waves, electricity and conduction in solids, ions and ionic conduction, magnetism and electromagnetic induction, alternating current, atomic nature of matter, X-rays, the nucleus and radioactivity, electronics, and either geometrical optics, optical instruments, wave optics, microscopes and their uses, or advanced electronics (Optometry students).

Physics Level II units

1.012 Mechanics and Thermal Physics  S1 L3T2

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

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.

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

1.032 Laboratory  FT3

Prerequisites: 1.001 or 1.011, 10.001. Excluded: 1.922.

Physics Level III units

1.013 Quantum Mechanics and Nuclear Physics  F L1½T½

Prerequisites: 1.012, 1.022, 10.2111, 10.2112.

Concepts and formulation, expectation values and measurement, steps, wells, and barriers, tunneling, harmonic oscillator, perturbation theory, hydrogen atom, angular momentum operators, spin and spin orbit coupling, vector model, fine structure, identical particles, helium atom, spectroscopy, electron states in molecules and solids.

Additional material is studied for the award of Distinction/High Distinction.
Detecting instruments for nuclear particles, counting statistics, Rutherford scattering, radioactivity, radiative processes, reactions, optical model, parity, introduction to particle physics, mesons, baryons, quarks.

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

1.023  Statistical Mechanics and Solid State Physics  S1 L3T1
Prerequisites: 1.012, 1.022, 10.2111, 10.2112. Co-requisite: 1.013 or 2.023A.

Canonical distribution, paramagnetism, Einstein solid, ideal gas, equipartition, grand canonical ensemble, chemical potential, phase equilibria, Fermi and Bose statistics, Bose condensation, blackbody radiation. Crystal structure, bonding, lattice dynamics, phonons, free-electron model of metals, band theory, point defects, dislocations.

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

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  F T6
Prerequisites: 1.012, 1.022, 1.032.

A course of instruction in modern experimental techniques, methods of experimental design and analysis of results. Experiments which will in the main consist of small open-ended projects, will be available in many areas of physics including electromagnetic waves, solid state physics, nuclear physics, atomic physics and spectroscopy, optical and laser physics, vacuum systems.

School of Sociology

Undergraduate Study

53.001  Introduction to Sociology (Double Unit)

Under these two headings such issues as social control, power, racism, sexism, work and leisure, class distinction, etc. treated both factually and theoretically, will be considered as they relate to the situation in Australia and in the developing countries.

53.206  Science, Technology and Society
The attention of students is drawn to this subject given in the School of Sociology. Details are given in the Faculty of Arts Handbook. This subject may be taken as an alternative to an advanced elective in General Studies, with the permission of the Head of the School of Sociology. Interested students should apply to the School of Sociology before the beginning of Session 1.
Yarn Manufacture: Introduction, historical development. Principles and practices of manufacture of yarns on the cotton and worsted systems.


Part B. Yarn Manufacture: Principles and practice of yarn manufacture for wool on the woollen 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.

13.112 Textile Technology II F L5T7

Part B. Yarn Manufacture: Principles and practice of yarn manufacture for wool on the woollen 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.


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.

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 aspects 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.

School of Town Planning
Undergraduate Study

36.411 Town Planning


School of Wool and Pastoral Sciences
Undergraduate Study

9.111 Livestock Production I
9.112 Livestock Production II
9.113 Livestock Production III

9.101 Biology of Grazing Sheep and Cattle

A field excursion of one week's duration is held in Session I.

9.131 Animal Health I
9.132 Animal Health II

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.

9.133 Animal Health III


9.201 Agronomy


9.202 Pastoral Agronomy

Pasture ecology. Establishment, management and utilization of pastures and fodder crops. Vegetation management in and around arid areas. Pasture research techniques.

Subject Descriptions

Undergraduate Study

9.001 Project
9.002 Seminar
9.101 Biology of Grazing Sheep and Cattle

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.

Seminars will deal with research and/or development work being undertaken or recently completed by members of the School of Wool and Pastoral Sciences, other University schools and research organisations. There will also be seminars on communication in wool and pastoral sciences and on problems facing rural industries.

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 introductory concepts of animal health.

Field excursions and laboratory work are integral parts of the course.
Applied Science

9.203 Crop Agronomy S2 L2T1

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 course will cover two broad strands: the basic economic principles, and applied methods for farm management planning. The material on economic principles will centre 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. Certain ancillary topics will be considered, for example, the nature of economies of size in agriculture.

