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

University of New South Wales — Faculty of Applied Science — Periodicals
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General Information

In order to minimize the time and effort that you will put into your study you should make an effort to learn what facilities the University offers, to investigate the best methods of study and to discover as much as possible about the course for which you are enrolled.

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

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

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

Some people who can help you

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

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

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

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

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

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

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

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

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

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

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

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**Calendar of Dates**

**1976**

**Session 1**

(14 weeks)

March 1 to May 9.

May Recess: May 10 to May 16

May 17 to June 13

Midyear Recess: June 14 to July 18

July 19 to August 22

August Recess: August 23 to August 29

August 30 to October 31

Study Recess: November 1 to November 7

**February**

Saturday 7  Deferred examinations end

Monday 16  Enrolment period begins for new students and students repeating first year

Tuesday 17  Last day for appeal against exclusion by students who infringed re-enrolment rules at annual examinations

Tuesday 24  Last day for application for review of deferred examination results

Tuesday 27  Last day for application for permission to re-enrol by students who infringed re-enrolment rules at deferred examinations

**March**

Monday 1  Session 1 commences

Friday 12  Last day for acceptance of enrolments by new students (late fee payable)

Thursday 18  Last day for appeal against exclusion by students who infringed re-enrolment rules at deferred examinations

Thursday 25  Last day for acceptance of enrolments by students re-enrolling in second and later years (late fee payable)

Friday 26  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

Monday 29  Last day to enrol in additional subjects

**April**

Friday 16 to Monday 19  Easter

Friday 23  Last day for students attending the University for the first time to discontinue without failure subjects which extend over Session 1 only

Sunday 25  Anzac Day

Monday 26  Public Holiday

**May**

Tuesday 4  Publication of provisional timetable for June/July examinations

Monday 10  May Recess begins

Wednesday 12  Last day for acceptance of corrected enrolment details forms

Friday 14  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

**June**

Monday 26  Australia Day—Public Holiday

Tuesday 27  Deferred examinations begin

Sunday 16  May Recess ends
General Information

Monday 17

Last day for students to advise of examination timetable clashes

June

Tuesday 1

Publication of timetable for June/July examinations

Sunday 13

Session 1 ends

Monday 14

Queen's Birthday—Public Holiday

Midyear Recess begins

Tuesday 15

Midyear examinations begin

Thursday 29

Midyear examinations end

July

Sunday 18

Midyear Recess ends

Monday 19

Session 2 begins

Friday 30

Foundation Day

Last day for students attending the University for the first time to discontinue without failure subjects which extend over the whole academic year

August

Friday 13

Last day for students other than those attending the University for the first time to discontinue without failure subjects which extend over Session 2 only

Monday 23

August Recess begins

Holiday for non-academic staff

Sunday 29

August Recess ends

Tuesday 1

Last day for acceptance of applications for re-admission in 1977 after exclusion under the re-enrolment rules

September

Friday 10

Last day for students attending the University for the first time to discontinue without failure subjects which extend over Session 2 only

Sunday 12

Last day for applications from students graduating in 1977 for admission to University degrees and diplomas

Tuesday 14

Last day for return of corrected enrolment details forms

Tuesday 21

Publication of provisional timetable for annual examinations

October

Friday 1

Last day to apply to MUAC for transfer to another university in Sydney metropolitan area and Wollongong

Monday 4

Eight Hour Day—Public Holiday

Tuesday 19

Publication of timetable for annual examinations

November

Monday 1

Study Recess begins

Sunday 7

Session 2 ends

Monday 8

Annual examinations begin

Tuesday 30

Annual examinations end

December

Saturday 25

Christmas Day—Public Holiday

Monday 27

Boxing Day—Public Holiday

1977

Session 1

March 7 to May 14

May Recess: May 16 to May 21

May 23 to June 18

Midyear Recess: June 20 to July 23

July 25 to August 27

August Recess: August 29 to September 3

September 5 to November 5

Study Recess: November 7 to November 12

January

Monday 3

Public Holiday

Friday 7

Last date for application for review of results of annual examinations

Monday 10

Publication of timetable for deferred examinations

Friday 14

Last day for acceptance of applications by Admissions Office for transfer to another course within the University

Tuesday 25

Deferred examinations begin

Monday 31

Australia Day—Public Holiday

February

Saturday 5

Enrolment period begins for new students and students repeating first year

Monday 14

Deferred examinations end

Friday 18

Results of deferred examinations available

Monday 21

Enrolment period begins for second and later year students

Tuesday 22

Last day for applications for review of deferred examination results

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 as well as short recesses of one week within each of the sessions.

Session 1 commences on the first Monday of March.
Organization of the University

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

In 1975 the University had 18,128 students and 3,984 staff who worked in more than eighty buildings. These figures include staff and students at Broken Hill (W. S. and L. B. Robinson University College), Duntroon (the Faculty of Military Studies) and Jervis Bay.

The Council

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

The Council consists of 42 members representative of the professions, commerce and industry, the legislature, employee organizations, rural, pastoral and agricultural interests, and the academic staff of the University, its graduates and students.

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

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

The Professorial Board

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

The Faculties

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

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

The eleven Faculties are Applied Science, Architecture, Arts, Biological Sciences, Commerce, Engineering, Law, Medicine, Military Studies, Professional Studies, and Science. In addition, the Board of Studies in General Education fulfills a function similar to that of the faculties. The Board of Studies in Science is responsible for the academic administration of the Science course.

The Schools

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

Executive Officers

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

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

General Administration

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

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

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

Student Representation on Council and Faculties

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

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

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

Identification of Subjects by Numbers

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

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

General Studies Program

Almost all undergraduates in Faculties other than Arts and Law are required to complete a General Studies program. The Department of General Studies publishes its own Handbook which is available free of charge. All enquiries about General Studies should be made to the General Studies Office, Room G54, Morven Brown Building (663 0351 Extn. 3478).

Student Services and Activities

The University Library

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

There are services at other centres:


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

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

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

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

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

Accommodation

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

The Kensington Colleges

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

International House

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

New College

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

Shalom College

Shalom College provides accommodation for 86 men and women students. Non-resident membership is available to students who wish to avail themselves of the Kosher dining room and tutorial facilities. Apply in writing to the Master, Shalom College, The University of New South Wales, PO Box 1, Kensington, NSW 2033.

Warrane College

An affiliated Roman Catholic residential college, Warrane provides accommodation for 220 men students, both graduate and undergraduate. Non-resident membership is available to male students who wish to participate in College activities and make use of its facilities. Fees are payable on a session basis. Apply in writing to the Master, Warrane College, PO Box 24, Kensington, NSW 2033.

International House

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

New College

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

Shalom College

Shalom College provides accommodation for 86 men and women students. Non-resident membership is available to students who wish to avail themselves of the Kosher dining room and tutorial facilities. Apply in writing to the Master, Shalom College, The University of New South Wales, PO Box 1, Kensington, NSW 2033.

Warrane College

An affiliated Roman Catholic residential college, Warrane provides accommodation for 220 men students, both graduate and undergraduate. Non-resident membership is available to male students who wish to participate in College activities and make use of its facilities. Fees are payable on a session basis. Apply in writing to the Master, Warrane College, PO Box 24, Kensington, NSW 2033.

Off-campus Housing

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

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

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

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

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

Student Health

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

Counselling appointments are available during sessions and recesses between 9 am and 7 pm. Phone 663 0351 or 3275. Urgent interviews are possible on a walk-in basis between 9 am and 5 pm. Group counselling programs are offered both day and evening between 9 am and 9 pm by special arrangement.

Student Amenities and Recreation

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

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

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

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

Physical Education and Recreation Centre

The Physical Education and Recreation Centre consists of eight squash courts and a main building. The latter has a large gymnasium and ancillary practice rooms for fencing, table tennis, judo, weight-lifting and a physical fitness testing room. The Supervisor of Physical Recreation is responsible for the Centre and provides a recreational program for both students and staff.

The University Union

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

The Union is housed in three buildings near the entrance to the Kensington Campus from Anzac Parade. These are the Roundhouse, the Blockhouse and the Squarehouse. Membership of the Union is compulsory at $45 per year for all registered students and is open to all members of staff and graduates of the University.

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

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

The Students' Union

The Students' Union is run by students and represents them on and off campus. Presidential elections are by
The Students' Union is affiliated with the Australian Union of Students (AUS) which represents students on the national level.

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

Chaplaincy Centre

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

Student Clubs and Societies

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

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

Details of sporting facilities are available in the Orientation Magazine, available at the Student Amenities and Recreation Unit (Hut B at the foot of Basser Steps).

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

Other Services and Activities

University Co-operative Bookshop Limited Membership is open to all students, on payment of a fee of $5, refundable when membership is terminated. Members receive an annual rebate on purchases of books.

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

Australian Armed Forces Enquiries should be directed to:

Royal Australian Navy: Royal Australian Naval Liaison Officer, Professor J. S. Ratcliffe, Commander, R.A.N.R., at the School of Chemical Engineering. Phone extension 2406.

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

Royal Australian Air Force: Undergraduates interested in the R.A.A.F. Undergraduate Scheme should contact The Recruiting Officer, Defence Forces Recruiting Centre, 320 Castlereagh Street, Sydney.

General Information

Tertiary Education Assistance Scheme

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

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

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

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

Benefits

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

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

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

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

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

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

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

Scholarships, Cadetships, Prizes

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

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

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

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

Details of graduate awards are contained in the University Calendar.

Other Financial Assistance

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

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

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

3 Early in 1973 the Australian Government made funds available to the University to provide loans to students in financial difficulty. The loans are to provide for living allowances and other approved expenses associated with attendance at University. Repayment usually commences after graduation or upon withdrawal from the course. Students are required to enter into a formal agreement with the University to repay the loan.

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

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

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

Financial Assistance to Aboriginal Students

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

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

Rules and Procedures

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

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

Admission and Enrolment

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

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

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

If a student is unable to pay the fees the enrolment form must still be lodged with the Cashier and the student will be issued with a 'nil' receipt. The student is then indebted to the University and must pay the fees by the end of the second week of the Session for which enrolment is being effected. Penalties apply if fees are paid after that time (see below). Payment may be made through the mail in which case it is important that the student registration number be given accurately.

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

Those who are selected will be required to complete enrolment at a specified appointment time before the start of Session 1. Compulsory fees must be paid on the day of the appointment. In special 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 below).

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

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

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

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

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

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

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

Final Dates for Completion of Enrolments No enrolments for courses occupying Session 2 only will be accepted after the end of the second week of Session 2 (30 July 1976) without express approval of the Deputy Registrar (Student Services). No enrolments for courses occupying Session 1 only will be accepted after the end of the second week of Session 1 (28 March 1976) without the express approval of the Deputy Registrar (Student Services).
How do assisted students (eg scholarship holders) enrol? Scholarship holders or sponsored students who have an enrolment voucher or letter of authority from their sponsor should present it at the time of enrolment. Such vouchers and authorities are generally issued by the NSW Department of Education and the NSW Public Service. They are not always issued in time and students who expect to receive an enrolment voucher or other authority must pay the fees (and arrange a refund later). Such vouchers and authorities are not the responsibility of the University and their late receipt is not to be assumed as automatically exempting a student from the requirements of enrolling and paying fees.

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

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

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

In the case of a student enrolled for Session 2 only this disbarment applies if any portion of fees is outstanding after the end of the sixth week of Session 2 (27 August 1976). In very special cases the Registrar may grant exemption from disqualifications referred to in the preceding paragraph upon receipt of a written statement setting out all relevant circumstances.

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

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

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

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

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

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

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

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

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

Are there any restrictions upon students re-enrolling? The University Council has adopted the following rules governing re-enrolment with the object of requiring students with a record of failure to show cause why they should be allowed to re-enroll and retain valuable class places.

First-year Rule
1. A student enrolled for the first time in any undergraduate course in the University shall be required to
show cause why he/she should be allowed to continue the course if that student fails more than half the program in which he/she is enrolled. In order that students may calculate half their program, the 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. Failure in a deferred examination as well as in the initial examination counts for the purposes of this rule as one failure.

General Rule

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

The Session-unit System

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

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

Exemption from Rules by Faculties

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

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

‘Showing Cause’

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

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

Appeal

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

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

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

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

The decision of the Committee shall be final.

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

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

Exclusion

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

* It is proposed that under this arrangement, the membership of the Appeal Committee will be Pro-Vice-Chancellor J. B. Thornton (Chairman), Professor D. M. McCallum, Chairman of the Professorial Board, and a member of Council in the category of members elected by the graduates of the University, nominated by the Vice-Chancellor.
B A student who is required to show cause under the provisions of Rule 2 and either does not attempt to show cause or does not receive special permission to re-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.

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

Re-admission after Exclusion

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

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

C An application should include evidence that the circumstances which were deemed to operate against satisfactory performance at the time of exclusion are no longer operative or are reduced in intensity and/or evidence of appropriate study in the subject(s) (or the equivalent) on account of which the applicant was excluded.

Restrictions and Definitions

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

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

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

Fees*

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

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

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

University Union entrance fee—$20 payable on first enrolment

Students Activities Fees:
University Union—$45 annual subscription
Sports Association—$6 annual subscription
Students' Union:
Students enrolling in full-time courses—$10 annual subscription
Students enrolling in part-time courses—$5 annual subscription
Miscellaneous—$25 annual fee.

(The miscellaneous fee is used to finance expenses generally of a capital nature relating to student activities. Funds are allocated to the various student bodies for projects recommended by the Student Affairs Committee and approved by the University Council.)

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

Who is exempt from payment of fees?

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

2. Students enrolled in courses classified as External are exempt from all Students Activities Fees and the University Union entrance fee.

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

4. Students who while enrolled at another university in Australia in a degree or diploma course are given approval to enrol at the University of New South Wales but only in a miscellaneous subject or subjects to be credited towards the degrees or diplomas for which they are enrolled elsewhere are exempt from all Student Activities Fees and the University Union entrance fee.

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

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

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

How much will textbooks and special equipment (if any) cost? You must allow quite a substantial sum for textbooks. This can vary from $200 to $600 depending on the course taken. These figures are based on the cost of new books. The Students' Union operates a second-hand bookshop. Information about special equipment costs, accommodation charges and cost of subsistence on excursions, field work, etc., and for hospital residence (medical students) are available from individual schools.

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

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

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

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

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

Yes. The following rules apply:

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

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

Examinations

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

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

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

In the assessment of your progress in University courses, consideration is given to work in laboratory and class exercises and to any term or other tests given throughout the year as well as to the results of written examinations.

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

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

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

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

Annual examinations held in November/December 1976 —Friday 7 January 1977.

Deferred examinations held in January/February 1977 —Tuesday 22 February 1977.

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

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

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

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

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

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

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

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

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

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

4. No candidate shall be admitted to an examination after thirty minutes from the time of commencement of the examination.

5. No candidate shall be permitted to leave the examination room before the expiry of thirty minutes from the time the examination commences.

6. No candidate shall be re-admitted to the examination room after he has left it unless during the full period of his absence he has been under approved supervision.

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

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

9. All answers must be in English unless otherwise directed. Foreign students who have the written approval of the Officer-in-Charge of Examinations may use standard translation dictionaries.

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

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

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

1. When a student through illness or some other acceptable circumstance has been prevented from taking the annual examination or has been placed at a serious disadvantage during the annual examinations.

2. To help resolve a doubt as to whether a student has reached the required standard in a subject.

3. To allow a student by further study to reach the required standard in a subject.

4. Where a student's progression or graduation is inhibited by his failure in one subject only, a deferred examination may be granted notwithstanding his failure otherwise to qualify for this concession.
In the Faculties of Arts, Commerce and Law special circumstances apply in the granting of deferred examinations. Details in each circumstance are given in the section Faculty Information in the respective handbooks for these faculties, or in the Calendar.

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

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

Student Conduct on Campus

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

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

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

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

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

If you fail a subject at the annual examinations in any year and re-enrol in the same course in the following year, you must include in your program of studies for that year the subject in which you failed. This requirement will not be applicable if the subject is not offered the following year; is not a compulsory component of a particular course; or if there is some other cause which is acceptable to the Professorial Board, for not immediately repealing the failed subject.

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

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

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

The card must be presented when borrowing from the University libraries, when applying for travel concessions and when notifying a change of address. It must also be presented when paying fees on re-enrollment 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-enrollment.

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

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

Why should I inform the University if I change my address? If you change your address you should notify the Student Records Section of the Registrar’s Division as soon as possible. Failure to do this could lead to important correspondence (including examination results) not reaching you. The University cannot accept responsibility if official communications fail to reach students who have not notified their change of address.

Change of Address Advice Forms are available at Faculty and School offices and at the Information Counters on the Ground Floor of the Chancellery Building.

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

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

In spite of the policy, there are sometimes accusations made that the University has revealed information, including addresses (especially to insurance companies). All students should be aware that students' addresses are eagerly sought by various commercial agents and that sometimes tricks are used to obtain them. For example, from time to time people claiming to be from the University telephone students or their families and ask for information (usually another student’s address) which is often given, unsuspectingly. There is evidence that this is a technique used by commercial agents.
It would be generally helpful if students (and their families and friends) are cautious in revealing information, making it a practice to ask the name, position, and telephone extension of any caller claiming to be from the University and, if suspicious, returning the call to the extension given.

How are student records kept up to date? Enrolment details forms will be sent to all students on 26 April and 30 August. It is not necessary to return these forms unless any information recorded thereon is incorrect. Amended forms must be returned to the Examinations and Student Records Section within fourteen days. Amendments notified after the closing date will not be accepted unless exceptional circumstances exist and approval is obtained from the Registrar. Amended forms returned to the Registrar will be acknowledged in writing, within fourteen days.

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

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

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

Further Information

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

General

Any student who requires information on the application of these rules or any service which the University offers, may make enquiries from the Admissions Office, the Student Counselling Unit or the Registrar.

Admissions Office

The Admissions Office provides students with information concerning courses, admission requirements and enrolment procedure.

It will receive applications from students who wish to defer or resume courses of study, to transfer from one course to another, or seek any concession in relation to a course in which they are enrolled.

These applications should, wherever possible, be lodged before the beginning of the academic year in which the concession is to apply.

Students in doubt as to whether an application is necessary to cover their own particular situation should inquire at the Admissions Office.

The Admissions Office is located in the Chancellery on the upper campus. Office hours are from 9 am to 1 pm and 2 pm to 5 pm, Monday to Friday. An evening service is provided during the enrolment period.

Notices

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

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.
Foreword

The importance of the Applied Sciences in this University's development has always been recognized, and is especially referred to in our Act of Incorporation. Undergraduate courses in the fields of Applied Geography, Applied Geology, Chemical Engineering, Chemical Technology, Food Technology, Metallurgy, Mining Engineering, Textile Technology and Wool and Pastoral Sciences are well established. 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
Staff

Comprises Schools of Applied Geology, Chemical Engineering, Chemical Technology, Geography, Metallurgy, Wool and Pastoral Sciences, Textile Technology, and Mining Engineering.

Dean
Professor M. Chaikin

Chairman
Professor R. T. Fowler

Senior Administrative Officer
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School of Applied Geology

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and Head of School
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Professor of Geology
Vacant

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Henry George Golding, BSc Lond., MSc PhD N.S.W., ARCS, AMAusIMM
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Peter Cyril Rickwood, BSc Lond., PhD Cape T., ARIC, FGS
Bryce Leslie Wood, MSc DSc Otago, MAusIMM

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Michael Thomas Pailthorpe, BSc PhD N.S.W.

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Douglas McPherson Murray, BAgSc PhD Melb., MFrurSc N.E.
Archibald Niven Sinclair, MVSc Syd., FRCVS, FACBS, MACVS

Lecturer
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Tutor
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Professional Officer
Edgar Devaud, IngAgr Concepción

Professional Officers (Faculty)
Endel Nomm, BA Macq.
Vivian Noel Edward Robinson, BSc PhD W Aust
Dante Somin Santea, Dipling T.I.lessey
Faculty Information

Faculty of Applied Science Enrolment Procedures

Preliminary Enrolment

Before proceeding on vacation students are required to attend the office of the respective School to complete the necessary preliminary enrolment procedures.

School of Geography
Re-enrolment forms will be obtainable from the School Office, Room 1009, Applied Science Building, from early October. These are to be collected and returned completed no later than 23 January. Any students requiring advice on their 1976 program can make an appointment to discuss it by telephoning 662 2084, or calling at the School Office.

Enrolment Timetable
Students in any of the above courses are required to attend Unisearch House in accordance with the following timetable.

1. Full-time Courses
Year 2, and Year 1 repeats
Thursday 26 February
9.30 am to 12.30 pm (Courses 300-310)
2.00 pm to 4.30 pm (Courses 312-322)

Year 3
Tuesday 24 February
9.30 am to 12.30 pm (Courses 300-310)
2.00 pm to 4.30 pm (Courses 312-322)

Year 4
Monday 23 February
9.30 am to 12.30 pm (Courses 300-310)
2.00 pm to 4.30 pm (Courses 312-322)

2. Part-time Courses
Stage 1 repeats and Stage 2, 3, 4, 5, 6 and later stage students.
Wednesday 25 February
2.00 pm to 4.30 pm (All courses)
and
6.00 pm to 8.00 pm (All courses)

3. New Students with Advanced Standing
Friday 27 February
9.30 am to 12.30 pm (All courses)

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

Enrolment Centre
Unisearch House
221 Anzac Parade
(across from Main Campus)
Late Enrolments

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

There are two late enrolment sessions:

First Late Enrolment Period
Wednesday 3 March

Second Late Enrolment Period
Wednesday 10 March

The times and locations for late enrolment are:
Administrative Office
of appropriate School
5.00 pm to 7.00 pm

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

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

1. A candidate for the degrees of BSc(Tech) or BSc(Eng) shall:
   A comply with the requirements for admission;
   B follow the prescribed course of study in the appropriate school and pass the necessary examinations;
   C complete an approved program of industrial training over such period as is prescribed concurrently with attendance in the course. In general, this training must be completed before 31 January in the year in which the degree is to be recorded.
   2. During each year a student shall perform laboratory, drawing office and field work, attend demonstrations and excursions to such an extent and in such a manner as is prescribed from time to time by the Professorial Board on the recommendation of the Faculty, and, in addition, undertake industrial training as approved by the Head of the School.
   3. A student may be granted advanced standing by the Professorial Board on the recommendation of the appropriate Faculty, but in each case must complete an adequate period of approved industrial training before being eligible for the degree except for students in the School of Electrical Engineering, where such training is recommended but not required. In addition to the above requirements a student coming from another institution must follow an approved course of study in this University for at least two years.
   4. 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
   5. The degree shall be awarded in the pass grade only but in the case of superior performance throughout the course the degree shall be conferred "with merit".
   5. Students shall be required to conform with the general rules relating to progression in University courses.

General Rules for Progression

1. Course programs will be stated and timetabled by year and by stage.
   2. Students must satisfy the rules governing re-enrolment, particularly those requiring that all first-year subjects must be completed by the end of two years' full-time or four years' part-time study.
   3. Before being permitted to enrol in any subject, students must satisfy the relevant prerequisite subject requirements. Normally this will necessitate students attempting to satisfy requirements of subjects of a particular year or stage before proceeding to subjects in the next part of the course. Details of prerequisite subjects, co-requisite subjects and any special rules governing progression in particular courses should be obtained from the relevant school.
   4. Only in exceptional circumstances will students be permitted to enrol in subjects extending over more than two years of a full-time course, or two stages of a part-time course, or for more than 28 hours of course work per week if full-time or 14 hours per week if part-time. Students repeating subjects are required to select a program with the approval of the Head of School which limits their hours of course work to 24 hours per week if full-time.
and 12 hours per week if part-time. Extension of these hours will need the special permission of the Head of School.