The management planning strand of the subject will emphasise 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 will also include 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 F L2T1
Prerequisite: 9.301.
Analysis of agricultural policies: agricultural marketing concepts; and an introduction to international trade theory. Investment appraisal and cost-benefit analysis.
Quantitative methods in agricultural economics and farm management, with emphasis on (i) response surface estimation and analysis. (ii) Linear programming methods, with an introduction to other mathematical programming methods. (iii) Systems analysis and simulation methods.

9.411 Agricultural Chemistry I F L1T3
An integrated course in various aspects of chemistry directed to the special interests of pastoral science. Experimental techniques, preparative and analytical, built around biological interest. Correlations of theoretical chemistry with biological processes.
Treatment of separation techniques, theory and design of chromatographic and distillation processes. Reaction principles, functional groups, analytical chemistry and roles in biological processes. Colorimetric and spectrophotometric control. Oxidation reactions and electron transfer: Separations and reactions of proteins, fats and carbohydrates, chemical and physical properties, cyanogenic glycosides.

9.412 Agricultural Chemistry II F L2T4
Animal milks, analysis and heat treatment changes and detection. Roles of trace metals in biological processes, metal complexes with proteins and metal catalysis.

9.421 Animal Nutrition S2 L3T1
While particular emphasis will be given to nutritional requirements of sheep, those of other farm livestock will be dealt with in this section.

9.501 Wool Science I F L4T3
Prerequisite: 9.501.
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 F L1T2
Prerequisite: 9.501.
The effect of clip preparation on textile processing; wool metrology (raw wool); distribution of fibre parameters.

9.503 Wool Science III F L2T2
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; chemical, physical and mechanical properties of wool fibres; advanced appraisal and evaluation; current wool outlook; research developments.
9.601 Animal Physiology I

Physiological systems of mammals are treated with special attention to homeostasis. Cell membranes; blood and body fluids; the immune reaction. Cardiac control, functions and haemodynamics. Respiration. The endocrine system with particular emphasis upon growth, reproduction, lactation and stress. The nerve impulse, its excitation and transmission. Physiology of digestion, the gastro-intestinal tract and of the kidney. Heat tolerance and climatic adaptation.

9.602 Animal Physiology II

Prerequisite: 9.601.


9.801 Genetics I


9.802 Genetics II


9.811 Biostatistics I

Prerequisite: 45.101.


9.812 Biostatistics II

Prerequisite: 9.811.


9.901 Rural Extension


Graduate Study

9.105G Advanced Livestock Production

Advanced aspects of the principles of animal production with particular emphasis on physiology and endocrinology. Biostatistics and population genetics. Parasites. Management to maximize economic return.

9.503G Wool Study


9.711G Advanced Wool Technology


9.902G Techniques of Laboratory and Field Investigation

Financial Assistance to Students

The scholarships and prizes listed below are available to students whose courses appear 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 on the Ground Floor of the Chancellery.

Unless otherwise indicated in footnotes, applications for the following scholarships should be made to the Registrar by 14 January each year. Please note that not all of these awards are available every year.

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
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<tbody>
<tr>
<td>Bursary Endowment Board*</td>
<td>$150 pa</td>
<td>Minimum period of approved degree combined degree course</td>
<td>Merit in HSC and total family income not exceeding $4000</td>
</tr>
</tbody>
</table>

* Apply to The Secretary, Bursary Endowment Board, Box 460, PO, North Sydney 2060 immediately after sitting for HSC.
## Undergraduate Scholarships (continued)

<table>
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<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
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<tbody>
<tr>
<td><strong>General (continued)</strong></td>
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<tr>
<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 Scholarship</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>
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<tr>
<td><strong>Applied Geology</strong></td>
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<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>
<tr>
<td><strong>Ceramic Engineering</strong></td>
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<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>
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<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>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>
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<tr>
<td>The State Brickworks</td>
<td>Up to $900 pa</td>
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<tr>
<td>Wunderich Limited</td>
<td>Up to $600 pa</td>
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## Undergraduate Scholarships (continued)

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<tr>
<th>Donor</th>
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<th>Year/s of Tenure</th>
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<tr>
<td><strong>Chemical Engineering</strong></td>
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<tr>
<td>Shell Refining (Australia) Pty Ltd</td>
<td>Up to $300 pa</td>
<td>1 year renewable for the duration of the course subject to satisfactory progress</td>
<td>Eligibility for admission to the second year of the full-time course in Chemical Engineering</td>
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<td></td>
<td>plus $100 book and equipment allowance</td>
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<tr>
<td>Dow Chemical (Australia)</td>
<td>Up to $500 pa</td>
<td></td>
<td>Permanent residence in Australia and eligibility for admission to the full-time degree course in Chemical Engineering</td>
</tr>
<tr>
<td>Australian Waste Disposal Conference Committee</td>
<td>Up to $300 pa</td>
<td></td>
<td>Permanent residence in Australia and eligibility for admission to any year of the full-time degree course in Fuel Technology</td>
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<tr>
<td><strong>Food Technology</strong></td>
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<tr>
<td>Bush-Boake-Allen Pty Ltd</td>
<td>Up to $4000 over 4 years</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 year of the full-time degree course in Food Technology</td>
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<tr>
<td>Coca-Cola Export Corporation</td>
<td>Up to $1000 pa</td>
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<tr>
<td>Food Technology Association</td>
<td>Up to $1000 pa</td>
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<tr>
<td>George Weston Foods Ltd</td>
<td>Up to $4000 over 4 years</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>
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<tr>
<td>Gillespie/White Wings</td>
<td>Up to $1000 pa</td>
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<tr>
<td><strong>Fuel Technology</strong></td>
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<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>
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<tr>
<td><strong>Metallurgy</strong></td>
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<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 Process Engineering</td>
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### Undergraduate Scholarships (continued)

<table>
<thead>
<tr>
<th>Donor</th>
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<th>Year/s of Tenure</th>
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<tr>
<td><strong>Mining Engineering</strong></td>
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<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>
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<tr>
<td><strong>Textile Technology</strong></td>
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<tr>
<td>The Australian Wool Corporation</td>
<td>$2386, $2126 or $1400 pa</td>
<td>1 year renewable for the duration of the course, subject to satisfactory progress</td>
<td>Permanent residence in Australia and eligibility for admission to the full-time degree course in Textile Technology</td>
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<tr>
<td>Bonds Industries Ltd</td>
<td>Up to $4000 over 4 years</td>
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<tr>
<td>Bradmill Industries Ltd</td>
<td>Up to $1000 pa</td>
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<tr>
<td><strong>Wool and Pastoral Sciences</strong></td>
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<tr>
<td>The Australian Estates Co Ltd</td>
<td>Up to $1000 pa</td>
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</tr>
<tr>
<td>The Australian Wool Corporation</td>
<td>$2386, $2126 or $1400 pa</td>
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</tr>
<tr>
<td>Commercial Banking Company of Sydney Limited</td>
<td>Up to $1000 pa</td>
<td>1 year renewable for the duration of the course, subject to satisfactory progress</td>
<td>Permanent residence in Australia and eligibility for admission to the full-time degree course in Wool and Pastoral Sciences</td>
</tr>
<tr>
<td>Dalgety Australia Limited</td>
<td>Up to $4000 over 4 years</td>
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<tr>
<td>Merck Sharp &amp; Dohme (Aust) Pty Ltd</td>
<td>Up to $1000 pa</td>
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<tr>
<td>National Council of Wool Selling Brokers of Australia</td>
<td>Up to $1000 pa</td>
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</table>

### Graduate Scholarships

Application forms and further information are available from the Student Employment and Scholarships Unit, which is located on the ground floor of the Chancellery. This Unit produces the booklet *Graduate Awards*, and also provides information on additional scholarships which may become available from time to time, mainly from funds provided by organizations sponsoring research projects.

Where possible, the scholarships are listed in order of faculty.
Graduate Scholarships (continued)