5. Students shall enrol in courses as full-time students or in those Schools offering part-time courses as part-time students. Transference between full-time and part-time courses will be permitted once only. Students who transfer will be expected to remain in their new course until the completion of all academic and practical requirements of that course.

6. Notwithstanding the above, students can enrol in any non-standard program only with permission of the Head of School. A non-standard program is one that involves enrolment in subjects from more than one year, or two stages, or which comprises subjects which do not normally constitute a particular year's course work.

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, 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 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 degree of Bachelor of Science (Technology) are offered in Food Technology by the School of Chemical Engineering; 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 degree of Bachelor of Science (Engineering) is available at Broken Hill.

Students who qualify for the BSc(Tech) degree in the Faculty of Applied Science and who wish to proceed to 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 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) courses, but one of the conditions for the award of the BSc(Tech) and BSc(Eng) degrees is that at least three years of approved industrial experience be gained before graduation. This requirement will apply to students transferring from full-time courses.

BSc(Tech) and BSc(Eng) Courses With Partial Full-time Attendance

BSc(Tech) and BSc(Eng) 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**

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 and on economic aspects of geology.

The applied nature of the course is indicated by the inclusion of subjects such as Mining and Mineral Process Engineering. Courses in exploration geophysics, mineral exploration, petroleum geology and engineering geology are offered in the later stages of the program.

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 Hydrogeology-Engineering 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.

### 300 Applied Geology—Full-time Course

**Bachelor of Science**

**BSc**

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.011 Geology I*</td>
<td>6</td>
</tr>
<tr>
<td>1.001 Physics I or</td>
<td></td>
</tr>
<tr>
<td>1.011 Higher Physics I</td>
<td>6</td>
</tr>
<tr>
<td>2.001 Chemistry I</td>
<td>6</td>
</tr>
<tr>
<td>10.001 Mathematics I or</td>
<td></td>
</tr>
<tr>
<td>10.011 Higher Mathematics I</td>
<td>6</td>
</tr>
</tbody>
</table>

* Three field tutorials, involving up to five days in all are an essential part of the course. Attendance is compulsory.

<table>
<thead>
<tr>
<th>Year 2</th>
<th>Hpw</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.012 Geology 2A*†</td>
<td>S1</td>
</tr>
<tr>
<td>25.022 Geology 2B*†</td>
<td>3</td>
</tr>
<tr>
<td>2.002A Physical Chemistry</td>
<td>7</td>
</tr>
<tr>
<td>2.002C Analytical/Inorganic Chemistry</td>
<td>1½</td>
</tr>
</tbody>
</table>

* Field work of up to six days in each case is a compulsory part of the course. † Prerequisites: 25.011 Geology I and 2.001 Chemistry I.

**Year 3**

<table>
<thead>
<tr>
<th>Hpw</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.013 Geology IIIA†</td>
</tr>
<tr>
<td>25.023 Geology IIIB*†</td>
</tr>
<tr>
<td>25.033 Geology IIIC*§</td>
</tr>
<tr>
<td>Two General Studies Electives</td>
</tr>
</tbody>
</table>

† Prerequisites: 25.012, 25.022.
* A geological survey camp of 10 days' duration is a compulsory part of this course.
§ Field tutorials constitute an essential part of this course.

**Year 4**

<table>
<thead>
<tr>
<th>Hpw for Session 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.044 Geology IV: Mineral Exploration†§</td>
</tr>
<tr>
<td>25.054 Geology IV: Sedimentary Basin†</td>
</tr>
<tr>
<td>25.064 Geology IV: Applied Geophysics†</td>
</tr>
</tbody>
</table>

† Prerequisites: 25.013, 25.023 and 25.033.
§ Students taking this option must take 7.023.
The School of Chemical Engineering consists of the Departments of Biological Process Engineering, Chemical Engineering, Food Technology and Fuel Technology. The course in Chemical Engineering contains a number of electives in technical areas, including Biological Process Engineering and Fuel Engineering.

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

Biological Process Engineering is the extension of chemical engineering principles to systems involving biological materials. Typical areas of interest are: the manufacture of antibiotics; the fermentation industries; bacterial mineral extraction; and the production of industrially useful materials by the growth and utilization of micro-organisms.

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

Food Technology is concerned with the management of foods from the time of production until they reach the consumer. It is the responsibility of the food technologist to see that foods do not spoil or perish. This covers handling, transportation, storage and packaging of fresh and prepared foods and the techniques for preservation such as cold storage, freezing, canning, dehydration and packaging.

For the award of honours, students need to have distinguished themselves in the formal work, in other assignments as directed by the Head of the School, and in the final year project, for which a thesis is required.

It is 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 three years of industrial training concurrently with their University work.

### Department of Chemical Engineering

**304 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 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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
</tr>
<tr>
<td>1.001 Physics I</td>
<td>6</td>
</tr>
<tr>
<td>2.001 Chemistry I</td>
<td>6</td>
</tr>
<tr>
<td>5.010 Engineering A</td>
<td>6</td>
</tr>
<tr>
<td>5.030 Engineering C</td>
<td>0</td>
</tr>
<tr>
<td>10.011 Mathematics I or</td>
<td></td>
</tr>
<tr>
<td>10.011 Higher Mathematics I</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td><strong>24</strong></td>
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</table>

<table>
<thead>
<tr>
<th>Year 2</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td>2.002A Physical Chemistry</td>
<td>6</td>
</tr>
<tr>
<td>2.002B Organic Chemistry</td>
<td>0</td>
</tr>
<tr>
<td>2.002C Inorganic/Analytical Chemistry</td>
<td></td>
</tr>
<tr>
<td>3.111 Chemical Engineering Principles I</td>
<td>3</td>
</tr>
<tr>
<td>3.112 Chemical Engineering Principles II</td>
<td>2</td>
</tr>
<tr>
<td>8.112 Materials and Structures</td>
<td>3</td>
</tr>
<tr>
<td>10.031 Mathematics</td>
<td>2</td>
</tr>
<tr>
<td>10.331 Statistics SS</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td><strong>24</strong></td>
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</tbody>
</table>

**Plus one of the following electives:**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>3.311 Fuel Engineering I</td>
<td>2</td>
</tr>
<tr>
<td>4.031 Physics of Metals</td>
<td>3</td>
</tr>
<tr>
<td>25.201 Mineralogy</td>
<td>2</td>
</tr>
<tr>
<td>44.111 Microbiology</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
</tr>
<tr>
<td>3.121 Chemical Engineering Principles II</td>
<td>11</td>
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<tr>
<td>3.122 Chemical Engineering Thermodynamics and Reaction Engineering</td>
<td>4</td>
</tr>
<tr>
<td>3.123 Chemical Engineering Design I A and B</td>
<td>2</td>
</tr>
<tr>
<td>3.124 Chemical Engineering Design and Practice*</td>
<td></td>
</tr>
<tr>
<td>6.801 Electrical Engineering</td>
<td>3</td>
</tr>
<tr>
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<td>2</td>
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<tr>
<td>General Studies Elective</td>
<td>1½</td>
</tr>
<tr>
<td></td>
<td><strong>23½</strong></td>
</tr>
</tbody>
</table>

**Plus one of the following electives:**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.013L Chemistry and Enzymology of Foods</td>
<td>3</td>
</tr>
<tr>
<td>3.321 Fuel Engineering II</td>
<td>3</td>
</tr>
<tr>
<td>4.121 Principles of Metal Extraction</td>
<td>3</td>
</tr>
<tr>
<td>18.121 Production Management</td>
<td>3</td>
</tr>
<tr>
<td>22.113 Industrial Chemistry Processes†</td>
<td>3</td>
</tr>
<tr>
<td>Any Year 2 elective not previously studied‡</td>
<td>3</td>
</tr>
</tbody>
</table>

* The hours for this subject, which is normally conducted throughout the year, cannot be predetermined.
† Less factory visits. These are part of 3.123 Chemical Engineering Design A and B.
‡ Students taking a Year 2 elective at this point may prejudice their honours degree.
Various course patterns involving full-time/part-time study may be approved by the Head of the School (for details of material covered in Stages 1-6 see 1974 Calendar).

Candidates presently enrolled in the BSc(Tech) degree are allowed to complete their degrees as outlined in the 1974 Calendar.

The project to be selected from the following:

3.140 Chemical Engineering Design Project
3.150 Chemical Engineering Experiment Project
3.240 Food Technology Project
3.340 Fuel Engineering Project
3.440 Biological Process Engineering Project

Plus one or more of the following electives to a total of 7 hrs/week for 28 weeks.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.131</td>
<td>Chemical Engineering Principles III</td>
<td>S1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S2</td>
</tr>
<tr>
<td>3.132</td>
<td>Chemical Engineering Process Dynamics and Control</td>
<td>5</td>
</tr>
<tr>
<td>3.133</td>
<td>Chemical Engineering Design II</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>General Studies Advanced</td>
<td>0</td>
</tr>
<tr>
<td>Elective</td>
<td></td>
<td>1½</td>
</tr>
<tr>
<td>Project</td>
<td></td>
<td>11</td>
</tr>
</tbody>
</table>

18½ 18½

Year 4

Course Outlines

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.

304

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 2 the appropriate elective is 44.111 Microbiology; in Year 3 it is 2.013L Chemistry and Enzymology of Foods; and in Year 4, 3.411 Biological Process Engineering, plus 3.440 Biological Process Engineering Project.

Successful completion of this 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 has accepted the degree courses in Chemical Engineering with fuel electives as providing exemption from the examination required for admission to corporate membership of the Institute.

Successful completion of the BE course in Chemical Engineering with fuel electives is accepted by the Council of Engineering Institutions, UK, the Royal Australian Chemical Institute, and the Institution of Engineers, Australia, as sufficient academic qualification for corporate membership.
# 304  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. 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 2 the appropriate elective is 3.311 Fuel Engineering I, and in Year 3 it is 3.321 Fuel Engineering II. In Year 4, 3.331 Fuel Engineering III, 3.332 Fuel Engineering IV and 3.340 the Fuel Engineering Project can be taken.

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.

## Department of Food Technology

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

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

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

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

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

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

---

### 306 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.

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
</tr>
<tr>
<td>1.001 Physics I</td>
<td>6</td>
</tr>
<tr>
<td>2.001 Chemistry I</td>
<td>6</td>
</tr>
<tr>
<td>10.001 Mathematics I or</td>
<td>6</td>
</tr>
<tr>
<td>10.011 Higher Mathematics I</td>
<td>6</td>
</tr>
<tr>
<td>17.011 Biology of Mankind</td>
<td>6</td>
</tr>
<tr>
<td>17.021 Comparative Functional Biology</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 2</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>2.002A Physical Chemistry</td>
<td>6</td>
</tr>
<tr>
<td>2.002B Organic Chemistry</td>
<td>6</td>
</tr>
<tr>
<td>2.002D Analytical Chemistry</td>
<td>6</td>
</tr>
<tr>
<td>3.201 Food Technology I</td>
<td>3</td>
</tr>
<tr>
<td>10.031 Mathematics</td>
<td>2</td>
</tr>
<tr>
<td>41.101 Biochemistry I (Units A and B)</td>
<td>12</td>
</tr>
<tr>
<td>44.141 Introductory Microbiology</td>
<td>6</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>1½</td>
</tr>
<tr>
<td></td>
<td>24½</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>2.043L Chemistry and Enzymology of Foods</td>
<td>6</td>
</tr>
<tr>
<td>3.211 Food Technology II</td>
<td>6</td>
</tr>
<tr>
<td>3.212 Food Technology III</td>
<td>0</td>
</tr>
<tr>
<td>3.231 Food Engineering I</td>
<td>3</td>
</tr>
<tr>
<td>10.331 Statistics SS</td>
<td>2</td>
</tr>
<tr>
<td>44.142 Microbiology</td>
<td>6</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>1½</td>
</tr>
<tr>
<td></td>
<td>24½</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 4</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3.221 Food Technology IV</td>
<td>7</td>
</tr>
<tr>
<td>3.250 Project</td>
<td>8</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>1½</td>
</tr>
<tr>
<td>General Studies Advanced Elective</td>
<td>1½</td>
</tr>
<tr>
<td></td>
<td>Plus one or more of the following electives to a total of not less than 6 hrs/wk</td>
</tr>
<tr>
<td>2.003B Organic Chemistry</td>
<td>6</td>
</tr>
<tr>
<td>3.222 Oenology</td>
<td>3</td>
</tr>
<tr>
<td>3.223 Food Engineering II</td>
<td>3</td>
</tr>
<tr>
<td>18.121 Production Management</td>
<td>3</td>
</tr>
<tr>
<td>18.551 Operations Research</td>
<td>3</td>
</tr>
<tr>
<td>28.012 Marketing Models</td>
<td>3</td>
</tr>
<tr>
<td>28.022 Marketing Systems</td>
<td>0</td>
</tr>
<tr>
<td>42.102 Fermentation Technology</td>
<td>0</td>
</tr>
</tbody>
</table>
or such other electives, to a total of not less than 6 hrs/week, as approved by the Head of School.

During the second, third and fourth years of the course, excursions are made to various food industries. Detailed reports of some of these visits are required.

A detailed report of the student's activities during his period in industry is required, and is taken into account in the classification for the honours list.

### 307 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 degree of Bachelor of Science (Technology). A minimum of three years' concurrent industrial training is required before graduation.

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 degree of Bachelor of Science (Technology) may proceed to the degree of Bachelor of Science BSc(Tech) 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 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.

### Hours per week

<table>
<thead>
<tr>
<th>Stage 1 and 2*</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.001 Physics I</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>2.001 Chemistry I</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>10.001 Mathematics I or Higher Mathematics I†</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>17.011 Biology of Mankind</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>17.021 Comparative Functional Biology</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>24</strong></td>
<td><strong>24</strong></td>
</tr>
</tbody>
</table>

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

### Stage 3

<table>
<thead>
<tr>
<th></th>
<th>S1</th>
<th>S2</th>
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</thead>
<tbody>
<tr>
<td>2.002A Physical Chemistry</td>
<td>6</td>
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</tr>
<tr>
<td>2.002B Organic Chemistry</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>2.002D Analytical Chemistry</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>10.031 Mathematics</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Two General Studies Electives</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>11</strong></td>
<td><strong>17</strong></td>
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### Stage 4

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<tr>
<th></th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.201 Food Technology I</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>41.101 Biochemistry I (Units A and B)</td>
<td>12</td>
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<tr>
<td>44.141 Introductory Microbiology</td>
<td>0</td>
<td>6</td>
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<td><strong>Total</strong></td>
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### Stage 5

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<tr>
<th></th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.043L Chemistry and Enzymology of Foods</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>3.211 Food Technology II</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>3.213 Food Engineering I</td>
<td>3</td>
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<tr>
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<td><strong>15</strong></td>
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### Stage 6

<table>
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<tr>
<th></th>
<th>S1</th>
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<tr>
<td>3.212 Food Technology III</td>
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<td>10</td>
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<td>10.331 Statistics SS</td>
<td>2</td>
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<td>44.142 Microbiology</td>
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<td>General Studies Elective</td>
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<td>1½</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>11½</strong></td>
<td><strong>13½</strong></td>
</tr>
</tbody>
</table>

### 307 Food Technology BSc(Tech) Course

**Full-time/Part-time Study**

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

Students enrolling in the Food Technology BSc(Tech) course may reduce the time required for completion by undertaking the following program of combined part-time/full-time study:

- **Stage 1** Part-time (as for BSc(Tech) course above)
- **Stage 2** Part-time (as for BSc(Tech) course above)
- **Stage 3A** Full-time (as for second year of full-time BSc course above)
- **Stage 4A** Full-time (as for third year of full-time BSc course above)
- **Stage 5A** Part-time (a program of 6-9 hours per week selected from undergraduate subjects on the advice of the Head of the School).

### School of Chemical Technology

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 three years of industrial training concurrently with their University work.

Department of Industrial Chemistry

The courses in Industrial Chemistry are concerned with the study of the development, manufacture and use of inorganic and organic industrial chemicals and macromolecules—that special class of materials comprising surface coatings, plastics, elastomers and adhesives. Graduates from these courses are expected to play an effective role in research and development, production control, quality control and technical sales and service.

Arrangements have been made with the University of Wollongong for students who have completed a specified program to be admitted with advanced standing to Year 3 of the Industrial Chemistry course at the University of New South Wales.

Department of Ceramic Engineering

The Department of Ceramic Engineering offers courses designed to provide scientists and engineers fitted for service in industries and organizations concerned with the development, manufacture and use of materials in the fields of: whitewares, structural ceramic products, high-temperature materials, electrical ceramics, glass, ceramic surface coatings, abrasives, cermets and nuclear ceramics. Graduates from these courses would find employment in the general field of ceramics in such capacities as ceramist or ceramic engineer on research and development, production control, quality control, product evaluation or technical sales and service.

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 Ceramic Engineering course at the University of New South Wales.

Department of Polymer Science

The Department of Polymer Science provides instruction in polymer science in the full-time and part-time courses in Industrial Chemistry. These subjects provide a sound treatment of the principles of polymer chemistry and polymer physics, giving Industrial Chemistry students a familiarity with the surface coatings, plastics and rubber industries.

310 Industrial Chemistry—Full-time Course

Bachelor of Science

BSc

Year 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.001</td>
<td>Physics I</td>
<td>6</td>
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<tr>
<td>2.001</td>
<td>Chemistry I</td>
<td>6</td>
</tr>
<tr>
<td>10.001</td>
<td>Mathematics I or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Higher Mathematics I</td>
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</tr>
<tr>
<td>Plus one of:</td>
<td>Engineering A† and</td>
<td>5</td>
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<td></td>
<td>Engineering C†</td>
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<tr>
<td>5.010</td>
<td>Biology of Mankind* and</td>
<td>6</td>
</tr>
<tr>
<td>17.021</td>
<td>Comparative Functional Biology*</td>
<td>6</td>
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<tr>
<td>25.011</td>
<td>Geology I</td>
<td>6</td>
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* One session only.
† Chemical Technology students take Introduction to Systems and Computers in 5.030 and Materials in 5.010.

Year 2

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<th>Course Name</th>
<th>Hours per week</th>
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<tr>
<td>1.212B</td>
<td>Physics (Electronics)</td>
<td>3</td>
</tr>
<tr>
<td>2.002A</td>
<td>Physical Chemistry</td>
<td>6</td>
</tr>
<tr>
<td>2.042C</td>
<td>Inorganic Chemistry</td>
<td>0</td>
</tr>
<tr>
<td>2.002B</td>
<td>Organic Chemistry</td>
<td>1½</td>
</tr>
<tr>
<td>10.031</td>
<td>Mathematics</td>
<td>2</td>
</tr>
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<td>10.331</td>
<td>Statistics SS</td>
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<td>22.112</td>
<td>Chemical Process Equipment</td>
<td>1</td>
</tr>
<tr>
<td>22.122</td>
<td>Instrumental Analysis</td>
<td>3</td>
</tr>
<tr>
<td>22.132</td>
<td>Industrial Chemistry</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Calculations</td>
<td></td>
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<tr>
<td></td>
<td>General Studies Elective</td>
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<td>S2</td>
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Year 3*

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<td>3.111</td>
<td>Chemical Engineering</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Principles I</td>
<td>3</td>
</tr>
<tr>
<td>22.113</td>
<td>Industrial Chemistry Processes</td>
<td>3½†</td>
</tr>
<tr>
<td>22.123</td>
<td>Chemical Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>and Kinetics</td>
<td>3</td>
</tr>
<tr>
<td>22.133</td>
<td>Data Processing</td>
<td>3</td>
</tr>
<tr>
<td>22.153</td>
<td>Material and Energy Balances</td>
<td>3</td>
</tr>
<tr>
<td>22.163</td>
<td>Instrumentation and Process</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Control I</td>
<td></td>
</tr>
<tr>
<td>22.303</td>
<td>Polymer Science</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Two General Studies Electives</td>
<td>3</td>
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<table>
<thead>
<tr>
<th></th>
<th>Hours per week</th>
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<tbody>
<tr>
<td></td>
<td>25½</td>
</tr>
<tr>
<td></td>
<td>23½</td>
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</tbody>
</table>

* Students who have completed a specified program at the University of Wollongong are admitted with advanced standing to Year 3 at this University.
† Laboratories operate for 4 hour periods in alternate weeks.
§ Laboratories operate for 3 hour periods in alternate weeks.
### Course Outlines

#### Year 4

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
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<tr>
<td>18.121 Production Management</td>
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<td>3</td>
<td>3</td>
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<tr>
<td>22.114 Processes</td>
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<td>2</td>
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</tr>
<tr>
<td>22.124 Applied Kinetics</td>
<td>3</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>22.134 Applied Thermodynamics</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>22.154 Process Simulation</td>
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<td>4</td>
<td></td>
</tr>
<tr>
<td>22.164 Instrumentation and Process Control II</td>
<td>5</td>
<td>0</td>
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<tr>
<td>22.174 Seminars</td>
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<td>3</td>
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<td>22.184 Process Analysis</td>
<td>1</td>
<td>2</td>
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<tr>
<td>22.194 Project</td>
<td>6</td>
<td>8</td>
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<tr>
<td>General Studies Advanced Elective</td>
<td>1½</td>
<td>1½</td>
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<tr>
<td></td>
<td></td>
<td>24½</td>
<td>23½</td>
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</table>

With the approval of the Head of School, students may substitute either 22.314 Polymer Chemistry and 22.324 Physical Chemistry of Polymers II or 22.334 Polymer Physics II for 22.114 Processes.

### 311 Industrial Chemistry—Part-time Course

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

#### Stages 1 and 2*

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
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<tbody>
<tr>
<td>1.001 Physics I</td>
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<tr>
<td>2.001 Chemistry I</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.001 Mathematics I or</td>
<td>6</td>
<td></td>
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<tr>
<td>10.011 Higher Mathematics I†</td>
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Plus one of:

<table>
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<th>Course</th>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
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<tbody>
<tr>
<td>5.010 Engineering A‡§ and</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.030 Engineering C‡§</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.011 Biology of Mankind‡§ and</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.021 Comparative Functional Biology†</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.011 Geology I</td>
<td>6</td>
<td></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).
† There are no evening lectures in this subject.
‡ One session only.
§ Chemical Technology students take Introduction to Systems and Computers in 5.030 and Materials in 5.010.

### Stage 4

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
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<th>S2</th>
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<tbody>
<tr>
<td>2.002B Organic Chemistry</td>
<td>6</td>
<td>0</td>
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<tr>
<td>2.042C Inorganic Chemistry</td>
<td>0</td>
<td>6</td>
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</tr>
<tr>
<td>22.122 Instrumental Analysis</td>
<td>3</td>
<td>3</td>
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<tr>
<td>22.132 Industrial Chemistry Calculations</td>
<td>1</td>
<td>1</td>
<td></td>
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<tr>
<td>General Studies Elective</td>
<td>1½</td>
<td>1½</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>11½</td>
<td>11½</td>
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### Stage 5

<table>
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<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
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<tbody>
<tr>
<td>3.111 Chemical Engineering Principles I</td>
<td>2</td>
<td>3</td>
<td></td>
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<tr>
<td>22.113 Industrial Chemistry Processes</td>
<td>3½ †</td>
<td>3½ †</td>
<td></td>
</tr>
<tr>
<td>22.153 Material and Energy Balances</td>
<td>3</td>
<td>0</td>
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<tr>
<td>22.303 Polymer Science</td>
<td>2</td>
<td>4</td>
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</table>

### 302 Ceramic Engineering—Full-time Course

**Bachelor of Science**  
**BSc**

#### Year 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
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<tbody>
<tr>
<td>1.001 Physics I</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>2.001 Chemistry I</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>5.010 Engineering A‡§ and</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.030 Engineering C‡§</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.031 Mathematics I or</td>
<td>5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>10.011 Higher Mathematics I†</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.231 Introductory Ceramic Engineering‡</td>
<td>6</td>
<td></td>
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<tr>
<td></td>
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<td>13½</td>
<td>11½</td>
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</table>

* Laboratories operate for 4 hour periods in alternate weeks.

### Stage 6

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
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</thead>
<tbody>
<tr>
<td>2.003B Organic Chemistry</td>
<td>6</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>22.123 Chemical Thermodynamics and Kinetics</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>22.133 Data Processing</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>22.163 Instrumentation and Process Control</td>
<td>0</td>
<td>3*</td>
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</tr>
<tr>
<td>General Studies Elective</td>
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<td>1½</td>
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<tr>
<td></td>
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<td>10½</td>
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* Laboratories operate for 3 hour periods in alternate weeks.
Applied Science

Year 3

<table>
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<tr>
<th>Subject</th>
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<tbody>
<tr>
<td>Chemical Engineering Principles I</td>
<td>2</td>
<td>3</td>
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<tr>
<td>Fuel Engineering I</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Part 2, Mineral Process Engineering</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Chemical Thermodynamics</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Material and Energy Balances</td>
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<td>Chemical Ceramics</td>
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<td>6</td>
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<td>Ceramic Process Principles</td>
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<td>Mineralogy</td>
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<td>Two General Study Electives</td>
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| Total Hpw                                    | 26 | 22 |

* Students who have completed a specified program at the University of Newcastle or at the University of Wollongong will be admitted with advanced standing to Year 3 at this University.

Year 4

<table>
<thead>
<tr>
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<tbody>
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<tr>
<td>Instrumentation and Process Control</td>
<td>8 0</td>
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<td>Physical Ceramics</td>
<td>6 6</td>
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<td>Ceramic Engineering</td>
<td>4 4</td>
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<td>Project</td>
<td>3 12</td>
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<td>General Studies Advanced Elective</td>
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<tr>
<td>General Studies Elective</td>
<td>1 1/2</td>
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<tr>
<td>Total Hpw</td>
<td>24 1/2</td>
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<tr>
<td>Total Hpw</td>
<td>23 1/2</td>
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</table>

303 Ceramics—Part-time Course

Bachelor of Science (Technology) BSc(Tech)

Stages 1 and 2

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>Physics I</td>
<td>6</td>
</tr>
<tr>
<td>Chemistry I</td>
<td>6</td>
</tr>
<tr>
<td>Engineering A**§</td>
<td>5</td>
</tr>
<tr>
<td>Engineering C***§</td>
<td>6</td>
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<tr>
<td>Mathematics I or</td>
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<tr>
<td>Higher Mathematics †</td>
<td>6</td>
</tr>
<tr>
<td>Introductory Ceramic Engineering ‡</td>
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</tr>
</tbody>
</table>

* Two subjects are taken in the first year and the other two in the second year (as directed).
** One session only.
§ Chemical Technology students take Introduction to Systems and Computers in 5.030 and Materials in 5.010.
† There will be no evening lectures in this subject.
‡ A series of 10 one hour lectures given in Session 2.

Stage 3

<table>
<thead>
<tr>
<th>Subject</th>
<th>S1</th>
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<td>Physics (Electronics)</td>
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<tr>
<td>Physics (Introduction to Solids)</td>
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</tr>
<tr>
<td>Physical Chemistry</td>
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<td>Mathematics</td>
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Stage 4

<table>
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<tr>
<td>Inorganic Chemistry</td>
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<tr>
<td>Analytical Chemistry</td>
<td>6 0</td>
</tr>
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<td>Materials and Structures General Studies Elective</td>
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| Total Hpw                                    | 10 1/2|
| Total Hpw                                    | 10 1/2|

Stage 5

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<td>Chemical Engineering Principles I</td>
<td>2 3</td>
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<tr>
<td>Part 2, Mineral Process Engineering</td>
<td>2 0</td>
</tr>
<tr>
<td>Material and Energy Balances</td>
<td>3 0</td>
</tr>
<tr>
<td>Ceramic Process Principles</td>
<td>4 4</td>
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<tr>
<td>Ceramic Engineering I</td>
<td>1 1</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>1 1/2</td>
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</tbody>
</table>

| Total Hpw                                    | 13 1/2|
| Total Hpw                                    | 9 1/2|

Stage 6

<table>
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<tr>
<th>Subject</th>
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<tbody>
<tr>
<td>Fuel Engineering I</td>
<td>2 2</td>
</tr>
<tr>
<td>Chemical Thermodynamics</td>
<td>3 0</td>
</tr>
<tr>
<td>Chemical Ceramics</td>
<td>4 6</td>
</tr>
<tr>
<td>Mineralogy</td>
<td>2 2</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>1 1/2</td>
</tr>
</tbody>
</table>

| Total Hpw                                    | 12 1/2|
| Total Hpw                                    | 11 1/2|

School of Geography

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 in northern Australia, and economic geographers are engaged as regional planners and market researchers.

Applied Geography—Full-time Courses Bachelor of Science

The School offers three four-year full-time courses leading to the degree of Bachelor of Science, which aim to train professional geographers for entry into applied fields. There are elective specializations in biogeography and economic geography, with emphasis on urban geography, or geomorphology and pedology. 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. It is recommended that all students spend a period of four to six weeks with organizations concerned with the investigation and planned use of resources etcetera.

301
Applied Geography—Full-time Course
Bachelor of Science
BSc

Biogeography and Climatology

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
</tr>
<tr>
<td>2.001</td>
<td>Chemistry I</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>10.021</td>
<td>Mathematics IT</td>
</tr>
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<td>17.011</td>
<td>Biology of Mankind</td>
</tr>
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<td>17.021</td>
<td>Comparative Functional Biology</td>
</tr>
<tr>
<td>27.001</td>
<td>Applied Physical Geography†</td>
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Total: 24

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

Year 2

<table>
<thead>
<tr>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
</tr>
<tr>
<td>6</td>
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Year 3

<table>
<thead>
<tr>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
</tr>
<tr>
<td>2½</td>
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Year 4

<table>
<thead>
<tr>
<th>Hours per week</th>
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</thead>
<tbody>
<tr>
<td>S1</td>
</tr>
<tr>
<td>6</td>
</tr>
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</table>

Course Outlines

Geomorphology and Pedology
For students enrolled for the first time prior to 1974.

<table>
<thead>
<tr>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
</tr>
<tr>
<td>6</td>
</tr>
</tbody>
</table>

Geomorphology and Pedology
For students enrolled for the first time in 1974 and thereafter.

<table>
<thead>
<tr>
<th>Year 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
</tr>
<tr>
<td>6</td>
</tr>
</tbody>
</table>

Year 2

<table>
<thead>
<tr>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
</tr>
<tr>
<td>6</td>
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</tbody>
</table>

Year 3

<table>
<thead>
<tr>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
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<tr>
<td>5½</td>
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</tbody>
</table>

Year 4

<table>
<thead>
<tr>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
</tr>
<tr>
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</tr>
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Course Outlines

Geomorphology and Pedology
For students enrolled for the first time prior to 1974.

<table>
<thead>
<tr>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
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Geomorphology and Pedology
For students enrolled for the first time in 1974 and thereafter.

<table>
<thead>
<tr>
<th>Year 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
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<tr>
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Year 2

<table>
<thead>
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</thead>
<tbody>
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<tr>
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Year 3

<table>
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</thead>
<tbody>
<tr>
<td>S1</td>
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<tr>
<td>5½</td>
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</tbody>
</table>

Year 4

<table>
<thead>
<tr>
<th>Hours per week</th>
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</thead>
<tbody>
<tr>
<td>S1</td>
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<tr>
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Course Outlines

Geomorphology and Pedology
For students enrolled for the first time prior to 1974.

<table>
<thead>
<tr>
<th>Year 4</th>
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</thead>
<tbody>
<tr>
<td>S1</td>
</tr>
<tr>
<td>6</td>
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</tbody>
</table>

Geomorphology and Pedology
For students enrolled for the first time in 1974 and thereafter.

<table>
<thead>
<tr>
<th>Year 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
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<tr>
<td>6</td>
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</tbody>
</table>

Year 2

<table>
<thead>
<tr>
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<tbody>
<tr>
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Year 3

<table>
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<tr>
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<tbody>
<tr>
<td>S1</td>
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<tr>
<td>5½</td>
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Year 4

<table>
<thead>
<tr>
<th>Hours per week</th>
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</thead>
<tbody>
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<td>S1</td>
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<tr>
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</tbody>
</table>

Course Outlines

Geomorphology and Pedology
For students enrolled for the first time prior to 1974.

<table>
<thead>
<tr>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
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<tr>
<td>6</td>
</tr>
</tbody>
</table>

Geomorphology and Pedology
For students enrolled for the first time in 1974 and thereafter.

<table>
<thead>
<tr>
<th>Year 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
</tr>
<tr>
<td>6</td>
</tr>
</tbody>
</table>

Year 2

<table>
<thead>
<tr>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
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<tr>
<td>6</td>
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</table>

Year 3

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>S1</td>
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<tr>
<td>5½</td>
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</table>

Year 4

<table>
<thead>
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<tbody>
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<td>S1</td>
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<tr>
<td>0</td>
</tr>
</tbody>
</table>

Course Outlines

Geomorphology and Pedology
For students enrolled for the first time prior to 1974.

<table>
<thead>
<tr>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
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<tr>
<td>6</td>
</tr>
</tbody>
</table>

Geomorphology and Pedology
For students enrolled for the first time in 1974 and thereafter.
### Year 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Hpw</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geology for Geomorphologists and Pedologists</td>
<td>S1</td>
</tr>
<tr>
<td>Geology for Pedologists</td>
<td>S2</td>
</tr>
<tr>
<td>Climatology</td>
<td>4</td>
</tr>
<tr>
<td>Biogeography*</td>
<td>0</td>
</tr>
<tr>
<td>Geomorphology*</td>
<td>4½</td>
</tr>
<tr>
<td>Pedology*</td>
<td>0</td>
</tr>
<tr>
<td>Advanced Methods in Physical Geography</td>
<td>2½</td>
</tr>
<tr>
<td>General Studies Advanced Elective</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total:** 20½ 17½

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

### Year 4

<table>
<thead>
<tr>
<th>Course</th>
<th>Hpw</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Geomorphology*</td>
<td>7</td>
</tr>
<tr>
<td>Advanced Pedology*</td>
<td>0</td>
</tr>
<tr>
<td>Project (Geomorphology and Pedology)</td>
<td>7</td>
</tr>
<tr>
<td>General Studies Advanced Elective</td>
<td>1½</td>
</tr>
</tbody>
</table>

**Total:** 17½ 17½

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

### Applied Economic Geography

#### Year 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics I or</td>
<td>6</td>
</tr>
<tr>
<td>Higher Mathematics I or</td>
<td></td>
</tr>
<tr>
<td>Mathematics II</td>
<td></td>
</tr>
<tr>
<td>Economics I A and</td>
<td>3/4</td>
</tr>
<tr>
<td>Economics II</td>
<td></td>
</tr>
<tr>
<td>Sociology I A and</td>
<td>3</td>
</tr>
<tr>
<td>Sociology II</td>
<td></td>
</tr>
<tr>
<td>Applied Economic Geography I (Part 1)†</td>
<td></td>
</tr>
</tbody>
</table>

**Total:** 18/19

† Two days' field work, equivalent to 16 tutorial hours, is an essential part of the subject.

### 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

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, Mt. Morgan, Gladstone, Port Pirie, Whyalla, Kwinana, Kalgoorlie or Pilbara; or in the metal manufacturing plants, including the automobile, aircraft, ship-building 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. The two courses offered at present are a full-time course for the degree of Bachelor of Science (pass or honours) and a part-time course leading to the degree of Bachelor of Science (Technology). A new full-time course leading to the degree of Bachelor of Engineering has been approved. Students enrolled in 1975 in the Bachelor of Science course with the engineering option are able to transfer, if they so desire, to Year 2 of the Bachelor of Engineering course, with full credit for subjects passed. The aim of this 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 Australian 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.

312 Metallurgy—Full-time Course

Bachelor of Science

BSc

Students in this course attend the University for twenty-eight weeks over two sessions from March to November (excluding examinations and recesses).

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

Year 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.001</td>
<td>Physics I</td>
<td>6</td>
</tr>
<tr>
<td>2.001</td>
<td>Chemistry I</td>
<td>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</td>
<td>6</td>
</tr>
<tr>
<td>Plus one of:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.010</td>
<td>Engineering A and</td>
<td>6</td>
</tr>
<tr>
<td>5.030</td>
<td>Engineering C or</td>
<td></td>
</tr>
<tr>
<td>25.011</td>
<td>Geology I</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24</td>
</tr>
</tbody>
</table>

Old Course

For students who completed Year 1 before the beginning of Session 1, 1975.

Year 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.012</td>
<td>Metallurgy II</td>
<td>19</td>
</tr>
<tr>
<td>4.013</td>
<td>Mathematical Methods or</td>
<td>3</td>
</tr>
<tr>
<td>6.801</td>
<td>Electrical Engineering</td>
<td>3</td>
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<tr>
<td>Two General Studies Electives</td>
<td>3</td>
<td></td>
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<tr>
<td></td>
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Year 4

<table>
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<tr>
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<th>Course Title</th>
<th>Hours per Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.013</td>
<td>Metallurgy III*</td>
<td>18</td>
</tr>
<tr>
<td>4.021</td>
<td>Metallurgy Project†</td>
<td>5</td>
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General Studies Advanced Elective

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per Week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1½</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24½</td>
</tr>
</tbody>
</table>

* Session 2

† From Week 12 in Session 1

Project includes three weeks' laboratory work during Midyear Recess.
## Revised Course

For students who completed Year 1 in 1975.

<table>
<thead>
<tr>
<th>Year 2 (Operates from 1976)</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
</tr>
<tr>
<td>2.002A Physical Chemistry</td>
<td>6</td>
</tr>
<tr>
<td>4.302 Chemical and Extraction Metallurgy I</td>
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</tr>
<tr>
<td>4.402 Physical Metallurgy I</td>
<td>7</td>
</tr>
<tr>
<td>4.602 Metallurgical Engineering I</td>
<td>2</td>
</tr>
<tr>
<td>4.802 Metallurgical Physics</td>
<td>0</td>
</tr>
<tr>
<td>10.031 Mathematics II</td>
<td>2</td>
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<tr>
<td>25.201 Mineralogy</td>
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<tr>
<td>General Elective Studies</td>
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<tr>
<td></td>
<td>25½</td>
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</table>

<table>
<thead>
<tr>
<th>Year 3 (Operates after 1976)</th>
<th>Hours per week</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
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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>4.613 Metallurgical Engineering IIA</td>
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<tr>
<td>4.703 Materials Science</td>
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<tr>
<td>4.813 Mathematical Methods or</td>
<td>3</td>
</tr>
<tr>
<td>6.801 Electrical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>7.023 Mineral Process Engineering Part 2</td>
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</tr>
<tr>
<td>Two General Studies Electives</td>
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</tr>
<tr>
<td></td>
<td>26</td>
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</table>

<table>
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<tr>
<th>Year 4 (Operates after 1976)</th>
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<tbody>
<tr>
<td></td>
<td>S1</td>
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<tr>
<td>4.024 Metallurgy Project*</td>
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<td>4.054 Metallurgy Seminar</td>
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<tr>
<td>4.314 Chemical and Extraction Metallurgy IIA</td>
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<tr>
<td>4.324 Chemical and Extraction Metallurgy IIB</td>
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<tr>
<td>4.414 Physical Metallurgy IIIA</td>
<td>4½</td>
</tr>
<tr>
<td>4.424 Physical Metallurgy IIIB</td>
<td>3</td>
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<tr>
<td>4.504 Mechanical and Industrial Metallurgy</td>
<td>3</td>
</tr>
<tr>
<td>General Studies Advanced Elective</td>
<td>1½</td>
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<tr>
<td></td>
<td>24½</td>
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</tbody>
</table>

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

### 318 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.

---

* Project includes three weeks' laboratory work during Midyear Recess.
Metallurgy—Part-time Course

Bachelor of Science (Technology) BSc(Tech)

The part-time course extends over six years of two sessions each. Students are required to obtain at least three years' approved experience in a metallurgical industry or research establishment concurrently with studies.

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

Modifications to the full-time BSc course in Metallurgy will necessitate consequential changes in the part-time courses available in the School. The course which is set out below is the present course and it will be revised during 1976. Students who enrolled in Stages 1 or 2 in 1975 may be required to transfer, with advanced standing, to the revised BSc course or the new BE course in 1976.

Stages 1 and 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.001</td>
<td>Physics I</td>
<td>6</td>
</tr>
<tr>
<td>2.001</td>
<td>Chemistry I</td>
<td>6</td>
</tr>
<tr>
<td>10.001</td>
<td>Mathematics I or Higher Mathematics I†</td>
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</tr>
<tr>
<td>25.011</td>
<td>Geology I</td>
<td>6</td>
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Plus one of:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.010</td>
<td>Engineering A and C or</td>
</tr>
<tr>
<td>5.030</td>
<td>Engineering C</td>
</tr>
</tbody>
</table>

25.011 Geology I

* Two of the first four subjects listed are taken in first year and the other two in second year.
† There are no evening lectures in this subject.
‡ This course will be revised in 1976.

Stage 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.002A</td>
<td>Physical Chemistry</td>
<td>6</td>
</tr>
<tr>
<td>4.802</td>
<td>Metallurgical Physics</td>
<td>0</td>
</tr>
<tr>
<td>10.031</td>
<td>Mathematics</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Two General Studies Electives</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.011</td>
<td>Metallurgy I</td>
<td>11</td>
</tr>
<tr>
<td>25.201</td>
<td>Mineralogy or</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*†</td>
<td></td>
</tr>
</tbody>
</table>

Stage 4

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.012</td>
<td>Metallurgy IIA*</td>
<td>9</td>
</tr>
<tr>
<td>4.813</td>
<td>Mathematical Methods or</td>
<td>3</td>
</tr>
<tr>
<td>6.801</td>
<td>Electrical Engineering</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
<td>1½</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>13½</td>
</tr>
</tbody>
</table>

* One session only.
† Part only.
‡ This course is subject to revision.

School of Mining Engineering

The School of Mining Engineering offers a full-time course in Mining Engineering leading to the degree of Bachelor of Engineering (pass or honours).

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

Part-time courses are conducted at the W. S. & L. B. Robinson University College, Broken Hill—in Mining Engineering leading to the BSc(Eng) and in Mineral Processing leading to the BSc(Tech)*.

The courses within the School prepare graduates for employment in the mineral industries and in research institutions.

* From 1975 the BSc(Eng) course will be replaced by the BE course over seven stages, consisting of a combination of full-time and part-time studies. Students already enrolled in the BSc(Eng) course will be allowed to complete it.
Since 1850 the mining industry has been a pioneering force in the development of Australia. However the problems of today are complex and require great technical skill.

The mining industry will become, because of its rate of growth, a greater influence in the development of this and neighbouring countries. Extensive and successful prospecting is taking place, particularly in those areas which in the past received little attention, and hidden, sub-surface deposits are being discovered. Following the discovery of a promising deposit there is a period of testing, proving and assessment followed by a period of development and construction. Finally, there is the production period with which is associated some extension of activities which include smelting and the establishment of new industries.

### 314 Mining Engineering—Full-time Course

**Bachelor of Engineering (BE)**

The first two years of the course are similar to the first and second years of the Civil Engineering course. The third year introduces Mining Engineering and Mineral Processing. The fourth year program is concerned with the professional Mining Engineering subjects.

The aim is to give students a thorough foundation in mining engineering and so permit them to enter "quarrying", "coal mining", "metaliferous mining" or the "petroleum industry", and to be employed in any of the phases of these industries, ranging from exploration to production in a technical or managerial role.

To cater for the varied needs of the industry and to develop the special talents of individual students, it is possible in the final year of the course to do advanced work in either Mining Engineering or Mineral Processing. In addition, during the final year of the course students are given a project linked with the mineral industry elective for which a thesis must be submitted.

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 the school, and in the final year project.

In the undergraduate course it is compulsory for students to gain practical experience in the mineral industry during successive long recesses. The minimum requirement of 100 days is to be completed prior to entering Year 4. Students are advised, however, to gain mining experience in excess of the minimum specification in order to facilitate fulfilment of experience requirements for the State Mines Department, Mine Managers, and the Mines Inspection Act No. 75, 1901 respectively.

The industrial training requirement should be completed in the recesses following completion of academic Years 1, 2 and 3.

After graduation it is normal for mining engineers to obtain the above-mentioned statutory certificate of competency from one of the State Government Departments of Mines. Graduates in Mining Engineering are examined principally in the applications of the above-mentioned Acts.

It is possible for students to undertake the First and Second Years of the BE course on a part-time basis.

#### Years of the BE course on a part-time basis.

<table>
<thead>
<tr>
<th>Year</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

---

**Note:** One half of the students take the subjects 4.941, 25.101 and 5.611 in Session 1 and the subjects 8.250 and 8.172 in Session 2. The other half take these subjects in reverse order of sessions.

---

**Year 1**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.001 Physics I</td>
<td>S1 6</td>
</tr>
<tr>
<td>2.001 Chemistry I or</td>
<td>S2 6</td>
</tr>
<tr>
<td>2.021 Chemistry IE**</td>
<td>6 6</td>
</tr>
<tr>
<td>5.010 Engineering IA*</td>
<td>6 0</td>
</tr>
<tr>
<td>5.020 Engineering IB**</td>
<td>0 6</td>
</tr>
<tr>
<td>5.030 Engineering IC*</td>
<td>0 6</td>
</tr>
<tr>
<td>10.001 Mathematics I or</td>
<td>6 6</td>
</tr>
<tr>
<td>10.011 Higher Mathematics</td>
<td></td>
</tr>
</tbody>
</table>

**Year 2**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.941 Materials</td>
<td>1</td>
</tr>
<tr>
<td>5.611 Fluid Mechanics/Thermodynamics I</td>
<td>3</td>
</tr>
<tr>
<td>6.801 Electrical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>7.012 Mineral Resources</td>
<td>1</td>
</tr>
<tr>
<td>8.172 Mechanics of Solids II*</td>
<td>4</td>
</tr>
<tr>
<td>8.250 Properties of Materials</td>
<td>2</td>
</tr>
<tr>
<td>10.022 Engineering Mathematics II</td>
<td>4</td>
</tr>
<tr>
<td>25.101 Geology for Engineers†§</td>
<td>4</td>
</tr>
<tr>
<td>29.441 Engineering Surveying†</td>
<td>6</td>
</tr>
<tr>
<td>28.491 Survey Camp‡</td>
<td>0</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>1½</td>
</tr>
</tbody>
</table>

* One session only. Students will take this subject in either Session 1 or 2.