<table>
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<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
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<tbody>
<tr>
<td><strong>General</strong></td>
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<tr>
<td>University of New South Wales Research Awards</td>
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<td>1-2 years for a Masters and 3-4 years for a PhD degree</td>
<td>Applicants must be honours graduates (or equivalent). Applications to Registrar by 31 October (30 November in special circumstances).</td>
</tr>
<tr>
<td>Commonwealth Postgraduate Research Awards</td>
<td>Living allowance of $4200 pa. Other allowances may also be paid.</td>
<td>As above</td>
<td>Applicants must be honours graduates (or equivalent) or scholars who will graduate with honours in current academic year, and who are domiciled 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 till 30 November).</td>
</tr>
<tr>
<td>Australian American Educational Foundation Travel Grant*</td>
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<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>A total of $500/$3200</td>
<td>Up to 1 year</td>
<td>Applicants must be female graduates from any accredited Australian or overseas university.</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 by 31 January for visits to commence during ensuing 1 April to 31 March.</td>
</tr>
<tr>
<td>The Caltex Woman Graduate of the Year Scholarship</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 will have completed a University degree or diploma this year and who are Australian citizens or have resided in Australia for at least seven years. Selection is based on scholastic and literary achievements, demonstrable qualities of character and accomplishments in cultural and/or sporting/recreational activities.</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>General (continued)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Canadian Pacific Airlines Award for Travel to Canada for University Graduates</strong></td>
<td>One free economy class return flight a year to Canada</td>
<td></td>
<td>Graduates of an Australian University who are Australian citizens or permanent residents. Candidates must have been accepted by a Canadian University, be able to support themselves on a full-time basis, and intend to return to Australia. Applications close with Registrar by 31 May.</td>
</tr>
<tr>
<td><strong>Commonwealth Scholarship and Fellowship Plan</strong></td>
<td>Varies for each country. Generally covers travel, living, tuition fees, books and equipment, approved medical expenses. Marriage allowance may be payable.</td>
<td>Usually 2 years, sometimes 3</td>
<td>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>Gowrie Graduate Research Travelling Scholarship</strong></td>
<td>Maximum $2000 pa</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></td>
<td>Living and travel allowances, tuition and research expenses, book and equipment and other allowances</td>
<td>Between 12 to 21 months</td>
<td>Candidates must be either: 1. Members of the Commonwealth 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 and be between 21-30 years of age. Applications close 23 July.</td>
</tr>
<tr>
<td><strong>Frank Knox Memorial Fellowships at Harvard University</strong></td>
<td>Stipend of $3600 plus tuition fees pa</td>
<td>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>
<tr>
<td><strong>The Rhodes Scholarship</strong></td>
<td>£3000 stg pa</td>
<td>2 years, may be extended for a third year</td>
<td>Unmarried male and female British subjects, 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>
</tbody>
</table>

---

* Application forms must be obtained from the Australian representative of the Fund, Mr L. T. Hinde, Reserve Bank of Australia, Box 3947, GPO, Sydney, N.S.W. 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.
** Applications to Mr H. McCredie, Secretary of the NSW Committee, University of Sydney, NSW 2006.
## Graduate Scholarships (continued)

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General (continued)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rothmans Fellowships Award†</td>
<td>$12000 pa</td>
<td>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**  
  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.

- **Australian Wool Corporation Research Scholarship in Wool and Pastoral Sciences**  
  Minimum 2 years. Maximum 3 to 4 years. Applicants must be graduates in applied science, agricultural science or veterinary science. Awarded for research into the beef and cattle industry leading to the Masters or PhD degree. Applications close by 31 July.

### 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.

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sydney Technical College Union Award</td>
<td>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>

† Applications to The Secretary, Rothmans University Endowment Fund, University of Sydney, NSW 2006.

* Application forms from Executive Officer, Australian Meat Research Committee, Box 4129, GPO, Sydney 2001.
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>Faculty of Applied Science</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institution of Engineers, Australia</td>
<td>Medal and 100.00</td>
<td>The most proficient final year (or last 2 years part-time) student in the Bachelor of Engineering (or Bachelor of Science (Engineering)) Degree courses offered by the following Schools: Civil Engineering; Electrical Engineering; Mechanical and Industrial Engineering; Chemical Engineering; Mining Engineering; Textile Technology (Textile Engineering option only)</td>
</tr>
<tr>
<td><strong>School of Chemical Engineering</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abbott Laboratories Pty. Ltd</td>
<td>50.00</td>
<td>Bachelor of Engineering degree course in Chemical Engineering — Year IV</td>
</tr>
<tr>
<td>Borden Chemical Co (Aust) Pty Ltd</td>
<td>200.00</td>
<td>Excellence in the final year of an Honours course</td>
</tr>
<tr>
<td>Chamber of Manufactures of New South Wales</td>
<td>15.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>Esso Australia Ltd</td>
<td>75.00</td>
<td>Best performance in Year 2 Chemical Engineering</td>
</tr>
<tr>
<td>The North Shore Gas Co Ltd</td>
<td>15.00</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>3.122 Chemical Engineering IIB</td>
</tr>
<tr>
<td>Western Mining Corporation Ltd</td>
<td>150.00</td>
<td>Best overall performance in 3.126 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 3.134 Chemical Engineering Laboratory II in the Bachelor of Engineering degree course</td>
</tr>
</tbody>
</table>

| **School of Chemical Technology** | | |
| Australian Paper Manufacturers Ltd | 21.00 | Subject selected by Head of School |
| Chemical Technology Society | 20.00 | Bachelor of Science degree course in Industrial Chemistry |
| | 20.00 | Bachelor of Science degree course in Industrial Chemistry, Years I and II or Stages 3 to 4 |
### Applied Science