** When 5.020 Engineering IB is included with Engineering IA and IC then 2.021 Chemistry IE will be taken.

---

**Year 3**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week for Session 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.023 Mining and Mineral Process Engineering—Parts 1 and 2</td>
<td>4</td>
</tr>
<tr>
<td>7.113 Mining Engineering I</td>
<td>8</td>
</tr>
<tr>
<td>7.213 Mine Surveying and Control Engineering</td>
<td>2</td>
</tr>
<tr>
<td>25.102 Geology for Engineers II*</td>
<td>8</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>1½</td>
</tr>
</tbody>
</table>

**Year 4**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week for Session 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Geology excursion is conducted at the end of the session.</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** After Session 1 students are required to obtain industrial experience. They write a report on this which is assessed first by their employers and then by the School. The range of experience obtained and the report submitted is considered when grading degrees at the end of the course.
### Year 4

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>Hpw</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.124 Mining Engineering II*</td>
<td>6 6</td>
<td></td>
</tr>
<tr>
<td>7.134 Mining Engineering III or</td>
<td>4 0</td>
<td></td>
</tr>
<tr>
<td>7.324 Mineral Processing II</td>
<td>6 0</td>
<td></td>
</tr>
<tr>
<td>7.144 Mining Engineering IV or</td>
<td>0 4</td>
<td></td>
</tr>
<tr>
<td>7.334 Mineral Processing III</td>
<td>0 2</td>
<td></td>
</tr>
<tr>
<td>7.224 Mine Valuation</td>
<td>2 0</td>
<td></td>
</tr>
<tr>
<td>7.234 Mineral Economics</td>
<td>2 2</td>
<td></td>
</tr>
<tr>
<td>7.314 Mineral Processing I*</td>
<td>6 6</td>
<td></td>
</tr>
<tr>
<td>7.414 Mineral Industry Elective Project</td>
<td>5 5 3 3</td>
<td>26 26</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Examined in two parts.

† An additional General Studies Elective may be included in Year 4.

### Stage 4

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>Hpw</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.611 Fluid Mechanics/ Thermodynamics</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>7.023R Mining and Mineral Process Engineering, Parts 1 and 2*</td>
<td>2 1½</td>
<td></td>
</tr>
<tr>
<td>25.101 Geology for Engineers‡</td>
<td>2 3</td>
<td></td>
</tr>
<tr>
<td>29.441 Engineering Surveying†</td>
<td>3 12½</td>
<td></td>
</tr>
</tbody>
</table>

* Consists of 44 lectures and also four visits, each of three hours, to mines or mineral processing plants.

‡ Two short Geology excursions are an essential part of the course.

† Includes 42 hours of practical work.

### 421

**Mining Engineering—Part-time Courses**

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

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

The School of Mining Engineering offers a part-time course in Mining Engineering, leading to the degree of Bachelor of Science (Engineering). From 1975 the BSc(Eng) course will be replaced by the BE course over seven stages, consisting of a combination of full-time and part-time studies. Students already enrolled in the BSc(Eng) course will be allowed to complete it.

### Stages 1 and 2

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>Hpw</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.001 Physics I</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>2.001 Chemistry I</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>2.021 Chemistry IE</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>5.010 Engineering IA†</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>5.020 Engineering IB</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>5.030 Engineering IC†</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>10.001 Mathematics I or</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>10.011 Higher Mathematics I</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

† One session only. Students will take this subject in either Session 1 or 2.

### Stage 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>Hpw</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.941 Materials</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7.012R Mineral Resources—Parts 1 and 2</td>
<td>1 1</td>
<td></td>
</tr>
<tr>
<td>8.151 Mechanics of Solids</td>
<td>3 3</td>
<td></td>
</tr>
<tr>
<td>8.250 Properties of Materials</td>
<td>0 4</td>
<td></td>
</tr>
<tr>
<td>10.022 Engineering Mathematics II</td>
<td>4 4</td>
<td></td>
</tr>
</tbody>
</table>

10 12

### Stage 5

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>Hpw</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.801 Electrical Engineering</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>7.113R Mining Engineering I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>7.213R Mine Surveying and Control Engineering</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>25.1021 Geology for Mining Engineers*</td>
<td>4 1½</td>
<td></td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>1½</td>
<td></td>
</tr>
</tbody>
</table>

* Geology excursion will be conducted during the year.

### Stage 6

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>Hpw</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.124R Mining Engineering II*</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>7.315R Mineral Processing for Mining Engineers</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>7.414R Mineral Industry Elective Project†</td>
<td>2 1½</td>
<td></td>
</tr>
<tr>
<td>General Studies Elective</td>
<td>1½</td>
<td></td>
</tr>
</tbody>
</table>

† Project for an award with merit is more advanced than that required for the award of the pass degree.

### 422

**Mineral Processing—Part-Time Course**

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

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

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.

From 1975 the BSc(Tech) course will be replaced by the BE course over seven stages, consisting of a combination of full-time and part-time studies. Students already enrolled in the BSc(Tech) course will be allowed to complete it.
### Applied Science

<table>
<thead>
<tr>
<th>Stages 1 and 2</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
</tr>
<tr>
<td>1.001 Physics I</td>
<td>6</td>
</tr>
<tr>
<td>2.001 Chemistry I</td>
<td>6</td>
</tr>
<tr>
<td>2.021 Chemistry IE</td>
<td>6</td>
</tr>
<tr>
<td>5.010 Engineering IA†</td>
<td>6</td>
</tr>
<tr>
<td>5.020 Engineering IB</td>
<td>6</td>
</tr>
<tr>
<td>5.030 Engineering IC†</td>
<td>5</td>
</tr>
<tr>
<td>10.001 Mathematics I or</td>
<td></td>
</tr>
<tr>
<td>10.011 Higher Mathematics I</td>
<td>6</td>
</tr>
</tbody>
</table>

† One session only. Students take this subject in either Session 1 or 2.

### School of Textile Technology

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 required to undertake a minimum of eight weeks' industrial training during the long recesses between Years 2 and 3, and 3 and 4.

#### Stage 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.002A</td>
<td>Physical Chemistry I</td>
<td>6</td>
</tr>
<tr>
<td>4.941</td>
<td>Materials</td>
<td>2</td>
</tr>
<tr>
<td>8.250</td>
<td>Properties of Materials</td>
<td>4</td>
</tr>
<tr>
<td>10.022</td>
<td>Engineering Mathematics II</td>
<td>4</td>
</tr>
</tbody>
</table>

#### Stage 4

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.022D</td>
<td>Analytical Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>7.023R</td>
<td>Mining and Mineral Process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Engineering—Parts 1 and 2*</td>
<td>2</td>
</tr>
<tr>
<td>10.331</td>
<td>Statistics SS</td>
<td>2</td>
</tr>
<tr>
<td>25.101</td>
<td>Geology for Engineers†</td>
<td>2</td>
</tr>
<tr>
<td>25.201</td>
<td>Mineralogy</td>
<td>2</td>
</tr>
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</table>

#### Stage 5

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.801</td>
<td>Electrical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>7.314R</td>
<td>Mineral Processing I—Parts 1 and 2</td>
<td>6</td>
</tr>
<tr>
<td>7.411</td>
<td>Fluid Mechanics</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
<td>1½</td>
</tr>
</tbody>
</table>

#### Stage 6

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.316R</td>
<td>Mineral Processing II</td>
<td>7</td>
</tr>
<tr>
<td>7.326R</td>
<td>Mineral Industry Processes, Parts 1 and 2</td>
<td>2</td>
</tr>
<tr>
<td>7.414R</td>
<td>Mineral Industry Elective Project†</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
<td>1½</td>
</tr>
</tbody>
</table>

#### Textile Technology—Full-time Course

<table>
<thead>
<tr>
<th>Year 1 (All courses)</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.001 Physics I or</td>
<td>6</td>
</tr>
<tr>
<td>1.011 Higher Physics I</td>
<td>6</td>
</tr>
<tr>
<td>2.001 Chemistry I</td>
<td>6</td>
</tr>
<tr>
<td>5.010 Engineering A and</td>
<td>6</td>
</tr>
<tr>
<td>5.030 Engineering C</td>
<td>6</td>
</tr>
<tr>
<td>10.001 Mathematics I or</td>
<td>6</td>
</tr>
<tr>
<td>10.011 Higher Mathematics I</td>
<td>6</td>
</tr>
</tbody>
</table>

† The Project for an award with merit is more advanced than that required for the award of the pass degree.
### Textile Chemistry

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.002A</td>
<td>Physical Chemistry</td>
<td>9</td>
</tr>
<tr>
<td>2.002B</td>
<td>Organic Chemistry</td>
<td>2</td>
</tr>
<tr>
<td>2.002D</td>
<td>Analytical Chemistry</td>
<td>2</td>
</tr>
<tr>
<td>10.031</td>
<td>Mathematics</td>
<td>8</td>
</tr>
<tr>
<td>10.331</td>
<td>Statistics SS</td>
<td>3</td>
</tr>
<tr>
<td>13.111</td>
<td>Textile Technology I</td>
<td>1½</td>
</tr>
<tr>
<td>13.211</td>
<td>Textile Science I</td>
<td>1½</td>
</tr>
<tr>
<td>General Studies Elective</td>
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</tr>
<tr>
<td>Hours Total</td>
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</tbody>
</table>

### Textile Engineering

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.020B</td>
<td>Engineering Mechanics II</td>
<td>4</td>
</tr>
<tr>
<td>5.311</td>
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</tr>
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**Course Outlines**

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**Textile Manufacture**

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Year 3

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* Not to include Economics or Psychology.

Year 4 (All courses)

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* Optional Subjects

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<td>14.602 Information Systems</td>
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 electives: 25

School of Wool and Pastoral Sciences

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 degree of Bachelor of Science (pass or honours). From 1972 the School provided the course in Wool and Pastoral Sciences (Education Option), previously offered under the title "Sheep and Wool Technology (Education Option)" within the then Board of Professional Studies. The purpose of the course is 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 Graduate Diploma in Wool and Pastoral Sciences. Research may also be undertaken for the degree 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 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.

Requirements for Industrial Training

Each student is required to complete satisfactorily twenty-four weeks' practical work on approved sheep properties, sixteen weeks of which work should be concurrent with the course. If a student has done practical work before entering the course, this may be taken into consideration in determining any further work required. Students in the Education Option are also required to obtain in Years 3 and 4 the equivalent of three hours per week classroom experience in Agricultural High Schools and/or the Department of Technical Education.

In order to obtain recognition of practical work carried out students shall:
1. Make application for the approval of the properties where they intend to carry out the practical work. Students should endeavour to obtain experience in the pastoral, sheep-wheat, and high rainfall zones;
2. At the conclusion of each period of work, produce certificates from employers stating periods of employment and reporting on the quality of the student's work;
3. Supply reports as hereunder:
   A On work carried out in the long vacation:
      1. monthly interim reports setting out briefly the nature of the work engaged in, with any notes of topical interest; and
      2. a final report on both the district and property, to be submitted within one month of resumption of lectures.
   B On work carried out in short vacations: a brief report to be submitted within one week of the resumption of the session.
C On work carried out for twenty-four weeks on a property or
properties:
1. Interim reports to be submitted every two months.
2. Final reports to be submitted by March 31 in the year of
resumption of studies. The nature of the interim and final reports
shall be as required for work carried out in the long vacation.

322
Wool and Pastoral Sciences—Full-time Course
Bachelor of Science
BSc

Year 1

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<td>Biology of Mankind†</td>
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<td>Comparative Functional Biology†</td>
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† One session only.
* Students wishing to specialize in Wool Science or Wool Technology may substitute 1.011 Higher Physics I for 1.001 Physics I or 27.001 Geography I.

Year 2

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Plus subjects providing at least 12 hours per week of lecture, tutorials and laboratory work in each session, selected from the following. The choice of subjects is to be approved by the Head of the School.

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<td>10.021</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.122</td>
<td>Livestock Production II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.123</td>
<td>Livestock Production III</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.311</td>
<td>Agricultural Economics I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.312</td>
<td>Agricultural Economics II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.313</td>
<td>Farm Management I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.314</td>
<td>Farm Management II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.316</td>
<td>Analysis of Rural Development Projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.061</td>
<td>Animal Physiology I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.121</td>
<td>Animal Physiology II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.122</td>
<td>Animal Physiology III</td>
<td></td>
<td></td>
</tr>
<tr>
<td>43.101</td>
<td>Plant Physiology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>58.061</td>
<td>Methods of Teaching*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>58.101</td>
<td>Introductory Microbiology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>58.401</td>
<td>Education IA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>58.402</td>
<td>Education IIA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**
1. Students may take either Geography I or Physics I.
2. Subjects in italics are compulsory.
3. Course requires yearly progression and apart from compulsory subjects, there are no co- or prerequisites.

321 Wool and Pastoral Sciences (Education Option)—Full-time Course

Bachelor of Science BSc

Years 1 and 2 of this course are the same as for the existing BSc degree course in Wool and Pastoral Sciences.

<table>
<thead>
<tr>
<th>Year 3</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S1</td>
</tr>
<tr>
<td>9.122</td>
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<td>9.123</td>
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</tr>
<tr>
<td>9.131</td>
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</tr>
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<td>9.311</td>
<td>2</td>
</tr>
<tr>
<td>9.313</td>
<td>2</td>
</tr>
<tr>
<td>9.801</td>
<td>2</td>
</tr>
<tr>
<td>44.101</td>
<td>3</td>
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<td>58.401</td>
<td>4</td>
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<tr>
<td>58.061</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>23</td>
</tr>
</tbody>
</table>

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

Qualifying Programs
(for admission to Higher Degree Candidature)

Students may only enrol in such programs after approval has been obtained from the relevant Higher Degree Committee. Unless advised to the contrary, successful applicants are required to attend for enrolment at the appropriate time and place as listed below. The letter offering a place must be taken to the enrolment centre.

Candidates who are continuing a qualifying program are required to attend for re-enrolment at the appropriate time and place as listed below.

Note: All qualifying students must lodge an authorized enrolment form with the Cashier on the day the enrolling officer signs the form. (See Enrolment Procedures earlier in this handbook.)

Friday 27 February
2.00 pm to 5.00 pm
6.00 pm to 8.00 pm
Office of the appropriate School

Higher Degree Research Programs

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

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

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

Masters and Graduate Diploma Courses

Note: All formal masters and graduate diploma students must lodge an authorized enrolment form with the Cashier on the day the enrolling officer signs the form. (See Enrolment Procedures earlier in this handbook.)

New Students
Students seeking admission to formal masters courses and graduate diploma courses are required to apply on the appropriate form and by the closing date specified for the particular course. Unless advised to the contrary successful applicants are required to attend for enrolment at the appropriate time and place as shown under Qualifying Programs. The letter offering a place must be taken to the enrolment centre.

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

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

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

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

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, Fuel Technology, Polymer Technology, Mining and Mineral Engineering and Wool Technology.

Courses leading to the degree of Master of Applied Science and to 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 in the Calendar. 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

802 Hydrogeology-Engineering Geology Graduate Course

Master of Applied Science MAppSc

The purpose of this course, which leads to the Master of Applied Science, is to train graduates who have a suitable background as specialist Hydrogeologists and Engineering Geologists. It is designed to provide a bridge between Civil Engineering and Geology for graduates who wish to study and work in the field of water resources or civil engineering geology.

The normal requirement for admission is completion of a four year degree course in Geology. Other graduates with suitable academic and professional attainments may be permitted to register.

The program may be completed in either one year on a full-time or two years on a part-time basis. The course consists of both subjects of Group A, one subject from Group B and two subjects from Group C.
Group A
25.034 Engineering Geology (Geomechanics)
25.403 Project

Group B
25.121 Engineering Geology
25.402 Hydrogeology
25.404 Environmental Geology

Group C
25.421 Foundation Geology
25.701 Subsurface Geology and Pollution Control

and either
27.901 Geomorphology for hydrologists

or
27.904 Geomorphology for engineering geologists
8.753 Soil Mechanics I
8.708 Finite Element Methods in Civil Engineering I

807 Applied Geophysics Graduate Course*

Master of Applied Science
MAppSc

The Master of Applied Science 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 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:
25.331 Applied Geophysics I
25.333 Applied Geophysics IIA
25.335 Applied Geophysics Project
Fifteen days' field tutorials and seminars are an integral part of the course.

* Not available in 1976.

809 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:

7.023 Mining and Mineral Process Engineering
25.014 Exploration Geophysics and Mathematical Geology
25.337 Geophysical Procedures
25.338 Computer Applications in Exploration Geology
25.339 Geology in Exploration
25.340 Geochemical Prospecting
25.341 Remote Sensing
7.001 Exploratory Drilling
25.343 Mineral Economics, Mining Law and Management
25.141 Advanced Engineering Geology or
4.121 Principles of Metal Extraction
25.000 Special Laboratory Project
25.344 Field and Laboratory Methods in Exploration
25.345 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.

Graduate Courses Specializing in:

800 Biological Process Engineering
801 Chemical Engineering
803 Food Technology
804 Environmental Pollution Control*
806 Fuel Technology
808 Industrial Pollution Control

Master of Applied Science
MAppSc

The MAppSc 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 and Fuel Technology; Biological Process Engineering and Food Technology.

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 courses specializing in Biological Process Engineering and Food Technology are primarily intended for graduates in Agriculture, Applied Science, and Science with principal

* For additional information see below.
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 in the Calendar), 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 given in Section D of the Calendar.

804 Environmental Pollution Control Graduate Course*

Master of Applied Science MAppSc

The graduate course in Environmental Pollution Control leads to 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.

### Hours per week

1. 3.170G Process Principles or Graduate Elective 2
2. 3.162G Urban Planning 1/2
   3.164G Medical Aspects 1
   3.166G Legislative Aspects 1
   27.902G Meteorological and Hydrological Principles 1
44.111 Microbiology 3
3. 3.163G Industrial Use and Re-use of Water 1 1/2
   3.242G Treatment and Utilization of Biological Effluents 2
   3.391G Atmospheric Pollution and Control 2
   3.396G Unit Operations in Waste Management 1 1/2
   Optional Elective(s) and 3

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

501 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 orientates students depending on their initial qualifications. The second year of the course contains more detailed instruction at a graduate level in Corrosion Theory and Prevention, together with suitable laboratory assignments.

### Year 1

3.170G Process Principles or 2
3.172G Corrosion Laboratory 2
3.171G Corrosion Technology I 3

### Hours per week

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.

### Hours per week

**Year 2**

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

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

### 502 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:

#### Hours per week

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.201 Food Technology I</td>
<td>1</td>
</tr>
<tr>
<td>3.211 Food Technology II</td>
<td>2</td>
</tr>
<tr>
<td>3.212 Food Technology III</td>
<td>2</td>
</tr>
<tr>
<td>3.213G Food Process Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>3.243G Food Technology Seminar</td>
<td>2</td>
</tr>
<tr>
<td>Electives*</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>18</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 the School. The hours for these electives must include at least four devoted to graduate subjects.

#### 503 Fuel Technology Graduate Diploma Course

#### Graduate Diploma GradDip

The Graduate Diploma Course in Fuel Technology has been designed to provide professional training and specialisation in fuel science and engineering for graduates in science, applied science or engineering who have not had previous training in this field.

Holders of the Graduate Diploma in Fuel Technology are exempted from the examination required for admission to corporate membership of the Institute of Fuel. Applicants holding an appropriate degree or equivalent qualification in science, applied science or engineering are eligible for admission to the course. They may also be required to undertake assignments or successfully complete examinations as directed by the Head of the School.

The Graduate Diploma in Fuel Technology (GradDip) is awarded on the successful completion of one year of full-time study (18 hours per week) or two years of part-time study (9 hours per week). The course is a blend of formal lectures and laboratory work at undergraduate and post-graduate levels.

#### Hours per week

**1. Introductory Stage (up to 9 hours per week)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.381 Principles of Fuel Technology</td>
<td>3</td>
</tr>
<tr>
<td>3.382 Combustion Engineering</td>
<td>3</td>
</tr>
<tr>
<td>3.383 Fuel Plant Evaluation and Assignments</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>

**2. Advanced Stage (up to 9 hours per week)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.390G Graduate Seminar</td>
<td>1</td>
</tr>
<tr>
<td>Advanced Electives*</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>

* Subjects to be selected from the following according to availability and specialization required:

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.391G Atmospheric Pollution and Control</td>
<td>2</td>
</tr>
<tr>
<td>3.392G Fuel Science</td>
<td>3</td>
</tr>
<tr>
<td>3.393G Fuel Engineering Plant Design</td>
<td>3</td>
</tr>
<tr>
<td>3.394G Thermal Engineering and Fuel Processing</td>
<td>3</td>
</tr>
<tr>
<td>3.395G Research Techniques and Extension Methods</td>
<td>2</td>
</tr>
<tr>
<td>3.396G Unit Operations in Waste Management</td>
<td>1</td>
</tr>
</tbody>
</table>

When appropriate, up to three hours per week may be selected from approved courses offered by other Schools within the University, eg Coal Preparation, Instrumentation and Automatic Control, Ceramics, Nuclear Engineering, etc.
School of Chemical Technology

880
Chemical Technology Graduate Course
Master of Applied Science
MAppSc

The aim of this course is not to produce narrow specialists but to train graduates to identify and solve a wide range of problems in those areas of the chemical industry concerned with the production and development of inorganic chemicals, organic chemicals, surface coatings, plastics, elastomers, or ceramic materials. The method is student participation in formal courses and projects of a collaborative kind.

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 percent of the total program. This would include a project constituting not less than 15 percent and not more than 30 percent of the program.

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

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

Graduate subjects in Chemical Technology may be selected from:

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

* These subjects operate for two sessions at the stated hours per week.

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.

805
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>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.211G</td>
<td>Graduate Metallurgy Project</td>
<td>Not less than 4</td>
</tr>
<tr>
<td></td>
<td>Metallurgical Practice</td>
<td>4 to 8</td>
</tr>
</tbody>
</table>

Detailed studies relating to one or more of the following:

52
1. Extractive Metallurgy
2. Metal working and forming
3. Foundry practice
4. Welding and metal fabrication
5. Metal finishing and corrosion protection

4.221G Advanced Metallurgical Techniques

4.231G Specialist Lectures in Advanced Theoretical Metallurgy

4.251G Advanced Materials Technology

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

**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.

**Hours per week**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.121 Principles of Metal Extraction</td>
<td>3</td>
</tr>
<tr>
<td>4.131 Principles of Physical and Mechanical Metallurgy</td>
<td>3</td>
</tr>
<tr>
<td>4.141 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).

504 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 of full-time or two years of 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</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.023 Mining and Mineral Process Engineering, Parts 1 and 2</td>
<td>4</td>
</tr>
<tr>
<td>7.033 Mineralogical Assessment</td>
<td>1</td>
</tr>
<tr>
<td>7.234 Mineral Economics</td>
<td>2</td>
</tr>
<tr>
<td>7.311G Mineral Beneficiation</td>
<td>3</td>
</tr>
<tr>
<td>7.111G Mining Engineering</td>
<td>3</td>
</tr>
</tbody>
</table>

*Offered in units of 7 hours (1 hour/week for 7 weeks)*

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.

**Year 2—Part-time**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.122G Mining Engineering Technology or</td>
<td>6</td>
</tr>
<tr>
<td>7.322G Mineral Beneficiation Technology</td>
<td>6</td>
</tr>
<tr>
<td>7.132G Mining Engineering Laboratory and Project or</td>
<td>6</td>
</tr>
<tr>
<td>7.332G Mineral Engineering Laboratory</td>
<td>6</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 Wool and Pastoral Sciences**

508 Wool Technology Graduate Diploma Course

Graduate Diploma GradDip

The course leading to the award of the Graduate Diploma in Wool Technology 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.

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

**Full-time Course**

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

**545 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 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. Students take part in a case-study program and staff from the Schools of the Faculty of Applied Science participate so that effective application of the principles of the course can be made to a student's own special industry.
The following pages contain a list of most of the subjects offered for courses in the Faculty of Applied Science. In general, the list is arranged according to subject numbers and the School responsible for the subject.

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.

Students are required to have their own copy of the prescribed textbooks. Lists of Reference Books for additional reading, and of textbooks, where not given here, are issued by the Schools. For General Studies subjects see the Board of General Studies Handbook, which is available free of charge.

### Information Key

The following is the key to the information supplied about each subject listed below:

- S1 (Session 1); S2 (Session 2); S1 + S2 (Session 1 plus Session 2, i.e. full year); S1 or S2 (Session 1 or Session 2, i.e. choice of either session); SS (single session, i.e. 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).

### Identification of Subjects by Numbers

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

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

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

<table>
<thead>
<tr>
<th>Identifying Number</th>
<th>School, Faculty or Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>School of Physics</td>
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<tr>
<td>2</td>
<td>School of Chemistry</td>
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<tr>
<td>3</td>
<td>School of Chemical Engineering</td>
</tr>
<tr>
<td>4</td>
<td>School of Metallurgy</td>
</tr>
<tr>
<td>5</td>
<td>School of Mechanical and Industrial Engineering</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Identifying Number</th>
<th>School, Faculty or Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>School of Mining Engineering</td>
</tr>
<tr>
<td>8</td>
<td>School of Civil Engineering</td>
</tr>
<tr>
<td>9</td>
<td>School of Wool and Pastoral Sciences</td>
</tr>
<tr>
<td>10</td>
<td>School of Mathematics</td>
</tr>
<tr>
<td>12</td>
<td>School of Psychology</td>
</tr>
<tr>
<td>13</td>
<td>School of Textile Technology</td>
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<tr>
<td>14</td>
<td>School of Accountancy</td>
</tr>
<tr>
<td>15</td>
<td>School of Economics</td>
</tr>
<tr>
<td>17</td>
<td>Biological Sciences</td>
</tr>
<tr>
<td>18</td>
<td>Department of Industrial Engineering</td>
</tr>
<tr>
<td>22</td>
<td>School of Chemical Technology</td>
</tr>
<tr>
<td>23</td>
<td>School of Nuclear Engineering</td>
</tr>
<tr>
<td>25</td>
<td>School of Applied Geology</td>
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<tr>
<td>26</td>
<td>Department of General Studies</td>
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<tr>
<td>27</td>
<td>School of Geography</td>
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<tr>
<td>28</td>
<td>School of Marketing</td>
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<tr>
<td>29</td>
<td>School of Surveying</td>
</tr>
<tr>
<td>36</td>
<td>School of Town Planning</td>
</tr>
<tr>
<td>41</td>
<td>School of Biochemistry</td>
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<tr>
<td>42</td>
<td>School of Biological Technology</td>
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<tr>
<td>43</td>
<td>School of Botany</td>
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<tr>
<td>44</td>
<td>School of Microbiology</td>
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<tr>
<td>53</td>
<td>School of Sociology</td>
</tr>
<tr>
<td>58</td>
<td>School of Education</td>
</tr>
</tbody>
</table>

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

Physics Level I units

1.001
Physics I*
S1 + S2 L3T3

Textbook
Weidner R. T. & Sells R. L. Elementary Physics, Classical and Modern Allyn & Bacon

1.112A
Electromagnetism
S2 L2½T3½
Electrostatics and magnetostatics in vacuum and in dielectrics. Magnetic materials. Maxwell’s equations and simple applications.

Textbook

1.112B
Modern Physics
S1 L2½T3½
Special theory of relativity, Lorentz transformation, relativistic mass, momentum and energy: Schrödinger wave equation, expectation values, operators, eigenfunctions, eigenvalues, free-particle, bound-particle and applications to physical systems, spectra, electron spin, spin-orbit coupling, exclusion principle, origins and spectra of X-rays, electron energy levels in solids.

Textbook
Arya A. P. Elementary Modern Physics Addison-Wesley

1.112C
Thermodynamics and Mechanics
S1 + S2 L1½T½


Textbooks
French A. P. Vibrations and Waves Nelson
Mandl F. Statistical Physics Wiley

Higher Physics Level II units

1.122A
Electromagnetism
S2 L2½T3½

Textbook
Lorrain P. & Corson D. Electromagnetic Fields and Waves 2nd ed Freeman

1.122B
Quantum Physics
S1 L2½T3½
Syllabus as for 1.112B but treated at a higher level and including some solid state physics.

Textbook
Eisberg R. M. Fundamentals of Modern Physics Wiley

1.122C
Thermodynamics and Mechanics
S1 + S2 L1½T½
Thermodynamics: As for 1.112C Thermodynamics but at higher level and with some additional topics. Mechanics: Oscillations and forced vibrations, Lagrange’s equation, variational principles, Hamilton’s equations.

Textbooks
Mandl F. Statistical Physics Wiley
Symon K. R. Mechanics 2nd ed Addison-Wesley
Terminating Physics Level II units

1.212
Physics 11T
Comprises both units 1.212B and 1.212C.

1.212 B Electronics
The application of electronics to other disciplines. Principles of circuit theory and analogue computing; amplifiers, their specification and application; transducers; electronic instrumentation, industrial data acquisition.

Textbook
Smith R. J. Circuits, Devices and Systems Theory 2nd ed Wiley

1.212C
Introduction to Physics of Solids
Introductory quantum mechanics and atomic physics; crystal structure; point and line defects; introductory band theory; conductors, semiconductors and insulators; energy level diagrams.

Textbook
Rudden M. N. & Wilson J. A. Simplified Approach to Solid State Physics Butterworths

1.113B
Electromagnetic Fields and Physical Optics
Wave equation; propagation in dielectrics and ionized media; reflection and transmission; guided waves, coherence of radiation; interaction of radiation with matter; stimulated emission; laser oscillators; properties of laser light; interferometry; diffraction; convolution theorem X-ray and neutron diffraction.

Textbook
Lipson H. & Lipson S. Optical Physics C.U.P.

1.113C
Statistical Mechanics and Solid State
Thermodynamic potentials, ensembles and partition functions, lattice vibrations, the grand canonical ensemble, Pauli exclusion principle, Bose-Einstein and Fermi-Dirac distributions.

Structure of crystals, imperfections, specific heat. Band theory of solids, semiconductors.

Textbooks
Blakemore J. S. Solid State Physics Saunders
Jackson E. A. Equilibrium Statistical Mechanics Prentice-Hall
Mandl F. Statistical Physics Wiley

Higher Physics Level III units

1.123A
Quantum Mechanics

Textbook
Gasiorewicz S. Quantum Physics Wiley

1.123B
 Electromagnetic Theory and Statistical Mechanics
Metallic boundary conditions, eigenfunctions and eigenvalues, cavities, wave guides, scattering by a conductor wave equation for potentials, radiation fields, Hertz potential, dipole and multipole radiation, radiated energy and angular momentum.

Statistical mechanics: Kinetic theory, the Boltzmann equation, Maxwell-Boltzmann distribution, Boltzmann's H-theorem, classical statistical mechanics: postulates, equipartition, ensembles, difficulties; quantum statistical mechanics: postulates, ensembles, Fermi and Bose statistics.

Textbooks
Lorrain P. & Corson D. Electromagnetic Fields and Waves 2nd ed Freeman
Reif F. Fundamentals of Statistical and Thermal Physics McGraw-Hill

1.123C
Solid State and Nuclear Physics
Crystallography, binding energy, phonons, lattice conducion, free electron gas, band theory.
Nuclear models, binding energy, nuclear forces, elementary particles, nuclear reactions, radioactive decay.

Textbooks
Burcham W. E. Nuclear Physics and Introduction Longmans
Kittel C. Introduction to Solid State Physics 4th ed Wiley

Physics Level III units

1.113A
Wave Mechanics
Concepts and formulation, finite wells and barriers, tunnelling, harmonic oscillator and applications, hydrogen atom, perturbations, systems of identical particles, electron states in complex systems, bonding, molecules, periodic solids.

Textbooks
No set texts.

School of Chemistry

Undergraduate Study

2.001
Chemistry I
Classification of matter and theories of the structure of matter. Atomic structure, the periodic table and chemical behaviour. Chemical bonding, molecular structure and stereochemistry. Chemical kinetics and equilibrium; enthalpy, free energy and entropy changes in chemical systems. The structure, nomenclature and properties of organic and inorganic compounds. Reactions of organic and inorganic compounds.

Textbooks
Aylward G. H. & Findlay T. J. V. eds SI Chemical Data Wiley
Chemistry I Laboratory Manual NSWP
Mahan B. H. University Chemistry 3rd ed Addison-Wesley
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Textbooks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.002A</td>
<td>Physical Chemistry</td>
<td>S1 or S2 L3T3</td>
<td>Prerequisites: 1.001 or 1.011 and 2.001 and 10.001, 10.011 or 10.021.</td>
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<tr>
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<td>Thermodynamics: First, second and third laws of thermodynamics;</td>
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<td></td>
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<td>statistical mechanical treatment of thermodynamic properties; applications</td>
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<td>of thermodynamics: chemical equilibria, phase equilibria, solutions of</td>
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<td>non-electrolytes and electrolytes, electrochemical cells.</td>
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<td>Kinetics: Order and molecularity; effect of temperature on reaction rates;</td>
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<td></td>
<td>elementary reaction rate theory</td>
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<td>Surface Chemistry and Colloids: Adsorption, properties of dispersions;</td>
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<td>macromolecules and association colloids.</td>
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<td>Textbooks</td>
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<td></td>
<td>Barrow G. M. Physical Chemistry 3rd ed McGraw Hill</td>
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<td></td>
<td>Shaw D. J. Introduction to Colloid and Surface Chemistry 2nd ed Butter-</td>
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<td>worths</td>
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<tr>
<td>2.002B</td>
<td>Organic Chemistry</td>
<td>S1 or S2 L3T3</td>
<td>Prerequisite: 2.001.</td>
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<td></td>
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<td>Chemistry of the more important functional groups: aliphatic hydro-</td>
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<td>carbons, monocyclic aromatic hydrocarbons, halides, alcohols, phenols,</td>
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<td>aldehydes, ketones, ethers, carboxylic acids and their derivatives,</td>
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<td>nitro compounds, amines, and sulphonic acids.</td>
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<td>Textbooks</td>
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<td></td>
<td>Vogel A. I. Elementary Practical Organic Chemistry Pt II Qualitative</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Organic Analysis Longman (only if proceeding to further study of Organic</td>
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<td></td>
<td></td>
<td></td>
<td>Chemistry).</td>
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<tr>
<td>2.002C</td>
<td>Chemistry II (Inorganic/Analytical Chemistry)</td>
<td>S1 or S2 L2T4</td>
<td>Prerequisite: 2.001.</td>
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<td></td>
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<td>Chemistry of non-metals; chemistry of typical metals; transition metals,</td>
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<td>lanthanides and actinides; introduction to nuclear chemistry. Quantita-</td>
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<td>tive inorganic analysis.</td>
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<td>Textbooks</td>
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<td>Barrow G. M. Chemical Equilibrium Harper Int</td>
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<td>Quagliano J. V. &amp; Vallarino L. M. Coordination Chemistry Heath</td>
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<tr>
<td>2.002D</td>
<td>Analytical Chemistry</td>
<td>S1 or S2 L2T4</td>
<td>Prerequisites: 2.001 and 10.001, 10.011 or 10.021.</td>
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<td>Chemical equilibria in analytical chemistry. Acid-base, complex formation,</td>
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<td>redox systems, solid/solution, and liquid/liquid equilibria with</td>
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<td>applications to volumetric, gravimetric and complexometric analysis, and</td>
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<td>to liquid/liquid extractions.</td>
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<td>Spectrophotometry, basic principles. Chromophores. Fundamentals of</td>
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<td>precision. Electrochemistry, theory and applications to electrodeposition</td>
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<td>and potentiometry; ion selective electrodes. Radioactive tracer techni-</td>
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<td>ques. Evaluation in analytical chemistry. Qualitative analysis.</td>
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<td>Textbooks</td>
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<tr>
<td></td>
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<td>Eckschlagler K. Errors and Measurements in Chemical Analysis R. A.</td>
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<td>Chalmers trans ed Van Nostrand</td>
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<td></td>
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<td>Ewing G. W. Instrumental Methods of Chemical Analysis McGraw-Hill</td>
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<td></td>
<td>Fischer R. B. &amp; Peters D. G. Quantitative Chemical Analysis Saunders</td>
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<tr>
<td>2.003B</td>
<td>Organic Chemistry</td>
<td>S1 or S2 L2T4</td>
<td>Prerequisite: 2.002B.</td>
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<td></td>
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<td>Alicyclic Chemistry: Stereochemistry of acyclic systems; classical and</td>
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<td>non-classical strain in cyclic systems; stereochemistry and conforma-</td>
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<td>tion of monocyclic and polycyclic compounds; synthesis, reactions and</td>
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<td>rearrangement of monocyclic compounds, including stereochromatic</td>
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<td>selectivity; transannular reactions in medium rings. Synthesis and re-</td>
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<td>actions of fused and bridged polycyclic systems.</td>
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<td>Heterocyclic Chemistry: Synthesis and reactions of the following hetro-</td>
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<td>aromatic systems: pyridine, quinoline, isoquinoline. Flavones and</td>
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<td>isoflavones; pyrimidine; pyrrole, furan, thiophen, indole, indazol.</td>
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<td></td>
<td>Textbooks</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Roberts J. D. &amp; Caserio M. C. Basic Principles of Organic Chemistry</td>
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<td>Benjamin</td>
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<td>Joule J. A. &amp; Smith G. F. Heterocyclic Chemistry Van Nostrand</td>
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<td>McQuillan F. J. Aicycyclic Chemistry C.U.P.</td>
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<td>Vogel A. I. Elementary Practical Organic Chemistry Pt II Qualitative</td>
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<td></td>
<td>Organic Analysis Longman</td>
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<td>Whittaker D. Stereochemistry and Mechanism Clarendon</td>
</tr>
<tr>
<td>2.003H</td>
<td>Molecular Spectroscopy and Structure</td>
<td>S1 or S2 L3T3</td>
<td>Prerequisite: 2.001.</td>
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<td>Absorption and emission of radiation. Atomic spectra. Molecular spectro-</td>
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<td>oscopy: vibrational, including infrared and Raman; UV-visible; instrument-</td>
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<td>ation and sample handling. Magnetic resonance. Mass spectrometry with par-</td>
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<td>ticular reference to structure determination. Laboratory and tutorial</td>
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<td>work to illustrate the above, including inspection of major instruments.</td>
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<td>Textbook</td>
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<td>Silverstein R. M. Basaler C. G. &amp; Morrill T. C. Spectrometric Identification</td>
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<td>of Organic Compounds 3rd ed Wiley</td>
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<td>2.013L</td>
<td>Chemistry and Enzymology of Foods</td>
<td>S1 + S2 L1T2</td>
<td>Prerequisite: 2.002B. Excluded: 2.003L, 2.033L, 2.043L.</td>
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<td>The chemistry of food constituents at an advanced level and the rela-</td>
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<td>tionship between the chemistry and enzymology associated with the origin</td>
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<td>and handling of foodstuffs. Treatment of the stability of constituents,</td>
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<td>changes in colour and texture occurring during processing and storage.</td>
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<td>Methods of assessment, chemical and physical. General classification of</td>
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<td>constituents, role of free and combined water. Fixed oils and fats,</td>
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<td>rancidity of enzymic and antioxidative origin, anti-oxidants—natural and</td>
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<td>synthetic—theories on mechanisms of action, carbohydrates reactivity, role</td>
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<td>in brewing processes, carbohydrate polymers, starch structure, enzymic</td>
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<td>susceptibility and mode of action, estimations, enzymic degradation and</td>
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<td>enzymic browning, reactions and stability of natural pigments, vitamins,</td>
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<td>preservatives.</td>
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<td>Textbooks</td>
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<td>No set texts. A list of reference books is provided.</td>
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<td>2.021</td>
<td>Chemistry IE</td>
<td>S1 or S2 L3T3</td>
<td>Prerequisite: 2.001.</td>
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<td>A terminating subject for students in the Aeronautical, Civil, Electrical,</td>
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<td>Industrial, Mechanical and Mining Engineering, and Naval Architecture</td>
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<td>courses. Classification of matter and theories of the structure of mater.</td>
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<td>Atomic and molecular structure, the periodic table and chemical behaviour.</td>
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Chemical bonding and the nature and properties of chemical systems. Equilibrium and energy changes in chemical systems. Introduction to colloidal systems.

Textbooks
Aylward G. H. & Findlay T. J. V. eds SI Chemical Data Wiley
Barrow G. M. Kenney M. E. Lassila J. D. Little R. L. & Thompson W. E. Understanding Chemistry Benjamin
Chemistry IE Laboratory Manual NSWUP

2.042C Inorganic Chemistry S1 or S2 L2T4
Prerequisite: 2.001.
Chemistry of the non-metals, including B, C, Si, N, P, S, Se, Te, halogens, and noble gases. Chemistry of the metals of groups IA, IIA, and AI. Typical ionic, giant-molecule and close packed structures. Transition metal chemistry, including variable oxidation states, paramagnetism, Werner's theory, isomerism of six- and four-coordinate complexes, chelation, stabilization of valency states. Physical methods of molecular structure determination. Chemistry of Fe, Co, Ni, Cu, Ag, Au.

Textbooks
Jolly W. L. The Chemistry of the Non-Metals Prentice-Hall
Larsen E. M. Transition Elements Benjamin

2.043L Chemistry and Enzymology of Foods
Prerequisite: 2.002B. Excluded: 2.033L, 2.013L, 2.043L
Syllabus as for 2.013L but in greater detail and depth.
Textbook
No set text. A list of reference books is provided.

Graduate Study

2.271G Chemistry and Analysis of Foods
Illustrates the bases and application of analytical techniques as applied to foods. Emphasis is placed on the design of methods, on the preparation of material for instrumental analysis and on the interpretation of data.
Subject matter includes: proteins and flesh foods, carbohydrates and saccharine foods, fats and oils, dairy and fermentation products, vitamins, food additives—preservatives and colouring matters, pesticide residues, metal contaminants—food microscopy.

School of Chemical Engineering

Undergraduate Study

General
Students are expected to possess a slide rule having exponential (log-log) scales, or a calculator of equivalent capabilities (In 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.

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.
Textbook
Dickson T. R. The Computer and Chemistry Freeman

3.111 Chemical Engineering Principles I
5. Dimensional Analysis Scale-up and Theory of Models: Dimensions; dimensionless numbers; dimensional analysis; static and dynamical similarity; regime concepts; use of models for scale-up. Pilot plants.
Textbooks
Coulson J. M. & Richardson J. Chemical Engineering Vol. 1 Pergamon
Holman J. P. Heat Transfer 4th ed McGraw-Hill ISE
McCabe W. L. & Smith J. C. Unit Operations of Chemical Engineering 2nd ed McGraw-Hill
Massby B. S. Mechanics of Fluids 2nd ed Van Nostrand-Reinhold

3.112 Chemical Engineering Material Balances and Thermodynamics
Material balances. Basic thermodynamic principles leading to Phase Rule. P-v-T relationships. Energy balances. Further thermodynamic principles leading to phase and reaction equilibrium.
Textbooks

3.121 Chemical Engineering Principles II
Heat Transfer: An extension of the work covered in 3.111 with an emphasis on the fundamentals of convection and condensation. Unsteady state conduction; introduction to heat exchange design.

Digital and Analogue Computations: A short introduction to digital and analogue computers and their uses.

Textbooks
Blatt J. M. Introduction to FORTRAN IV Programming Prentice-Hall
Coulson J. M. & Richardson J. F. Chemical Engineering Vol 2 Pergamon
Peterson G. R. Basic Analog Computation Collier Macmillan

3.122 Chemical Engineering Thermodynamics and Reaction Engineering

Thermodynamics: The application of basic material from 3.112 to selected processes and operations. Sources of data, methods of estimating, determining consistency of, and methods of presenting data. Applications of thermodynamics to specific systems, i.e. vapour-liquid, non-electrolyte solutions, aqueous electrolyte solutions and gas-solid systems. Thermodynamic analysis of processes. Irreversible thermodynamics, statistical thermodynamics and thermodynamics of adsorption and desorption.


Textbooks
Levenspiel O. Chemical Reaction Engineering 2nd ed Wiley
Smith J. M. Chemical Engineering Kinetics 2nd ed McGraw-Hill

3.123 Chemical Engineering Design I A and I B


Heat Exchangers: Thermal design procedures for shell and tube heat exchangers and fin-fan coolers. Service fluids for heating and cooling duties.

Mass Transfer Equipment: Construction and design of sieve and other type trays for plate towers. Design and construction of packed towers. Selection of packing; performance characteristics of packed and plate towers.


Process Engineering: Block diagrams, process flowsheets, presentation of material properties, mass and energy flows at various points. Engineering flowsheets. Process engineering (or performance) specifications for equipment items. Storage and safety considerations. The design report.


Process Measurements and Control: The principles of operation and use of the basic industrial measuring instruments. Fundamentals of feedback control, leading to the analysis and synthesis of single-loop linear systems.

Corrosion and Materials: A short course covering the theory of corrosion and materials of construction.

Textbooks
Backhurst J. R. & Harker J. H. Process Plant Design Heinemann
Mott L. C. Engineering Materials for M. E. T. Part 2 OUP
Rase H. F. Piping Design for Process Plants Wiley
Uhlig H. H. Corrosion and Corrosion Control Wiley
A.S. 1210-1972 Unifield Pressure Vessels Standards Assoc. of Australia
Doc. 1300 Australian Requirements for Boilers, Pressure Vessels and Gas Cylinders Standards Assoc. of Australia

3.124 Chemical Engineering Design and Practice

Design Report: A design report which is a test of 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.

Industrial Process Report: The Industrial Process Report is an exercise in which the student collects up-to-date information regarding a process which is in current use in Australia. He must report on its history, present state and future with particular respect to the scale, raw materials, alternative and competing products, and processes. The final report is a compilation of material copied directly from the literature.

3.131 Chemical Engineering Principles III

Combined Heat Mass and Momentum Transfer: An advanced theoretical treatment of situations where the various forms of interfacial transport occur simultaneously; fundamental consideration of units such as cooling towers and spray driers; modification to usual transport equations under high flux conditions. Transport Phenomena. The equations of conservation (mass, energy, momentum) and their solution in simple applications; the transport coefficients; the energy mass and momentum analogy. Optimization: A treatment with examples of such topics as single and multiple dimension search techniques including Simplex EVOP, linear programming, dynamic programming, introduction to other optimization techniques.

Computer Methods and Modelling: Brief review of FORTRAN programming, and an introduction to computer operating systems, disc storage, efficient programming methods; numerical methods for roots of equations, solution of linear algebraic equations, ordinary differential equations and partial differential equations; error propagation; search methods, sorting, table-look-up; analogue simulation, and the use of specialized computer programs such as CSMP, introduction to other high-level programs and PLI.

Textbooks
Pennington R. H. Introductory Computer Methods and Numerical Analysis Macmillan
3.132 Chemical Engineering Process Dynamics and Control

Textbook

3.133 Chemical Engineering Design II

Textbooks

3.134 Advanced Chemical Engineering Principles
Advanced Stagewise Operations: Brief review of conventional graphical calculation methods of Ponchon-Savarit and McCabe-Thiele type; phase equilibrium relationships for liquid-vapour and liquid-liquid systems; experimental methods, correlating equations, prediction methods (the case where more than two phases exist will be treated descriptively); graphical treatment of ternary distillation systems; multi-component separations; methods of Lewis-Matheson and Thiele-Geddes; detailed discussion of more modern computational methods; processes separation of binary azeotropes; heat economization, azeotropic and extractive distillation. Advanced Fluid and Particle Mechanics: Selected topics in fluid mechanics with relevance to chemical engineering. Advanced Diffusion and Separation. Advanced Heat Transfer. Advanced treatment of convective heat transfer and heat exchanger design. Case studies of unusual heat transfer problems. Investigation of unusual heat transfer devices. Associated experimental laboratory studies.

Textbooks

3.135 Chemical Engineering Practice
Specialized measurement techniques, experimental techniques, planning of experiments and analysis of engineering data. The use of the literature; information retrieval. The ethical, legal and social obligations of the engineer. Safety; pollution control. Integration of multi-unit complexes; seminar assignment, involving the presenting and discussion of recent chemical engineering papers. Analytical optimization of processes. Associated experimental laboratory studies.