#### 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 Technology (continued)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSR Limited</td>
<td>50.00</td>
<td>Subject within the discipline of Industrial Chemistry, selected by Head of School</td>
</tr>
<tr>
<td>Stauffer Chemical Co (Aust) Pty Ltd</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>
<tr>
<td><strong>School of Metallurgy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcan Australia Ltd</td>
<td>100.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>Austral Crane Ltd</td>
<td>100.00</td>
<td></td>
</tr>
<tr>
<td>Australian Institute of Metals</td>
<td>30.00</td>
<td></td>
</tr>
<tr>
<td>Australian Welding Institute</td>
<td>60.00</td>
<td>(book order)</td>
</tr>
<tr>
<td>Chamber of Manufactures of New South Wales</td>
<td>15.00</td>
<td></td>
</tr>
<tr>
<td>The Broken Hill Proprietary Co Ltd</td>
<td>50.00</td>
<td></td>
</tr>
<tr>
<td>The Eagle &amp; Globe Steel Co Ltd</td>
<td>50.00</td>
<td></td>
</tr>
<tr>
<td>The Electrolytic Refining and Smelting Co of Australia Ltd</td>
<td>20.00</td>
<td></td>
</tr>
</tbody>
</table>
### School of Metallurgy (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 Ltd</td>
<td>150.00</td>
<td>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</td>
</tr>
<tr>
<td></td>
<td>150.00</td>
<td>Best overall performance in Year 4 full-time (or its equivalent part-time) in the Bachelor of Engineering (or Bachelor of Science (Technology)) degree course</td>
</tr>
<tr>
<td>Zinc Corp Ltd</td>
<td>40.00</td>
<td>Subject selected by Head of School</td>
</tr>
</tbody>
</table>

### School of Mining Engineering

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint Coal Board</td>
<td>100.00</td>
<td>Bachelor of Engineering degree course in Mining Engineering, Year II</td>
</tr>
<tr>
<td></td>
<td>100.00</td>
<td>Bachelor of Engineering degree course in Mining Engineering, Year III</td>
</tr>
<tr>
<td></td>
<td>200.00</td>
<td>Bachelor of Engineering degree course in Mining Engineering — general proficiency throughout the course</td>
</tr>
<tr>
<td>Western Mining Corporation Ltd</td>
<td>75.00</td>
<td>Bachelor of Engineering degree course in Mining Engineering — general proficiency throughout the course</td>
</tr>
<tr>
<td></td>
<td>150.00</td>
<td>Best overall performance in Year 3 of Bachelor of Engineering degree course</td>
</tr>
<tr>
<td></td>
<td>150.00</td>
<td>Best overall performance in Year 4 of Bachelor of Engineering degree course</td>
</tr>
</tbody>
</table>

### School of Textile Technology

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<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>
</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 Wool and Pastoral Sciences</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bayer Australia Ltd — Asuntol Sheep Dips</td>
<td>25.00</td>
<td>General proficiency — Wool and Pastoral Sciences degree course, Years II and III</td>
</tr>
<tr>
<td>Parkes — Wool Promotion Committee</td>
<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>Bachelor of Science degree course in Wool and Pastoral Sciences, Year III</td>
</tr>
<tr>
<td>Samuel Clive Graham</td>
<td>50.00</td>
<td>Bachelor of Science degree course in Wool and Pastoral Sciences, Year IV — Thesis</td>
</tr>
<tr>
<td>C. R. Lucock</td>
<td>A book or a voucher to the value of 50.00 payable to University Co-op Bookshop Limited</td>
<td>Meat Science</td>
</tr>
</tbody>
</table>

### Graduate University Prizes

The following table summarizes the graduate prizes awarded by the University.

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Thistlethwayte Memorial Prize</td>
<td>100.00</td>
<td>Best essay in the field of water-waste water treatment or water quality management, by MEngSc, MAppSc, ME, MSc student.</td>
</tr>
</tbody>
</table>

| **School of Chemical Engineering** | 100.00 | 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. |
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.

Dean
Professor M. Chaikin

Chairman
Professor R. T. Fowler

Senior Administrative Officer
John David Collins, BSc PhD N.S.W., ATI

Project Officer
Desmond Rokfalussy, BE Bud.

Professional Officers
Badan-Singh Doel, MSc Punj., PhD Syd.
Endel Nomm, BA Mosc., MSc N.S.W.
Dante Simon Santea, DiplIng T.I.lassy

Electron Microscopist
Vivian Noel Edward Robinson, BSc PhD W.Aust.