3.136 Oil and Gas Engineering
Effects of temperature and pressure on the properties, thermodynamics and hydrodynamics of hydrocarbon materials. Design applications in the transport, storage and processing of oil and gas products.

3.140 Chemical Engineering Design Project
The design of plant for the production of chemicals and the estimation of product costs.

3.150 Chemical Engineering Experimental Project
An experimental investigation of some aspects of chemical engineering.

Department of Food Technology

3.201 Food Technology I
Introduction to food technology. Domestication, breeding and propagation of cultivated plants. Morphology, physiology and biochemistry of plants, horticultural factors, maturity assessment, harvesting, post-harvest handling and storage, storage disorders of fruit and vegetables.

Textbook
Janick J. Horticultural Science 2nd ed Freeman or Janick J. Schery R. W. Woods F. W. & Ruttan V. W. Plant Science Freeman

3.211 Food Technology II

Textbooks

3.212 Food Technology III
The science and technology of meat, fish, eggs, milk, fats and oils, cereals, sugars; their derived products, with particular reference to sources, structure and composition, microbiological and biochemical aspects, their reactions and modifications during processing and storage. Food package requirements. Food spoilage, its diagnosis and control.

Textbooks
3.221 Food Technology IV


3.222 Oenology

History and nature of grape wines; grape and wine statistics; concept of cultivars within Vitis vinifera; other Vitis species; wine and grape physiology and biochemistry; maturity assessment and significance; influence of climate, soil, and other factors on wine quality; harvesting procedures; enological 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 forlifying spirit and brandy; world wine industry, wine organizations, wine literature; social uses of alcohol.

3.231 Food Engineering I

An introduction to fluid mechanics, heat transfer, mass transfer with applications relevant to the food industry.

Textbooks
Earle R. L. Unit Operations in Food Processing Pergamon
Kay J. M. An Introduction to Fluid Mechanics and Heat Transfer 2nd ed C.U.P.

3.232 Food Engineering II


3.233 Food Technology (Chemical Engineering)


3.240 Food Technology Project (Chemical Engineering)

Project in Food Technology for students in Chemical Engineering.

3.250 Food Technology Project

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.

Department of Fuel Technology

3.311 Fuel Engineering I


Textbooks
Macras J. C. An Introduction to the Study of Fuel Eisevier
Mayhew Y. R. & Rogers G. F. C. Thermodynamic Properties of Fluids and Other Data Basil & Blackwell

3.321 Fuel Engineering II


Textbook

3.331 Fuel Engineering III


Textbooks
Trinks W. Industrial Furnaces Vols 1 and 2 Wiley

3.332 Fuel Engineering IV

Flames: Carbon formation, radiation, temperature calculation and measurement; characteristics of industrial flames. Secondary Fuels and Refractories: Carbonization: Evaluation of coals, blending, additives: liquid fuels; evaluation, physical properties, specifications; refractories: raw materials, types, thermal, mechanical and chemical properties. Atmospheric Pollution: Nature of pollutants, sources, sampling, measurement, physiological effects; plume dispersal; effect of meteorological conditions; industrial gas cleaning, air quality standards and Clean Air Legislation.

Fundamental Constitution of Fuels: Constitution and classification of mineral oils; coal petrology; techniques and application; physical and chemical fine structure of coal.
3.340 Fuel Engineering Project
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.

Department of Biological Process Engineering

3.411 Biological Process Engineering
Basic theory and applications of chemical engineering principles to the production of biological materials.

3.440 Biological Process Engineering Project
Project in Biological Process Engineering for students in Chemical Engineering.

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 Use and Re-Use of Water

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

3.165G Process Optimization
Statistical evaluation of process parameters including significance and effect on objective. Experimental optimization techniques for dealing with stochastic processes. The application of selected programming techniques for determination of optimum process conditions for deterministic processes.

3.170G Process Principles

3.171G Corrosion Technology I

Types of Corrosion: Direct chemical, galvanic, crevice, pitting, intergranular, phase attack, erosion—cavitation, stress, fatigue, hydrogen, fretting, atmospheric oxidation, high temperature oxidation.


3.172G Corrosion Laboratory
A number of laboratory assignments to illustrate and measure the mechanism of corrosion. Electroplating/anodising experiments.

3.173G Corrosion Materials
Metals—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.
Corrosion Technology II


Corrosion Seminar

Joint University/industry colloquium 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 colloquium.

Corrosion Literature Review

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, e.g., aspects of corrosion in the acid industry; marine corrosion; corrosion problems in the food industry; underground corrosion of pipelines.

Testing Laboratory

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

Advanced Process Dynamics


Process Optimization


Thermodynamics, Kinetics and Mechanism

Thermodynamics, kinetics and mechanism of proton transfer and electron transfer reactions, particularly with reference to selected industrial processes. Chemical kinetic theories and empirical analysis of reaction rates. Particular emphasis is given to mechanistic analysis in terms of kinetics and the equilibrium state and steady-state approximation methods. Experimental techniques and treatment of data.

System Simulation and Control

Topics to be dealt with will be selected from the following areas: Numerical methods for digital simulation and computation; Programming languages for system modelling; Unsteady-state distributed-parameter systems; Advanced analog computer methods; Digital computers in data-logging and control; Digital logic and instrumentation; Advanced control systems; eg, system identification, multiloop systems, non-linear systems, sampled-data systems.

Interphase Mass Transfer


Fluid Particle Interactions


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, eg, valves, fittings, pumps, safety devices. Economic aspects.

Advanced Process Engineering Economics


Graduate Colloquia

Joint University/industry colloquium on research developments in Chemical Engineering. Students are required to participate actively in the colloquium, give at least one dissertation based on their own investigations, and complete a number of assignments on topics related to research skills. These last will cover such areas as statistical planning of experiments, modelling and the use of optimization techniques in the evaluation of experimental data.
3.191G Thermodynamics

3.192G Computer-aided Design

Department of Food Technology

3.213G Food Process Laboratory L0T3
An integrated series of laboratory and pilot plant exercises illustrating the principles and procedures involved in processing of foods.

3.241G Food Technology L4T0
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.

3.242G Treatment and Utilization of Biological Effluents L2T0

3.243G Food Technology Seminar L0T2
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.

3.244G 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.

3.245G Food Quality Assessment L1T0
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.

3.246G Food Additives and Toxicology L1T0
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.

3.247G Oenology L1T0

3.248G Public Health and Legislative Aspects of Foods L1T2

3.249G Technology of Cereal Products L1T0

3.251G Marine Products L1T0
Applied Science

Department of Fuel Technology

3.381 Principles of Fuel Engineering
An expanded version of the course 3.311 Fuel Engineering I, including appropriate laboratory work.
Textbooks are as for 3.311 Fuel Engineering I.

3.382 Combustion Engineering
Similar to 3.321 Fuel Engineering II. Offered in the graduate diploma.
Textbooks as for 3.321 Fuel Engineering II.

3.383 Fuel Plant: Evaluation and Assignments
Designed to meet the needs of individual students in the graduate diploma course, with an emphasis on the practical aspects of combustion engineering and the efficiency of operation of fuel plant. Also included are bridge courses of lectures in heat transfer, fluid mechanics, and chemical and engineering thermodynamics, which are designed to bring students from the varied backgrounds of their first degrees to a common level to facilitate further study of these subjects in the graduate diploma course.
Students are supplied with reading lists appropriate to individual requirements.

3.390G Postgraduate Fuel Seminar
This is intended to assist students in assessing technical problems, in the collection of information and presentation of data, including technical report writing and critical evaluation of available information.

3.391G Atmospheric Pollution and Control
Causes, measurement and control of atmospheric pollutants with special reference to fuel-using plant. Clean air legislation.
Textbooks
Stern A. C., Wohlers H. C., Boubel R. W. & Lowry W. P. Fundamentals of Air Pollution A. P.
Perkins H. C. Air Pollution McGraw-Hill

3.392G Fuel Science
The nature of solid and liquid fuels, their physical and chemical properties and fundamental structure. The constitution of the coal matrix and coal petrography. The influence of the physical and chemical constitution of fuels and petrographic composition of coal on technological utilization.
Textbook
Krevelen D. W. van Coal Typology, Chemistry, Physics and Constitution Elsevier

3.393G Fuel Engineering Plant Design
Extends the design subject-matter of 3.331.
Textbooks
As for 3.331

3.394G Thermal Engineering and Fuel Processing
Extends the subject-matter of 3.331 and 3.332.
Textbooks
Inst. of Petroleum Modern Petroleum Technology
McAdams W. Heat Transmission McGraw-Hill

3.395G Research Techniques and Extension Methods
Designed to provide a critical approach to research activities. The topics are selected from the following:
1. Advanced analytical techniques (eg, spectroscopy, X-ray diffraction, chromatography, mass spectroscopy, NMR, other optical and instrumental methods. 2. Mathematical methods in the design and interpretation of experiments, eg, formulation and solution of equations; statistical evaluation of results; empirical equations and nomographs; analogue simulation; an introduction to programming and use of digital computers.
Students to be supplied with reading lists appropriate to individual requirements.

3.396G Unit Operations in Waste Management
The unit operations and processes associated with modern waste management practices, i.e. the origin, nature, characterization, handling, transportation, size reduction and storage of various waste materials; reduction at source and disposal by composting, landfill, incineration and chemical processing; recovery and re-use of marketable products. Legal aspects; case histories.
Textbook
1971 Waste Disposal Conference Dept of Fuel Technology Univ of NSW

Department of Biological Process Engineering

3.461G Physical Transport Processes

3.462G Microbial Energetics
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.

3.463G Theory of Rate Processes and Microbial Dynamics
Phenomenological characterization of reacting systems, mathematical and experimental characterization of complex kinetic systems. Kinetic behaviour of non-stationary state systems. Feedback mechanisms. Application to microbial systems. Control of metabolite and enzyme balance. Models of cell growth, eg, monod model; variable yield model; unstructured and structured models; feedback models.
3.464G
Theory and Design of Microbial Culture Processes

3.471G
Chemical Engineering in Medicine
An introduction to general physiology, particularly emphasizing renal and respiratory physiology. The design and operation of artificial kidneys and membrane oxygenators. Application of chemical engineering principles to design of artificial organs. Criteria of optimal therapy. Objective functions for future development.

3.481G
Heat, Mass and Momentum Transfer
Revision of fluid dynamics, heat and mass transfer; boundary layer theory; applications to stagewise processes and two-phase flow, lift and drag coefficients, non-Newtonian flow. Unsteady state heat transfer by conduction, convection and radiation.

3.482G
Thermodynamics
Review of fundamental principles. First and Second Laws. Applications to biological systems, energy in important processes. Rates of reaction, activation, energy, free energy, and metabolism, activated complexes, redox potential and irreversible electrode potentials.

3.483G
Process Dynamics and Biochemical Engineering Design
Process dynamics and control. Principles of process dynamics and the mathematical technique employed. Dynamics of batch and flow processes with living organisms. Unstable systems. Engineering design and operating characteristics of plant and processes normally used, e.g., sterilization and air purification; dehydration; drying at reduced pressure; reduced temperature preservation; radiation; product isolation; sedimentation; filtration; centrifugation; extraction; absorption, chromatography and ion exchange; absorption with reaction; electrophoresis and dialysis; aseptic design; materials of construction; effluent disposal.

3.900G
Master of Applied Science Major Project

3.901G
Pollution Elective

4.002
Introduction to Metallurgical Engineering
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.

Textbooks
Gordon J. E. The New Science of Strong Materials, or Why You Don't Fall through the Floor Penguin

4.011
Metallurgy I
3. Chemical and Extraction Metallurgy: Principles underlying the unit processes by which metals are extracted from ores and raw materials. The extraction metallurgy of iron and steel, copper, aluminium, lead, and zinc, together with the less common metals. An introduction to the principles of fluid flow, metallurgical stoichiometry, energy and mass balances, heat transfer.

Textbooks
Cotrell A. H. An Introduction to Metallurgy Arnold
Hume-Rothery W. & Raynor G. V. The Structure of Metals and Alloys: The Institute of Metals, London
Reed-Hill R. E. Physical Metallurgy Principles Van Nostrand

4.012
Metallurgy II
1. Metallurgical Thermodynamics: An introduction to the thermodynamics of metallurgical systems including a study of equilibria involving liquid metals, slags, gases and the solid state.
2. Chemical and Extraction Metallurgy: The application of physicochemical principles to the study of metallurgical processes. Electrochemistry and the related topics of corrosion and hydrometallurgy. The engineering basis of extraction metallurgy; heat and mass transfer; high temperature technology.
3. Physical Metallurgy: Theories of diffusion, phase equilibrium and transformation, and their application to alloying, heat treatment, and other metallurgical processes.


8. Special Topics: Further development of topics from the above sections.

Textbooks
As for 4.011 Metallurgy I, plus:
Bodsworth C. & Appleton A. S. Problems in Applied Thermodynamics Longman
Cottrell A. H. The Mechanical Properties of Matter W.I.E.
Hull D. Introduction to Dislocations Pergamon
Mann J. Y. Fatigue of Materials MUP
Swain R. A. Thermodynamics of Solids 2nd ed Wiley InterScience
West J. M. Electrodeposition and Corrosion Processes Van Nostrand
For the Mineral Processing section see under 7.023 (Part 2) Mining and Mineral Process Engineering (School of Mining Engineering).

4.0121 Metallurgy IIA S1 L5T4 S2 L5T6
Comprises sections 1., 2. (part only), 3. and 5. of 4.012 Metallurgy II, together with appropriate laboratory work.

4.0122 Metallurgy IIB S1 L4T6½ S2 L5T6
Comprises section 2. (part only), 4., 6., and 7. of 4.012 Metallurgy II, together with:
9. Industrial Metallurgy: A course of lectures on the application of metallurgical principles to industrial practice.
10. Metallurgy Seminar: As specified in 4.013 Metallurgy II.
The section on "Mineral Processing" in 4.012 and 4.0121 is given by the School of Mining Engineering in 7.023 (Part 2). For Textbooks see under 7.023.

Textbooks
For 4.0121 and 4.0122.
As for 4.012 Metallurgy II.

4.0123 Metallurgy IIC L2T2
Principally industrial metallurgy, and substantially as for section 9. in 4.0122.

4.0124 Metallurgy Report
A literature survey of approximately 10,000 words on a topic of relevance to the student’s employment. The proposed topic must be submitted to the Head of School for approval before the end of the third week of Session 1 and the report submitted not later than the end of the seventh week of Session 2.

4.013 Metallurgy III S1 L8T10 S2 L4T6
1. Development and application of metallurgical principles relating to the thermodynamics and kinetics of metallurgical processes; structural chemistry; the extraction and refining of the rarer metals; crystal imperfections, with reference to deformation, work hardening, annealing and

fections, with reference to deformation, work hardening, annealing and radiation damage; X-ray and neutron diffraction; phase transformations; fracture mechanisms; and the design of engineering materials.
2. The application of metallurgical principles to industrial practice, with particular reference to welding, foundry practice, metal shaping, metal finishing, materials selection and non-destructive testing.

Textbooks
As for 4.011 Metallurgy I and 4.012 Metallurgy II.

4.024 Metallurgy Project
An experimental investigation of some aspects of metallurgy.

4.121 Principles of Metal Extraction L2T1
The fundamental principles of metal extraction. Oxidation and reduction, roasting, slag reactions, distillation, leaching precipitation and electrolysis.

Textbooks
Pehlke R. D. Unit Processes of Extractive Metallurgy Elsevier
Rosenquist T. Principles of Extractive Metallurgy McGraw-Hill

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* S1 L1T4 S2 L1T1
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* S1 L4T3 S2 L2T0

4.314 Chemical and Extraction Metallurgy IIIA* L3T1½

* Textbooks provided by the School.
4.324 Chemical and Extraction Metallurgy IIIB* L3T1½
A selection of advanced topics in chemical and extractive metallurgy.

4.402 Physical Metallurgy I* S1 L3T4 S2 L2T4½

4.403 Physical Metallurgy II* S1 L4T6 S2 L2T3

4.414 Physical Metallurgy IIIA* L3T1½
Applications of dislocation theory to work hardening and annealing processes. Transformations in metals. Mathematical crystallography, reciprocal lattice, diffraction.

4.424 Physical Metallurgy IIIB* S1 L0T3 S2 L3T1½
Selection of advanced topics in physical metallurgy including radiation damage, martensitic transformations, neutron diffraction, internal friction, sintering.

4.504 Mechanical and Industrial Metallurgy* S1 L3T0 S2 L3T6
The application of metallurgical principles to industrial processing with particular reference to casting, welding, shaping, properties and selection of materials. Metal finishing. Metallurgical aspects in engineering design. Fracture mechanics, design against fatigue, brittle and ductile fracture.

4.602 Metallurgical Engineering I* S1 L2T0 S2 L3T3½

4.604 Metallurgical Engineering III* S1 L3T3 S2 L6T3
Theory of automatic process control. Process modelling and optimization. Process design, feasibility, costing and economics applied to metal extraction, refining, fabrication and finishing. Industrial practice. Case studies, design studies and assignments related to the design of integrated metallurgical process schemes.

4.613 Metallurgical Engineering IIIA* S1 L1T0 S2 L1T2

4.623 Metallurgical Engineering IIIB* L3T3
Measurement in metallurgical processes. Continuous process theory. Materials handling Metallurgical engineering design applied to mechanical, pyrometallurgical and hydrometallurgical extraction and refining processes, and to melting, casting and shaping processes. Design project.

4.703 Materials Science* L3T3
Extension of the structure—property relationships developed in earlier subjects to provide a unified physical, chemical and mechanical approach to the properties of materials.

4.802 Metallurgical Physics* L2T0
Development of physical principles for application in metallurgy—wave mechanics; electron theory; statistical mechanics; interaction of radiation with matter; solid state devices, instrumentation.

4.813 Mathematical Methods L2T1
1. 10.351 Statistics SM (see Combined Sciences 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.

Textbook

4.913 Materials Science L2T1

* Textbooks provided by the School.

Textbook
Clark D. S. and Varney W. R. Physical Metallurgy for Engineers Van Nostrand

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

Textbook
As for 4.911 Materials Science.

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

Textbook
As for 4.911 Materials Science.

4.941 Metallurgy for Engineers L1T0

Textbook
As for 4.911 Materials Science.

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

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

School of Mechanical and Industrial Engineering

Undergraduate Study

5.010 Engineering A SS L4T2
Prerequisite: None.
Introduction to Engineering Design: Engineering method, problem identification, creative thinking, mathematical modelling, computer-aided design, materials and processes, communication of ideas, the place of engineering in society.
Introduction to Materials Science: For subject description and textbooks see under 4.001.
Textbooks
Meriam J. L. Statics Wiley
Svensson N. L. Introduction to Engineering Design NSWUP
Walshaw A. C. S1 Units in Worked Examples Longman

For Introduction to Materials Science:
Gordon J. E. The New Science of Strong Materials or Why You Don’t Fall through the Floor Pelican
Scientific American Materials Freeman

5.020
Engineering B
SS L4T2
Prerequisite: 5.010.


Textbooks
Meriam J. L. Statics Wiley
Meriam J. L. Dynamics Wiley
This book required by students enrolling in 5.311

5.030
Engineering C

Engineering Drawing: Fundamental concepts of descriptive geometry, including reference systems, representation of point, line and plane; fundamental problems of position and measurement. Application of descriptive geometry to certain problems arising in engineering practice. Special emphasis on ability to visualize problems and processes involved in their solution. Instruction in the correct use of drawing instruments and the application of drawing standards. Measurements and dimensioning. Orthographic and isometric projections.

and either

Introduction to Systems and Computers: Introduction to computers to follow the computer work in Mathematics I. Develops familiarity with algorithms and the use of procedure-oriented languages, and introduces computing equipment.


or

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

or

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

or

(Mining Engineering students must take this option)

or

Introduction to Computing: Introduction to computer program design with emphasis on correctness and reliability.

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

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

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

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

5.011
Mechanical Engineering Design I

Prerequisites: 5.010, 5.020. Co- or prerequisite: 5.311, 5.611, 8.151, 8.259

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

Textbook
DeGarmo E. P. Materials and Processes in Manufacturing Macmillan

5.311
Engineering Mechanics
SS L1½T1

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

Kinematics and kinetics of the plane motion of rigid bodies. Absolute motion, relative translational motion and relative angular motion; dynamic equilibrium; work and energy; impulse and momentum.

Textbook
Meriam J. L. Dynamics Wiley

5.331
Dynamics of Machines I
S1 + S2 L1½T½

Prerequisites: 5.311, 10.022.


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

Textbook
Hirschhorn J. Dynamics of Machinery Nelson

5.611
Fluid Mechanics/Thermodynamics I
S1 + S2 L2T2

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


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

School of Electrical Engineering

Undergraduate Study

6.801 Electrical Engineering S1 + S2 L1T2
Prerequisite: 1.001.
The application of electrical engineering to other disciplines such as mechanical and civil engineering, industrial chemistry and geophysics. The only basic electrical theory considered is that necessary for an understanding of the applications. The course is divided into two sections, each of which contains an inter-disciplinary applications-oriented project.


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

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

School of Mining Engineering

Undergraduate Study

7.012 and 7.012R Mineral Resources

7.023 and 7.023R Mining and Mineral Process Engineering

Textbooks
Gaudin A. M. Principles of Mineral Dressing McGraw-Hill
Lewis R. S. & Clark G. B. Elements of Mining Wiley
Thomas L. J. An Introduction to Mining Hicks Smith

7.033 Mineralogical Assessment
Assessment of the physical and chemical properties of economic minerals. Significance of the textures of minerals on the selection of mineral beneficiation processes. Destructive and non-destructive testing of bore cores. Factors influencing effective comminution and liberation. Quantitative analysis by microscope; chemical; use of heavy liquids; or magnetic and conductive processes.

Textbook
Jones M. P. & Fleming M. G. Identification of Mineral Grains Elsevier

7.113 and 7.113R Mining Engineering I
Two parts will be taught in each session.

Textbooks
Calhoun J. C. Fundamentals of Reservoir Engineering Oklahoma UP
Lewis R. S. & Clark G. B. Elements of Mining Wiley or
Plieder E. P. & Eugen D. Surface Mining AIME
Sinclair J. Winning Coal Pitman.
Woodruff S. D. Methods of Working Coal and Metal Mines 3 vols Pergamon

7.124 Mining Engineering II
2. Bulk materials handling underground, hoisting, conveyors, tracked and trackless transport, wire ropes, oil and slurry pipe lines. Mine drainage pumps, pump stations, flooding and dewatering. Noise control in mines.

7.124R Mining Engineering II
For students in BSc(Eng) based on topics principally selected from the syllabi of 7.124, 7.224 and 7.234. Some topics from 7.134 and 7.144 may also be included or recommended for additional reading.

7.134 Mining Engineering III
Review of rock fragmentation and rapid excavation techniques, nuclear blasting applied to mining and oil reservoirs. Advanced composite mining techniques for coal and metaliferous deposits with particular reference to mechanization, computer applications to mining methods and transport.

7.144 Mining Engineering IV

Textbook

7.213 Mine Surveying and Control Engineering
Surveying methods in the development and exploitation of mineral resources and the assessment of mineral properties. Tunnel surveys, azimuth transfers, borehole surveys, stope and ore reserve surveys. Mine survey office organization. Production and development scheduling, use of networks, integrated networks, resource restrained networks. Production control, grade control. Demonstrations of equipment.