Professor of Geology
Gerald James Spurgeon Govett, DSc Wales, PhD Lond., DIC, FIMM

Associate Professors
Laric Villier Hawkins, MSc Syd., FGS
Laurence James Lawrence, DSc DipCom Syd., PhD N.S.W., DIC, MAusIMM
Frederick Charles Loughnan, BSc Syd., PhD DSc N.S.W., AMAusIMM
John Roberts, BSc N.E., PhD W.Aust.

Senior Lecturers
Alberto Albani, DrGeoSc Florence, MSc PhD N.S.W.
Alan Norval Carter, BSc PhD Melb., MSc Adel.
Phillip Richard Evans, BA Oxt., PhD Brist., FGS
Bastiaan 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
Bryce Leslie Wood, MSc DSc Otago, MAusIMM

Electron Microscopist
Vivian Noel Edward Robinson, BSc PhD W.Aust.

School of Applied Geology

Professor of Engineering Geology and Head of School
Francis Clifford Beavis, MA Cant., BSc PhD Melb., FGS

Lecturers
John Craig Cameron, MA BSc Edin., DIC, MAAPG, AMAusIMM
Michael John Knight, BSc PhD Melb.
Robert James Whiteley, MSc Syd.

Senior Tutors
Maren Kysko von Tryst, BSc GradDip N.S.W., AMAusIMM
Ivan Pauncz, BSc N.S.W.
Tutors
Graham Richard Carr, BSc N.S.W.
Alistair Chisholm Duniop, BSc N.E., PhD Lond., DIC, MIMM
Richard Brian Massicks Thompson, MBE, BA Camb., PhD Syd.

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.

School of Chemical Engineering

Professor of Chemical Engineering and Head of School
Robert Thomas Fowler, BSc Wales, PhD Lond., DScEng Syd.,
CEng, FIEAust, FIChemE, FinstF, FAIE, MIM, ARIC, AIM

Professor of Chemical Engineering
Vacant

Professor of Fuel Technology
Vacant

Senior Administrative Officer
Robert Frederick Starr, ASTC

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

Professor of Chemical Technology
David Lawrence Trimm, BSc PhD Exe., DIC

School of Chemical Technology

Associate Professors
Ian Dracup Doig, BSc(Eng) Lond., PhD N.S.W., CEng,
MIMechE, MIChemE
Professional Officers
Raymond George Anthony, BSc N.S.W., PhD Tas., ARACI
Robert Edmund Brand, BSc N.S.W., ASTC, ARACI
William Wai-Lam Ching, MSc N.S.W., ARACI
David John Kelly, BSc BE Syd.
John Walton Sharp, BSc(Tech) N.S.W.

School of Food Technology

Professor of Food Technology and Head of School
Ronald Alexander Edwards, BSc PhD N.S.W., ASTC, FAIFST

Associate Professor
Terence Henderson Lee, BSc PhD N.S.W., AAIFST

Senior Lecturers
Ronald Graham Bowrey, BE PhD N.S.W., MIEAust
Kenneth Alan Buckle, BSc PhD N.S.W., AAIFST, AFCIA
Ronald Baden Howe Wills, BSc N.S.W., PhD Macq., ASTC, AAIFST
Michael Wootton, BSc PhD N.S.W., AAIFST, ARACI, MAGI

Lecturers
Graham Harold Fleet, MSc Qld., PhD Calif., AAIFST
Heather Greenfield, BSc PhD Land., AAIFST

Tutors
Vera Szopen, BSc N.S.W.
Annesley Jean Watson, BSc N.S.W.

Department of Ceramic Engineering

Associate Professor
Eric Robert McCartney, BSc Syd., PhD N.S.W., FCeram, MIEAust, ARACI

Lecturers
Sviatoslav Antonovich Prokopovich, MSc N.S.W., ASTC
David John Young, BSc PhD Melb.

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, FIREE Aust
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 Hakan, MSc PhD N.S.W., ASTC, FRACI

Lecturers
Robert Paul Burford, BSc PhD Adel., ARACI
Rodney Phillip Chaplin, BSc PhD Adel., ARACI

School of Geography

Professor of Geography and Head of School
Jack Alan Mabbutt, MA Camb.

Professor of Geography
Barry Jardine Garner, BA Nott., MA PhD Northwestern

Associate Professor
Eugene Albert Fitzpatrick, BA Wash., MA Syd., PhD Rutgers
Senior Lecturers
Frederick Charles Bell, BSc Syd., MSc PhD N.S.W., MSocSigmaXI
Ian Harry Burnley, MA Cant., PhD Well.
Anthony Shepherd, MA Oxf.
Peter Leon Simons, BA PhD Syd.