7.213R Mine Surveying and Control Engineering
For students in the BSc(Eng) course, based on the syllabus of 7.213.
Textbooks for 7.213 and 7.213R
Stanley W. W. Introduction to Mine Surveying 2nd ed Stanford UP
Winiberg F. Metalliferous Mine Surveying 5th ed Min Pub Ltd
Metcalfe J. E. A Mining Engineer's Survey Manual Electrical Press

7.224 Mine Valuation

Textbook

7.234 Mineral Economics

Textbook
Commonwealth of Aust The Australian Mineral Industry Review Annual and Quarterly Bureau of Min Res

7.314 Mineral Processing I

7.314R Mineral Processing I
For students in the BSc(Tech) course. Based on the syllabus of 7.314.

7.315R Mineral Processing for Mining Engineers
An abridged course for students in the BSc(Eng) course based on the syllabus of 7.314.
Book List for 7.314, 7.314R and 7.315R.
Textbook
Taggart A. F. Handbook of Mineral Dressing Wiley

7.316R Mineral Processing II

Textbook
Taggart A. F. Handbook of Mineral Dressing Wiley
7.324
Mineral Processing II
Surface chemistry, adsorption, electrical double layers, stabilization and dispersion of mineral particles. Flocculation and froth flotation.
Textbook
Gaudin A. M. *Flotation* 2nd ed McGraw-Hill

7.326R
Mineral Industry Processes
Principles underlying extraction of some common metals, pyrometallurgy, hydrometallurgy, electro-metallurgy, chemical extraction, agglomeration, sintering, mineral processing as a bridge between mining and metallurgical industries.
Text and Principal Reference Books
Students should obtain list from Broken Hill.

7.334
Mineral Processing III
Integration of mineral processing techniques with chemical, mechanical and metallurgical operations. Process engineering. Laboratory and pilot plant testing, project evaluation. Preparation of flowsheets, equipment selection and plant design.
Textbooks
Denver Equip. Co *Modern Mineral Processing Flowsheets*
Leonard J. W & Mitchell D. R. *Coal Preparation AIME*

7.411R
Fluid Mechanics
Textbooks
Students should obtain book list, including principal reference books, from Broken Hill.

7.414
Mineral Industry Elective Project
The elective project may be selected from one of the following options, and consists of a literature survey and a thesis. An assignment is also set on the lectures and tutorials.
1. Mathematical Models for Mining Methods: Presenting a rapid technique for the examination and analysis of mining methods, indicating modifications to a basic mining system which makes for better adaptation to a particular ore body. Computer control of production and rapid re-assessment of the ore production capacity of a mine in relation to quantity and grade control.
3. Explosives Engineering: Characteristics of high explosive, classification of explosive compounds and mixtures; ammonium nitrate based explosive mixtures. Theories of detonation; rock fragmentation, theories of blasting, calculation of charge, bench blasting, short delay blasting, smoothwall blasting, submarine blasting. Ground vibration.
13. Coal Preparation: Coal constitution, core evaluation, non-destructive testing, interpretation of analyses for selective preparation, blending for utilization.
14. Mineralogical Assessment for Leaching: Analysis of Physical and chemical properties of mineral assemblages for process design, selection of solvents, methods of dissolution, solvent extraction, precipitation, cementation, reining.
15. Flowsheet Planning: Assessment of mineral properties; extraction processes and environmental conditions for the basis of process design. Selection of technology to be adopted; assemblage, selection and location of equipment. Fluid-solids flows; design of auxiliary units. Development and presentation of flowsheets and material balances.

7.414R
Mineral Industry Elective Project
For students in the BSc(Eng) and BSc(Tech) courses, based on the syllabus for 7.414: Literature survey and thesis.

Graduate Study
Generally the subjects are of three hours' duration per week or multiples of that time.

7.001G
Exploratory Drilling and Development
Drilling equipment and technology. Deep boring. Selection of drilling
methods. Deflection and deviation in diamond drilling; drill hole surveys. Development and exploitation of mineral resources; shaft sinking, tunnelling, excavation methods.

7.111G Mining Engineering
1. Surveying methods in the development and exploitation of mineral resources. Mine development, drilling equipment and techniques. Explosives, their characteristics and properties. Shaft sinking, tunnelling, excavation methods

7.122G Mining Engineering Technology
1. Mine ventilation, mine atmospheres, quality and properties of mine air, contaminants, toxicity of mineral particles and gases, thermodynamics of mine air, network analyses, air conditioning in mines. Mine safety, health, mine hygiene, noise control.
2. Mining lighting, electrical power distribution, generation and recirculation of compressed air. Materials handling, fundamental concepts. Surface and underground haulage systems, design of conveyors and locomotives, mine hoisting, design criteria. Mine drainage.
6. Subsidence phenomena associated with mine workings. Methods of working and design of structures to minimize damage.

7.132G Mining Engineering Laboratory
A selection of advanced laboratory exercises in sampling and valuation, mine support, temporary or long term; mine design and plant related to extraction areas 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
2. Principles and design of natural and artificial support systems. Interrelation of temporary, stabilizing and long term support. Support of permanent mining and civil engineering openings. Support at the face and in the waste. Control of ground in the vicinity of production excavations; mine filling, its source, characteristics and application.
3. Design and construction aspects of open pit slopes and tailing dams.

7.152G Mining Conservation
The reclamation of excavated land; integration with operational stages of mining. Mining cycles of alluvial, strip, and open-cuts, land clearing prior to mining, 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, air conditioning, ventilation planning, surveys, and network analysis. Computer applications. Selected laboratory experiments and network designs.

7.154G Rock Excavation and Transportation
Methods of rock fragmentation drilling, explosives, 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. Selection procedures, cost analysis.

7.311G Mineral Beneficiation

7.322G Mineral Beneficiation Technology
1. Fluid mechanics of mineral pulps, free hindered and zone settling, thickening, classification, hydrocyclones, dewatering, filtration. Gravity concentration, jigging, sink and float, flowim film, fluidized beds.
2. Interfacial phenomena, the structure of solid-water, air-water, solid-air and oil-water interfaces. Experimental techniques applicable to the study of these interfaces. Electrophoretic theory, electrical double layer interaction. Adsorption mechanisms. Collectors, activators, depressants, modifiers, frothers, flocculants.

7.332G Mineral Engineering Laboratory
Laboratory investigations may be selected from the following classifications according to availability and specialization: metalliferous ore concentration; coal preparation; beneficiation of non-metallics; processing of mineral fluids.
7.351G
Mineral Beneficiation
Process design based upon assessment of 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 and mineral processing operations carried out on mine leases. Cases are selected for examination and analysis, and a critical review must be written of the operations analysed.

Textbooks
For all Mining and Mineral Engineering Graduate Subjects
Baxter C. H. & Parks R. D. Examination and Valuation of a Mineral Property Addison-Wesley
Cameron E. N. Ore Microscopy Wiley
Jaeger J. C. & Cook N. G. W. Fundamentals of Rock Mechanics Methuen
Lewis R. S & Clark G. B. Elements of Mining Wiley
Peele R. Mining Engineers Handbook 3rd ed Vols I & II Wiley
Pfleider E. P. & Eugen D. Surface Mining A.I.M.E.
Rose H. E. & Sullivan R. M. Ball Tube and Rod Mills Constable
Taggart A. F. Handbook of Mineral Dressing Wiley
Woodruff S. D. Methods of Working Coal and Metal Mines 3 vols Pergamon

School of Civil Engineering

Undergraduate Study

8.112
Materials and Structures S1 + S2 L1T2
Properties of Materials: Mechanical behaviour of materials; response to static and dynamic loads. Laboratory techniques. Analysis and presentation of experimental results. Use of material properties in analysis and design.

8.171
Mechanics of Solids I
This subject forms part of 5.020 Engineering B and 5.030 Engineering C.
Concepts of stress, strain. Stress and deformation due to axial force; linear and non-linear problems; compound bars. Concepts of stiffness and flexibility. Bending moment and shear force in simple beams. First and second moments of area. Stress and deformation due to bending; linear and non-linear problems; use of step functions.
Textbook
Hall A. S. Introduction to the Mechanics of Solids SI ed Wiley

8.172
Mechanics of Solids II SS L2T2
Structural statics. Bending moments, shear force and torsion. Stresses due to shear force in solid and thin-walled sections; shear centre. Torsion of circular, non-circular and thin-walled sections. Principal stresses and strains; yield criteria. Combined stresses. Concepts of instability.
Textbook
Hall A. S. Introduction to the Mechanics of Solids SI ed Wiley

8.250
Properties of Materials
Textbook

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

Graduate Study

8.708G
Finite Element Methods in Civil Engineering I

8.753G
Soil Mechanics I
Soil pedology, fabric studies, unsaturated soils, transient water flow in soils.

8.901G
Civil Engineering Elective I
A Session 1 occasional elective on a civil engineering topic, selected according to current demand and availability of local and visiting specialists.
Undergraduate Study

9.121 Livestock Production I
The sheep and beef cattle industries and their place in the economic life of Australia; levels of production and trends. The physical, biological, managerial and economic conditions influencing production. Sheep producing zones. Sheep breeds for wool production. Cross-breeding, prime lamb production. Sheep management; nutrition, reproduction, survival.

Textbooks

9.122 Livestock Production II

Textbooks

9.123 Livestock Production III

Textbooks

9.124 Livestock Production IV

Textbooks

9.131 Animal Health and Preventive Medicine I

9.132 Animal Health and Preventive Medicine II

9.221 Agronomy

9.231 Pastoral Agronomy
Pasture ecology. Establishment, management and utilization of pastures and fodder crops. Vegetation management in arid and semi-arid areas. Pasture research techniques.

Textbooks for 9.221 and 9.231

9.232 Crop Agronomy

9.311 Agricultural Economics I
The nature and development of agricultural economics and farm management. Theory and practical applications of production economics principles and the analysis of production functions.
Theory, construction and analysis of cost curves. Economies of size and the problem of optimum farm size.

Introduction to price theory. The nature and derivation of supply and demand relationships, and of factors which affect these relationships. Illustration of the role of price theory in the analysis of agricultural policies. Problems in the empirical estimation of supply and demand.

Textbooks
Bishop C. E. & Toussaint, W. D. Introduction to Agricultural Economic Analysis Wiley
Headley E. O. Economics of Agricultural Production and Resource Use Prentice-Hall

9.312 Agricultural Economics II

The structure and functions of agricultural marketing systems and institutions. Use of price theory in the examination of problems and policies affecting marketing systems. Effects on agricultural markets of subsidies, taxation, population growth and economic development.

Introduction to the theory of international trade and international monetary mechanisms. Interrelationships between trade policies and agricultural policies.

Review of current issues in agricultural policy: the small farm problem and declining industries; rural credit policies.

Textbooks as for 9.311, plus:
Williams D. B. ed Agriculture in the Australian Economy Sydney UP

9.313 Farm Management I

Farm management planning methods: gross margins analysis; simplified programming; partial budgeting; parametric budgeting; whole-farm budgeting; development budgeting and cash flow budgeting. Discounting methods, taxation provisions and rural credit facilities affecting evaluation of rural investments.

Principles and practice of methods of valuation of rural assets. Land tenure and systems of title.

Financial and production records and accounts. Coordination of managerial accounts with taxation requirements. Current developments in managerial accounting for rural industries. Use of farm records as indicators of economic efficiency and as sources of information for normal farm planning methods.

Textbooks
Castle E. N. & Becker M. H. Farm Business Management Macmillan NY
Joint Committee on Standardisation of Farm Management Accounting Accounting and Planning for Farm Management Dept Primary Industries Brisbane
Hardaker J. B. Lewis J. N. & McFarlane G. C. Farm Management and Agricultural Economics A & R
Meredith G. G. Rickards P. A. & Pearse R. A. Farm Management Accounting: A Commentary Professional Farm Management Guidebook No 2 2nd ed UNE Armidale
Rickards P. A. & McConnell D. J. Budgeting, Gross Margins & Programming for Farm Planning Professional Farm Management Guidebook No 3 UNE Armidale

9.314 Farm Management II

Mathematical programming applications in agricultural industries: linear programming in static and development situations; parametric linear programming; Monte Carlo programming approaches; dynamic programming. Game theory, inventory analysis and other approaches to planning in uncertain or risky situations.

Textbooks
Dent J. B. & Casey H. Linear Programming and Animal Nutrition Crosby Lockwood
Headley E. O. & Candler W. Linear Programming Methods Iowa State UP
Throsby C. D. Elementary Linear Programming Random House

9.315 Farm Management III

Economic aspects of technical agricultural research, with emphasis on the evaluation and interpretation of research results at the farm level. Design and analysis of research projects for estimation of response relationships between rural resources and products. Problems in interpretation and application of these estimates.

Simulation of farm management systems and data requirements for simulation.

Textbooks
Dent J. B. & Anderson J. R. Systems Analysis in Agriculture Wiley
Dillon J. L. The Analysis of Response in Crop & Livestock Production Pergamon
Headley E. O. & Dillon J. L. Agricultural Production Functions Iowa State UP

9.316 Analysis of Rural Development Projects

Justifications for public investment in rural development. Australian developments in Federal-State financial relationships affecting the planning and evaluation of public development projects.

Evolution of cost-benefit analysis techniques. Theory of cost benefit analysis, and problems in its application, illustrated by case studies.

Input-output models and measurement of the impact of development projects on regional and national economies.

Textbooks
Commonwealth of Australia Investment Analysis—Supplement to the Treasury Information Bulletin Govt Printing Office Canberra
Davidson B. R. The Northern Myth MUP
Eckstein O. Water Resources Development Harv. UP
McKean R. N. Efficiency in Government Through Systems Analysis Wiley
Mishaw E. J. Cost Benefit Analysis Allen & Unwin
Patterson R. A. The Economic Justification of the Ord River Project 38th Cong ANZAAS 1965

9.411 Agricultural Chemistry I

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, cyanogenetic glycosides, isomerizations and transcinnamyl. Collodions and gel structures. Introductory heterocyclic chemistry, poisonous plants and alkaloid detection. Trace metals and soil analysis.
9.412 Agricultural Chemistry II  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  L3

While particular emphasis will be given to the nutritional requirements of sheep, those of other farm livestock will be dealt with in this section.

Textbooks
Crampton E. W. Applied Animal Nutrition Freeman
Dougherty R. W. et al Physiology of Digestion in the Ruminant Butterworths

9.531 Wool Technology I  L4T3

Textbook
Henderson A. E. Growing Better Wool A. H. & A. W. Reed

9.532 Wool Technology II  L2
Practical wool sorting, wool classing and appraisal. Objective clip preparation, presale testing and sale by sample. The physical handling and conversion of the Australian clip.

Textbook
Dawes K. Objective Measurement of Wool NSWUP

9.533 Wool Technology III  L1T2
Wool Metrology: Theories of sampling and measurement of wool characteristics. Laboratory procedures. Chemical and physical testing of raw wool. Estimation of wool damage.

Textbook
Aust. Wool Board Objective Measurement of Wool in Australia Parts I II and III

9.534 Wool Technology IV  L2
Raw Materials: Fibres other than wool; their properties, uses and identification.

9.535 Wool Technology V  L1T1
Wool Study: Relationships between subjective appraisal and objective measurement. Sampling and testing of baled bulks from Field Stations and commercial clips. Developments in wool marketing.

Textbook
Dawes K. Objective Measurement of Wool NSWUP

9.536 Wool Technology VI  L2T2
Wool Science: Fine structure of the fibre, chemical composition, wool fibre physics, chemical reactivity, mechanical properties and developments in wool technology.

Textbook
Onions W. J. Wool Benn

9.601 Animal Physiology I  L2T3
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. Reproduction. The endocrine system with particular emphasis upon growth, reproduction, lactation and stress. The nervous system and its excitation and transmission. Physiology of digestion, the gastro-intestinal tract and of the kidney. Heat tolerance and climatic adaptation.

Textbooks
Frye B. E. Hormonal Control in Vertebrates Macmillan
Putton J. F. Textbook of Physiology Saunders
Perry J. S. The Ovarian Cycle of Mammals Oliver & Boyd
Sampson Wright Applied Physiology 10th ed OUP

9.602 Animal Physiology II  L2
Major aspects of mammalian physiology relevant to animal production, behavioural physiology, reproduction in the female and lactation, senem physiology. Introductory courses on environmental physiology, lower gut physiology, respiratory gas transport, renal function, the physiology of gene action, ageing and the problem of chemical residues will be given.

9.603 Animal Physiology III  L2T2
Mammalian physiology directed towards domestic livestock production and homeostatic mechanisms. Emphasis will be placed upon techniques. Active transport and allied membrane phenomena. Co-ordinator systems (neural, humoral), reproduction and lactation. Development physiology. General metabolism and its regulation; the physiology and metabolism of specific organs—heart, muscle, liver, kidney. The physiology of the mammalian digestive tract. Environmental physiology; adaptive mechanisms, especially in the newborn, and in heat tolerance, the immune reaction. Electrolyte physiology; acid-base equilibrium of
the organism; use of clearance values in measuring renal and liver activity; respiration; techniques of gas analysis and respirometry. Circulation, cardiac output and distribution (experimental techniques), special vascular circuits (pulmonary, cerebral, hepatic, splenic, renal, testicular). Physiology of the skin.

Textbooks
Cole H. H. & Cupps P. T. eds Reproduction in Domestic Animals 2nd ed Academic
Donovan B. T. Mammalian Neuroendocrinology McGraw-Hill
Sampson Wright Applied Physiology 10th ed OUP

9.801
Genetics I
L2T½

Textbooks
Falconer D. S. Introduction to Quantitative Genetics Oliver & Boyd
Fraser A. S. Heredity, Genes and Chromosomes McGraw-Hill

9.802
Genetics II
L2T2

Textbooks
As for 9.801.

9.811
Biostatistics
L2T2

Textbook
Snedecor G. W. & Cochran W. G. Statistical Methods 6th ed Iowa State UP

9.901
Rural Extension
L2T2

Textbook
Rogers E. M. Diffusion of Innovations Collier Macmillan

Graduate Study

9.105G
Advanced Livestock Production
L4
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
L2T4

9.711G
Advanced Wool Technology
L2T2

9.902G
Techniques of Laboratory and Field Investigation
L2T2

School of Mathematics

Undergraduate Study

10.001
Mathematics I
Calculus, analysis, analytic geometry, linear algebra, an introduction to abstract algebra, elementary computing.

Preliminary Reading List
Bell E. T. Men of Mathematics 2 vols Pelican
Courant R. & Robbins H. What is Mathematics? OUP
Pólya G. How to Solve It Doubleday Anchor
Sawyer W. W. A Concrete Approach to Abstract Algebra Freeman
Sawyer W. W. Prelude to Mathematics Pelican

Textbooks
Blatt J. M. Basic Fortran IV Programming Miditran Version Computer Systems (Aust)
Shields P. C. Elementary Linear Algebra 2nd ed Worth
Thomas G. B. Calculus and Analytic Geometry 4th ed Addison-Wesley
Subject Descriptions and Textbooks

10.011 Higher Mathematics I
Calculus, analytic geometry, linear algebra, an introduction to abstract algebra, elementary computing.

Preliminary Reading List
As for 10.001 plus:
David F. N. Games, Gods and Gambling Griffin
Felix L. The Modern Aspect of Mathematics Science
Huff D. How to Lie with Statistics Gollancz
Reid C. From Zero to Infinity Routledge

Textbooks
Fagg S. V. Differential Equations EUP
Spivak M. Calculus Benjamin
Crowell R. H. & Williamson R. E. Calculus of Vector Functions Prentice-Hall
Hochstadt H. Differential Equations Holt Rinehart & Winston
Lang S. Linear Algebra Addison-Wesley
Murdoch D. C. Linear Algebra for Undergraduates Wiley
Spivak M. Calculus on Manifolds Benjamin

10.021 Mathematics IT
Calculus, analysis, analytic geometry, algebra, probability theory, elementary computing.

Textbooks
Blatt J. M. Basic Fortran IV Programming Miditran Version Computer Systems (Aust)
Greening M. G. First Year General Mathematics NSWUP
Youse B. K. & Salnaker A. W. Calculus for the Social and Natural Sciences International Textbook Co

10.022 Engineering Mathematics II
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, eigen values and their numerical evaluation; vector algebra and solid geometry; multiple integrals; introduction to vector field theory.

Textbooks
Giles E. Pretorius W. J. & Prokhovnik S. J. Supplement to Mathematical Methods Science Press

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

Textbooks

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

Textbooks
or
Keane A. & Senior S. A. eds Mathematical Methods 2nd ed Science Press
and
Giles E. Pretorius W. J. & Prokhovnik S. J. Supplement to Mathematical Methods Science Press

10.111A Pure Mathematics II—Linear Algebra
Vector Spaces: inner products, linear operators, spectral theory, quadratic forms. Linear Programming: convex sets and polyhedra, feasible solutions, optimality, duality.

Textbook
Tropper A. M. Linear Algebra Nelson Paperback

10.111B Pure Mathematics II—Analysis
Real analysis; partial differentiation, multiple integrals. Analysis of real valued functions of one and several variables. Complex analysis; analytic functions, Taylor and Laurent series, integrals, Cauchy’s theorem, residues, evaluation of certain real integrals, maximum modulus principles.

Textbooks
Session 1
Kolman B. & Trench W. F. Elementary Multivariable Calculus Academic
Session 2
Churchill R. V. Complex Variables and Applications ISE McGraw-Hill

10.121A Higher Pure Mathematics II—Algebra
Linear Algebra: vector spaces, commutative rings, polynomials, modules, linear transformations, eigenvalues, invariant subspaces, canonical forms, linear functions, bilinear and multi-linear algebra. Group Theory: sub-groups, quotient groups, isomorphisms, Lagrange’s theorem, Sylow’s theorem.

Textbooks
Clark A. Elements of Abstract Algebra Wadsworth
Hoffman K. & Kunze R. Linear Algebra Prentice-Hall

10.121B Higher Pure Mathematics II—Real and Complex Analysis
Construction of reals; uniform convergence; implicit and inverse function theorems; analytic functions; Laurent and Taylor series; calculus of residues.

Textbooks
Session 1
Williamson R. E. Crowell R. H. & Trotter H. F. Calculus of Vector Functions Prentice-Hall
Session 2
Jameson G. J. D. A First Course on Complex Functions Chapman & Hall
Knopp K. Elements of the Theory of Functions Dover

10.211A Applied Mathematics II—Mathematical Methods
Review of functions of two and three variables, divergence, gradient,
curt; line, surface, and volume integrals; Green's and Stokes' theorems. Special functions, including gamma and Bessel functions. Differential equations and boundary value problems, including vibrating string and vibrating circular membrane; Fourier series.

Textbooks
Sneddon I. N. Fourier Series Routledge
Spiegel M. R. Advanced Mathematics for Scientists and Engineers Schaum
Spiegel M. R. Theory and Problems of Vector Analysis Schaum

10.221A
Higher Applied Mathematics II—Mathematical Methods
As for 10.211A but in greater depth.

Textbooks
Queen N. M. Vector Analysis McGraw-Hill
Rabenstein A. L. Introduction to Ordinary Differential Equations Academic Int ed

10.331
Statistics SS
An introduction to the theory of probability, with finite, discrete and continuous sample spaces. The standard elementary univariate distributions: binomial, Poisson and normal; an introduction to multivariate distributions. Standard sampling distributions, including those of $\chi^2$, $t$ and $F$. Estimation by moments and maximum likelihood (including sampling variance formulae, and regression); confidence interval estimation. The standard tests of significance based on the above distributions, with a discussion of power where appropriate. An introduction to experimental design: fixed, random and mixed models, involving multiple comparisons and estimation of variance components.