Lecturers
Colin John Chartres, BSc Brist., PhD R'dg.
John Richard Dodson, MSc Monash, PhD A.N.U.
Andrew John Holmes, MA Camb., PhD N.S.W.
Michael Dick Melville, BScAgr PhD Syd.
Anthony John Parsons, BA MSc Shell., PhD R'dg.
Morgan Eugene Cyril Sant, BA Keele, MSc PhD Lond.
Hans Joachim Schneider, Geog Chil. State, DU Bordeaux
Susanne Rae Walker, MA Well., DPhil Oxf.
Donald John Webb, BA DipEd Melb., MPhil Lond., PhD N.S.W.
Frank Williamson, MSc Lond., PhD Syd.

Senior Tutor
Noel Galvin Lonergan, BA DipEd N.E.

Tutors
Glenn Atkinson, BSc N.S.W.
Henrietta Ann Boyce, BA Macq.
Fergal Conrad Fleming, BA Otago
Pamela Anne Hazalton, BSc Syd., DipEd N.E.
Vivienne Rae Milligan, BA Syd.
Robert Kingsley Murfet, BA Tas.
Patricia Christina Vorst, BA Macq.

Research Assistant
Jeannie Friedewald, BA Macq.

Administrative Assistant
Brian McClenaghan, BA N.E.

Graduate Assistant
David Owen Johnson, BSc Syd.

Research Professor of Physical Metallurgy
John Stephen Bowles, MSc Melb., CEng, FIM

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

Professional Officers
Edda Filson, ASTC, ARACI
Ulo Joosoo, MSc N.S.W., ASTC
John Milton Newburn, MSc N.S.W., ASTC, MIM
Frederick Henry Scott, BSc N.S.W., MAIP
John Armitage Taylor, ASTC, FAISS, MIEAust, AMAusIMM

Department of Chemical and Process Metallurgy

Senior Lecturers
Sidney Blairs, BSc PhD Manc.
Bruce Harris, BSc Syd., MSc N.S.W., MAusIMM
Alan Phillip Prosser, BSc PhD Lond., DIC, ARCS, ARIC, ARACI, MAusIMM
David Ronald Young, BSc(Eng), PhD Lond., ARSM, MAusIMM

Department of Materials

Associate Professor
Lewis Henry Keys, MSc PhD N.S.W., ASTC, CEng, FIM

Lecturers
Peter Krauklis, BSc PhD N.S.W., MIM
Keith Robin Lee Thompson, BSc Wales, PhD N.S.W., CEng, MIM
Department of Physical and Industrial Metallurgy

Associate Professors
Max Hatherly, MSc PhD N.S.W., ASTC, CEng, FIM
Graig 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, MIM
Roy Thomas Southin, PhD Camb., CEng, FIM, MIBF

Lecturer
Michael Bernard McGirr, BSc Syd., PhD N.S.W.

School of Mining Engineering

Professor of Mining Engineering and Head of School
Frank Ferdinand Roxborough, BSc PhD Durh., CEng, FInstF, FIMM, MAusIMM

Professor of Mining Engineering
John Phillip Morgan, BE Adel., ASTC, FSASM, FIEAust, FAIM, MAusIMM, MAIME, CentMineManager

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Joseph Arthur Shonhardt, BSc(Tech) N.S.W., AIM, AMAusIMM

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Department of Mining Engineering

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Edward George Thomas, BE PhD Qld., MAusIMM

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Huw Ronald Phillips, MSc Brist., PhD N’cle.(U.K.), CEng, MIMinE, MIEE

Tutor
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Department of Mineral Processing

Senior Lecturer and Head of Department
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Lecturer
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School of Textile Technology

Professor of Textile Technology and Head of School
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Professor of Textile Physics
Max Feughelman, BSc DSc Syd., FAIP, ASTC

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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

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Thomas Stanislaus Hickie, BSc PhD N.S.W., ASTC
Mstislav Stephen Nossar, Diploma Harbin, PhD N.S.W., FIEAust
Michael Thomas Pailthorpe, BSc PhD N.S.W.

Lecturer
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Senior Project Scientist
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Michael David Young, BSc PhD N.S.W., ATI
Oto Zubzanda, Diploma T.U. Bratislava

School of Wool and Pastoral Sciences

Associate Professor and Head of School
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Professor of Pastoral Sciences
Haydn Lloyd Davies, PhD W.Aust., BSc Wales, MAIAS

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Walter Ragnall McManus, BScAgr Syd., PhD N.S.W., MAIAS
Euan Maurice Roberts, MAgriSc N.Z., PhD N.S.W., MAIAS
Kenneth James Whiteley, BSc N.S.W., PhD Leeds, FTI, MAIAS

Administrative Assistant
John Edward Lawrence
Broken Hill Division

Staff

Director
Professor J. E. Andersen

Department of Mining and Mineral Sciences

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Ian Lachlan 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
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Mineral Science

Senior Lecturer
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W.S. and L.B. Robinson University
College

Head of Department of Science
Professor John Everard Andersen, BE Melb., PhD N.S.W., FIEAust, MAUSI, ARACI

Head of Department of Mining and Mineral Sciences
Professor Leon John Thomas, BSc PhD Birm., CEng, FIEAust, MAUSI, MMI, MIMinE

Administrative Officer
Peter Francis Hern, AASA
**Applied Science**

**Geology**

Senior Lecturer
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Kevin David Tuckwell, BSc PhD N.S.W., AMAusIMM

Tutor
Alaster Carlile Edwards, BSc Melb.

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**Fowlers Gap Research Station**

Officer-in-Charge
John Alfred Reynolds, BSc PhD N.S.W.

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**Department of Science**

**Chemistry**

Associate Professor
Keith George O'Brien, MSc Syd., PhD N.S.W., FRACI, AMAusIMM

Lecturer
Derek Richard Smith, BSc PhD Wales

Senior Tutor
Robert Edward Byrne, MSc N.S.W., ARACI, AMAusIMM

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**Mathematics**

Senior Lecturer
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Lecturers
David Charles Guiney, BSc PhD Adel.
Dennis William Trenerry, BSc PhD Adel.

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**Physics**

Senior Lecturer
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Lecturer
Kenneth Reid Vost, BSc Glas., MSc N.S.W., AMAusIMM
The University of New South Wales
Kensington Campus 1979

Theatres
Biomedical Lecture Theatres E27
Central Lecture Block E19
Classroom Block (Western Grounds) H3
Electrical Engineering Theatre F17
Keith Burrows Lecture Theatre J14
Mathews Theatres D23
Old Main Theatrette K15
Parade Theatre E3
Science Theatre F13
Sir John Clancy Auditorium C24

Buildings
Affiliated Residential Colleges
New (Anglican) L6
Shalom (Jewish) N9
Warrane (Roman Catholic) M7

Applied Science Faculty
Applied Science F10
Architecture H14
Arts (Morven Brown) C20
Banks F22
Barker Street Gatehouse N11
Basser College C18
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Dalton F12
Robert Heffron E12
Civil Engineering H20
Commerse (John Goodsell) F20
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Geography and Surveying K17
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Gymnasium B5
House at Pooh Corner N8
International House C6
John Goodsell (Commerce) F20
Kensington Colleges C17
Basser C18
Goldstein D16

General
Accountancy C20
Admissions Office C22
Anatomy C27
Applied Geology F10
Applied Science (Faculty Office) F10
Appointments Office C22
Architecture (including Faculty Office) H14
Arts (Faculty Office) C20
Australian Graduate School of Management F23
Biochemistry D26
Biological Sciences (Faculty Office) D26
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
Commerce (Faculty Office) F20
Community Medicine D26
Computing Services Unit E21
Drama D9
Economics F20
Education G2
Engineering (Faculty Office) K17
English
Examinations and Student Records C22
Fees Office C22
Food Technology F10
French C20
General Studies C20
Geography K17
German C20
Health Administration C22
History C20
History and Philosophy of Science C20

Industrial Arts C1
Industrial Engineering J17
Institute of Languages G14
Institute of Rural Technology B8
Kindergarten (House at Pooh Corner/Child Care Centre) N8
Landscape Architecture H14
Law (Faculty Office) E21
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
Pathology C27
Patrol and Cleaning Services F20
Philosophy C20
Physics K15
Physical Education and Recreation Centre (PERC) B5
Physiology and Pharmacology C27
Political Science C20
Postgraduate Committee in Medical Education B27
Postgraduate Extension Studies (Closed Circuit Television) F20
Postgraduate Extension Studies (Radio Station and Administration) F29
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 C20
Student Health E15
Students' Union E4
Surveying K17
Teachers' College Liaison Office F16
Tertiary Education Research Centre E15d
Textile Technology G14
Town Planning K15
University Union (Blockhouse) G6
Wool and Pastoral Sciences B8
Zoology D26
This Handbook has been specially designed as a source of reference for you and will prove useful for consultation throughout the year.

For fuller details about the University—its organization, staff membership, description of disciplines, scholarships, prizes, and so on, you should consult the Calendar.

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For detailed information about courses, subjects and requirements of a particular faculty you should consult the relevant Faculty Handbook.

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