Textbooks
Statistical Tables
Freund J. E. Mathematical Statistics 2nd ed Prentice-Hall
Kreigie E. Introductory Mathematical Statistics Wiley

School of Textile Technology

Undergraduate Study

13.111
Textile Technology I


Textbook

13.112
Textile Technology II


Textbook
Peters R. H. Textile Chemistry Vol 2 Elsevier

13.113
Textile Technology III


Textbook
Peters R. H. Textile Chemistry Vol 1 Elsevier

13.211
Textile Science I


Textbook
Peters R. H. Textile Chemistry Vol 1 Elsevier

13.212
Textile Science II


Textbook
Hearie J. W. S. Grosberg P. & Backer S. Structural Mechanics of Fibres, Yarns and Fabrics Vol 1 Interscience
13.213  
Textile Science III  
Textbook  
Wright W. D. The Measurement of Colour 4th ed Adam Hilger

13.223  
Advanced Textile Chemistry  
Textbook  
Bird C. L. & Boston W. S. The Theory of Coloration of Textiles Dyers Co Publ Trust

13.233  
Advanced Textile Physics  
(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  
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  

13.313  
Advanced Textile Engineering  
(a) Same as (a) in 13.233 Textile Physics.  
(b) Heat and mass transfer. Conveying of gases, fluids and solids.

14.081  
Introduction to Financial Analysis  
Aims to provide students, other than those enrolled within the Faculty of Commerce, with an understanding of the basic concepts and principles necessary to make effective financial management decisions. The course includes training in methods of psychological enquiry, and the use of elementary statistical procedures.  
Textbooks  
Lumsden J. Elementary Statistical Method WAUP  
Selected Scientific American reprints, as advised by the School

14.501  
Accounting and Financial Management IA  
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.  
Textbooks  

14.511  
Accounting and Financial Management IB  
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.  
Textbooks  
As for Accounting and Financial Management IA

14.602  
Information Systems  
Management information systems, including data collection and processing, internal control and internal reporting. System design and computer applications.
School of Economics

Undergraduate Study

15.001 Economics IA
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.

Textbooks
Tisdell C. A. Economics of Markets: An Introduction to Economic Analysis Wiley
Tisdell C. A. Workbook to Accompany Economics of Markets Wiley

15.011 Economics IB
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.

Textbooks
Rowan D. C. Output, Inflation and Growth Aust ed Macmillan

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

Textbook
Ferguson C. E. Micro-Economic Theory 3rd ed Irwin

15.022 Economics IIB
An introduction to welfare economics and its application to some contemporary problems of public policy.

Textbooks
Ferguson C. E. Micro-Economic Theory 3rd ed Irwin
Layard R. ed Cost-Benefit Analysis Penguin
Mishan E. J. Cost-Benefit Analysis Allen & Unwin

15.042 Economics IIC
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.

Textbooks
Nevile J. W. Fiscal Policy in Australia 2nd ed Cheshire
Rowan D. C. Output Inflation and Growth Aust ed Macmillan
Wrightsman D. An Introduction to Monetary Theory and Policy Free Press

15.082 Labour Economics
The theory of the labour market and applications to the Australian situation, including labour supply and demand, with emphasis on structural changes in the labour force, and the effects of technology and migration; work-leisure preferences; unemployment and underemployment; wage theory and practice, with reference to market forces, collective bargaining and government regulation; the Australian arbitration system and its interaction with other wage determinants; wage differentials.

Textbooks
Horn R. V. Australian Labour Market Economics Cheshire
Noland J. R. & Isaac J. R. eds Australian Labour Economics Readings Sun Books
Rees A. The Economics of Work and Pay Harper & Row

15.003 Economics IIIA
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.

Textbooks
Makin J. H. Macroeconomics Holt Saunders
Nevile J. W. Fiscal Policy in Australia 2nd ed Cheshire
Nevile J. W. & Stammer D. eds Inflation and Unemployment Pelican

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

Textbooks
McColl G. D. ed Overseas Trade and Investment Pelican

15.043 The Soviet Economy
A study of how basic economic problems are solved in the contemporary Soviet economy within a socialist institutional framework. The emphasis is on analysis of the actual operation of the Soviet economy and on an assessment of the extent to which and the efficiency with which it meets its own stated goals. For comparative, illustrative and analytical purposes reference is also made to other East European socialist countries, including Yugoslavia.

Textbooks
Bernard P. I. Planning in the Soviet Union Pergamon Press
Campbell R. W. Soviet-type Economics Macmillan
Dirlam J. B. & Plummer J. L. An Introduction to the Yugoslav Economy Merrill

15.053 Economic Development
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.

Textbooks
Bernstein H. Underdevelopment and Development Penguin
Spiegelglas S. & Welsh C. J. eds Economic Development's Prentice-Hall
Sutcliffe R. B. Industry & Underdevelopment Addison-Wesley

15.073 Natural Resource Economics
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.

Textbooks
Barnett H. J. & Morse C. Scarcity and Growth: The Economics of Natural Resource Availability Johns Hopkins UP
Dorfman R. & N. eds Economics of the Environment Norton

15.093 Public Sector Economics
Public goods and social issues, such as poverty, health, education, transport and conservation. Analysis of case studies employing cost-benefit analysis to evaluate public projects and examine economic, social and environmental impacts of investment projects. The pricing policies of public utilities.

Textbooks
Layard R. ed Cost-Benefit Analysis Penguin
Milward R. Public Expenditure Economics McGraw-Hill
Munby D. ed Transport Penguin
Turvey R. ed Public Enterprise Penguin
Turvey R. Economic Analysis and Public Enterprises Allen & Unwin

15.601 Economic History IA—The Making of Modern Economic Society
The purpose of this course is to provide a survey of the forces that have determined the pattern and course of economic development in the later nineteenth and twentieth centuries. Stages of economic development; the transformation of agrarian society; the triumph of industrialism and liberal democracy. Pax Britannica and the European hegemony. The First World War and capitalist society in crisis; competing forms of political and economic organization; shifts in world power. The quest for unity in Europe. Problems of affluence in advanced industrial economies. The development of the administrative state and the multi-national corporation. The progress of the underdeveloped nations.

Preliminary Reading
Hohenberg P. M. A Primer on the Economic History of Europe Part 1* 

Textbooks
Hosenberg E. E. A. Industrialization and Economic History McGraw-Hill*

15.611 Economic History IB—Australian Economic Development in the Twentieth Century
The aim of the course is to delineate and explain the origins and evolution of the modern Australian economy from Federation 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; the impact of war on the Australian economy; 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.

Preliminary Reading
Alexander F. Australia since Federation Nelson*

Textbooks
Boehm E. A. Twentieth Century Economic Development in Australia Longman*
Forster C. ed Australian Economic Development in the Twentieth Century Allen & Unwin*
Schedvin C. B. Australia and the Great Depression Sydney UP
Wheelwright E. L. & Buckley Ken eds Essays in the Political Economy of Australian Capitalism Vol I Australian and New Zealand Book Co*

Biological Sciences

Undergraduate Study

17.011 Biology of Mankind
Mankind Evolving: Primate evolution; background of early man.
Evolution of Technological Man: Biological problems associated with communication and tool-making; development of man as a hunting predator.
Development of Utilization of Natural Resources: Development of man as a pastoralist and farmer; animal and plant domestication.
Evolution of Urban Man, Culture, Society: Reproductive biology and genetics of man; population growth, fluctuation, control; natural history of disease, background of medical and industrial microbiology.
Effects of Modern Society: Biology of social stress; effect of society in contemporary environments, planning and control.

Textbooks
Abercrombie M. et al A Dictionary of Biology Penguin
Boughey A. S. Man and the Environment 2nd ed Macmillan

17.021 Comparative Functional Biology
Maintenance of the Organism: Gas exchange systems in plants and animals; transport inside organisms; uptake, digestion, absorption; enzymes structure and function; photosynthesis, process and structural relationships; metabolic systems, energy yields and pathways.
Developing Organisms: Sexual reproduction in plants and animals; general life cycle patterns; cell development and differentiation in flowering plants and mammals.
Control and Co-ordination in Organisms: Organisms and water, uptake and effects; control mechanisms, urinary systems and kidney structure and function; stimuli and responses, plant hormones, hormones in vertebrate animals, muscle activity and muscle structure, eye structure and vision mechanism; ear structure and hearing mechanism; nerves, central nervous system, nerve action, brain structure and functioning.

Textbooks
Abercrombie M. et al A Dictionary of Biology Penguin
Roberts M. B. V. Biology. Functional Approach Nelson*

* Paperback.
Department of Industrial Engineering

Undergraduate Study

18.121 Production Management S1 + S2 L3T0
Prerequisites: 10.031, 10.331.

Engineering Economy: Economic objectives of the firm. Economic measures of performance: net present value, annual equivalent value and the DCF rate of return (including the incremental rate of return) and their application in the selection and replacement of processes and equipment. The Use of Human and Physical Resources. Methods engineering, ergonomics, motion and time study, financial incentives, applications to machine controlled processes, work sampling and data collection. Plant location, factory layout. Production and Quality Control: Control of jobbing, repetitive batch and continuous production. Manufacturing organizations, functions, inter-relationships and information flow. Sampling techniques in quality control, control charts. Introduction to Inventory Control: Analysis of some engineering planning decisions. Introduction to Operational Research: The formulation and optimization of mathematical models of industrial processes. The development of decision rules. Some techniques of operational research and applications, eg mathematical programming, queuing theory, inventory models, simulation.

Textbooks
Buffa E. S.: Modern Production Management 3rd ed Wiley
Lu F. P. S.: Economic Decision-making for Engineers and Managers Whilcombe & Tombs
Moore P. G.: Basic Operational Research Pitman

18.551 Operations Research S1 + S2 L2T1
Prerequisites: either 5.071 and 18.021 or 10.031, 10.331 and 18.121.

The formulating and optimization of mathematical models. The development of decision rules. Some techniques of operations research such as mathematical programming, queuing theory, inventory models, replacement and reliability models, and simulation will be introduced. These techniques will be applied to situations drawn from industrial fields, eg production planning and inventory control. Practical problems of data collection, problem formulation and analysis will be included.

Textbook

School of Chemical Technology

Undergraduate Study

22.112 Chemical Process Equipment L1
Co- or prerequisite: 2.001.

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 L1½T2
Prerequisites: 2.002A, 22.112. Co- or prerequisite: 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 chemical industry—cellulose, industrial alcohols, formaldehyde, phenol, urea, phenolic and urea resins, acetic acid, polymers based on ethylene and acrylaine, 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.

Textbook

22.114 Processes S2 L2
Prerequisite: 22.113.

Topics selected from the following will be studied in depth: refractories, high-temperature processes, high pressure processes (especially ammonia synthesis—thermodynamics and equipment), nuclear metals, industrial polymers, fermentation industries (for details see 42.114 Fermentation Processes), applied electrochemistry.

22.122 Instrumental Analysis L1T2
Prerequisites: 1.001, 2.001. Co- or prerequisite: 22.132.

Basic principles of volumetric and gravimetric analysis and the application of spectrometry and selected techniques to the analysis of process streams and quality control.

Textbook

22.123 Chemical Thermodynamics and Kinetics L1½T1½


Textbooks
Smith N. O.: Chemical Thermodynamics—A Problems Approach Reinhold

22.124 Applied Kinetics S1 L2T1
Prerequisite: 22.123.

The defect solid state; solid-state diffusion; heterogeneous catalysis.
Subject Descriptions and Textbooks

22.132 Industrial Chemistry Calculations
Prerequisites: 2.001, 10.001.
Conversion of units; the role of stoichiometry in industrial chemistry; the influence of the dynamic situation; transposition of chemical and physical data; evaluation of the accuracy of data from experimental analytical measurements. Development of algorithms for the solution of selected examples relevant to the process chemical industry.

Textbooks
Smith J. M. Chemical Engineering Kinetics McGraw-Hill

22.133 Data Processing
Prerequisites: 10.331, 22.132.
Computer programming and numerical methods: Fortran IV and Basic II programming, solution of equations (Newton-Raphson), simultaneous linear algebraic equations, numerical differentiation and integration, interpolation, ordinary differential equations, partial differential equations, least squares approximations, matrix operations, numerical optimization (Simplex method), linear programming, linear models with one and more than one independent variable, non-linear models. Application of the principles of statistics to chemical problems (z test, t test, F test and 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.

Textbooks
Dorn W. S. & McCracken D. D. Numerical Methods with Fortran IV Case Studies Int ed Wiley
McCracken D. D. A Guide to Fortran IV Programming 2nd ed Wiley

22.134 Applied Thermodynamics
Prerequisites: 22.123, 22.153.
Calculation of thermodynamic properties, statistical methods for calculation of thermodynamic properties of gases from spectroscopic data, thermodynamics of non-ideal solutions, polymers and the glassy state, changing standard states. A study of heterogeneous equilibria in multicomponent systems with particular emphasis on systems of practical importance.

Textbooks
Karbowiak A. E. & Huey R. M. eds Information, Computers, Machines and Man Int ed Wiley
Luyben W. L. Process Modelling, Simulation and Control for Chemical Engineers McGraw-Hill

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.

Textbooks
Karbowiak A. E. & Huey R. M. eds Information, Computers, Machines and Man Int ed Wiley
Luyben W. L. Process Modelling, Simulation and Control for Chemical Engineers McGraw-Hill

22.144 Instrumentation and Process Control
Prerequisites: 12128, 10.031.
Instrumentation (primary sensitive elements and final control elements concerned with the parameters normally encountered in the chemical industry), elementary principles of digital computation, process dynamics, open-loop process system analysis, principles of analogue computation and simulation, automatic process control systems.

Textbooks
Karbowiak A. E. & Huey R. M. eds Information, Computers, Machines and Man Int ed Wiley
Luyben W. L. Process Modelling, Simulation and Control for Chemical Engineers McGraw-Hill
Students will be required to deliver two lecturettes 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.

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.

Textbook
Maennia A. M. Chemical Engineering Process Analysis Oliver & Boyd

22.213 Chemical Ceramics S1 L2T2 S2 L2T4
Prerequisites: 2.002A, 2.002C, 2.002D.
Co- or prerequisites: 22.123A, 22.2331, 25.201.

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.

Textbook
Ford W. F. Institute of Ceramics Textbook Series, IV Effect of Heat on Ceramics MacIiren

22.224 Physical Ceramics L3T3
Prerequisites: 22.213, 22.2331.

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.

Textbooks
Budworth D. W. An Introduction to Ceramic Science Pergamon
Kingery W. D. Introduction to Ceramics Wiley

22.231 Introductory Ceramic Engineering
The nature of ceramic materials, the history of ceramics and the ceramic industry, the structure of the ceramics industry and the role of the ceramic engineer.

22.2331 Ceramic Process Principles L1½T2½
Clay and non-clay raw materials; unit operations in the ceramic industry; beneficiation, forming, drying, firing, melt forming, hot forming and miscellaneous forming processes. Testing methods and instrumentation in quality control. Stoichiometry and ceramic calculations, including glaze, porcelain enamel and body formualtion.

Students are required to take part in a series of factory inspections.

Textbooks
Ford R. W. Institute of Ceramics Textbook Series, III. Drying MacIiren
Griffiths R. & Radford C. Calculations in Ceramics I. T. A. Calculations in Ceramics Macliren
Moore F. Institute of Ceramics Textbook Series, II. Rheology of Ceramic Systems Macliren
Worrall W. E. Institute of Ceramics Textbook Series, I. Raw Materials Macliren

22.2332 Ceramic Engineering I L1
Co- or prerequisites: 3.311, 7.023/2, 22.2331.

The principles of operation, construction and fields of application of equipment used in the mining, preparation, and fabrication of raw materials, and the drying and firing of ceramic products.

22.234 Ceramic Engineering II L2T2
Prerequisites: 3.111, 8.112, 22.2331, 22.2332.


Students are required to take part in a series of factory inspections.

22.294 Project S1 T3 S2 T12
Prerequisites: 22.213, 22.2331, 10.331.
Co- or prerequisites: 22.224, 22.234.

22.303 Polymer Science S1 L2 S2 L2T2
Prerequisites: 2.002A, 2.002B, 10.031, 3.311.
Co- or prerequisites: 3.111, 22.113.


Textbooks
Lenz R. W. Organic Chemistry of Synthetic High Polymers Wiley
Cowie J. M. G. Polymers, Chemistry and Physics of Modern Materials Intertext
Treloar L. R. G. The Physics of Rubber Elasticity Clarendon
McKelvey J. M. Polymer Processing Wiley
22.314
Polymer Chemistry
Prerequisite: 22.303
Inorganic polymers, polymers for high temperature service, the use of modern instrumental methods for establishing composition and structure of high polymers.

22.324
Physical Chemistry of Polymers II
Prerequisite: 22.303
Selected topics from basic texts and the original literature, covering anionic polymerization, polymer degradation, polymer rheology, polymer visco-elasticity, fracture and environmental stress cracking, polyelectrolytes.

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

Textbook
McKelvey J. M. Polymer Processing Wiley

22.341
Statistical Techniques
Prerequisite: 10.331.
The application in the Polymer industry of the z test, t test, $\chi^2$ test and F test, correlation of one and two variables, single factor and two factor analysis of variance.

Textbook

Graduate Study

22.110G
Process Evaluation
S1 + S2 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 reactors; residence time distributions; maximum mixedness and segregated flow; multiple steady states; control of tubular and stirred tank reactors.

22.131G
Catalysis 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 gassolid 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
S1 + S2 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 electronics, 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
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
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
Nature of refractories. Methods of manufacture and forms of refractories. Characterization of raw materials. The composition, structure, properties and production of typical refractory materials such as silica, alumina silicates, high alumina, basic materials and zircon. Special single and mixed oxides, carbides, nitrides and oxynitrides. Kiln furnishing, insulating products, refractory mortars and specialty mortars. Refractory evaluation tests. Chemical, mechanical and thermal properties: hot and cold modulus of rupture, cold crushing strength, refractoriness under load, creep resistance, thermal conductivity, thermal shock resistance, pyrometric cone equivalent, size stability, abrasion resistance, chemical resistance. Examination of macro- and micro-structures of refractories by optical microscopy of thin and polished sections, scanning electron microscopy, transmission electron microscopy, microprobe analysis. Behaviour of refractories in service. Chemical, physical and mechanical behaviour in typical installations. Discussions of case histories from ferrous and non-ferrous metallurgical industries, glass manufacture, boiler installations, cement and lime kilns and the aerospace and nuclear industries. Laboratory experiments and demonstrations will form part of the course.

22.300G
Polymer Science
Classification of polymers; methods of polymerization: bulk, solution, emulsion, suspension, high pressure; processes: step growth, chain growth; the chemistry and applications of polymer systems including polyesters, polyamides, phenolic condensation resins, vinyl polymers, synthetic elastomers. Natural polymers.
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.

22.310G
Analytical Characterization of Polymers
Composition of formulated polymeric material. Group reactions, specific and colour reactions. Instrumental characterization of polymers, and co-polymers and associated additives eg plasticizers, antioxidants etc. by UV and IR spectrophotometry and pyrolysis gas chromatography. Analysis of films by transmission and reflectance spectrophotometric methods. Thermal analysis.

22.330G
Polymer Engineering

22.340G
Polymer Physics

School of Nuclear Engineering

Graduate Study

23.051
Nuclear Power Technology
School of Applied Geology

Undergraduate Study

25.011 Geology I
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 epirogenesis, integrated theory of plate tectonics and continental drift.


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

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; landform 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.

Textbooks

Structural Geology
Ragan D. M. Structural Geology—An Introduction to Geometrical Techniques 2nd ed Wiley
Spencer E. W. Introduction to the Structure of the Earth McGraw-Hill

Mineralogy, Igneous and Metamorphic Petrology:
Bliss F. D. An introduction to the Methods of Optical Crystallography Holt Rinehart & Winston

Photogeology:
Von Bandial H. F. Aerogeology Gulf Pub.

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.

Textbooks
Durbar C. O. & Rodgers J. Principles of Stratigraphy Wiley

25.013 Geology IIIA


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

Mineralogy and Petrology


Sedimentary Petrology: The influence of transportation, deposition and diagenesis on the composition, texture and structure of detrital sedimentary rocks including limestones. The classification of the detrital sedimentary rocks. The chemically formed sedimentary rocks including the phosphates, zeolites, evaporites, ferruginous and siliceous deposits. Introduction to coal petrology.

Textbooks
Economic Geology A
Park C. F. & MacDiarmid R. A. Ore Deposits 2nd ed Freeman
Stanton R. L. Ore Petrology McGraw-Hill

Mineralogy and 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: Introductory course in exploration geophysics covering the following methods: seismic, electrical, electromagnetic, gravity, magnetic and radioactive with applications 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.

Textbooks
Stratigraphy and Palaeontology
As for Stratigraphy and Palaeontology in 25.022 with: Krumbein W. C. & Skloss L. L. Stratigraphy and Sedimentation Freeman

25.033 Geology IIIC

Mathematical Geology and Geological Surveying
Mathematical Geology. An introduction to the 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

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 petrofabaric 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 is 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—otope studies, trace elements, phase equilibria, inclusions in minerals.

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


Laboratory: Economic Geology and Mineralogy: Study of regional setting, current research, petrology and mineralogy of selected deposits dealt with in lectures.

2. Micropalaeontology

Morphology, stratigraphic distribution and significance of the principal microfossil groups: foraminifera, ostracods, conodonts, spores and pollen, dinoflagellates, coccoliths and chitinozoa. Extraction techniques.

3. Surficial Geology


Quaternary geology—methods of dating, sea level change, glacial sequences, surficial geology of non-glaciated areas of Australia—especially the Riverine Plain. Quaternary sequences in Canada and Europe.

Textbooks
Mathematical Geology and Geological Surveying
Geochemistry and Petrology
Introductory Geomechanics: Engineering classification behaviour, and testing of rocks and soils. Stress and strain: elasticity and plasticity, stress distribution in virgin rock masses, about excavations, and beneath foundations.
25.0303
Geology for Geomorphologists and Pedologists

Prerequisites: Geoscience 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, evaporites, 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.

Textbooks

Folk R. L. Petrology of Sedimentary Rocks Univ of Texas Press
Loughnan F. C. Chemical Weathering of Silicate Minerals American Elsevier
Milner H. B. Sedimentary Petrography 4th ed Arnold

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 tectonics. 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.

Textbooks

Blyth F. G. H. & Defitis M. H. A Geology for Engineers 6th ed Arnold
Ernst W. G. Earth Materials Prentice-Hall
Rutley F. Elements of Mineralogy Read H. H. ed 26th ed Murby London

25.102
Geology for Engineers II


Practical Work: The study of fossils in hand specimens. Relative age interpretation using geological maps and stratigraphic correlation diagrams.

Structural geology: A detailed study of the structural aspects of folds, faults, joints of metamorphic, igneous and sedimentary rocks, including regional stress distribution. Analysis of geological structures using stereographic methods.


Energy sources: The nature and origin of coal and coal seams including type and rank. The origin of oil and gas and their mode of accumulation. The mode of formation and occurrence of water resources.

Practical Work: Study of coal in hand specimens and under the microscope.

Ore Deposits: The mineralogy of metallic and non-metallic minerals of industrial importance. Principles and theories of ore formation within the igneous, metamorphic and sedimentary cycles. Structural control of ore deposition. Aspects of weathering and secondary enrichment processes in relation to ore deposits.

Practical Work: Study of economic minerals and ores in hand specimens and in polished sections using polarised reflected-light microscopy.


Practical Work: Feasibility interpretations of geological maps. Structure contour mapping as applied to surface and underground mining. Ore reserve estimations.

Geophysics: The principles, methods and applications of geophysical exploration viz gravity, magnetic, electrical, seismic, radioactive and miscellaneous.

Practical Work: Demonstration of geophysical instruments. Interpretation of geophysical data.

Field Tutorials: Field Tutorial(s) are conducted during the Semester. Attendance is compulsory and satisfactory reports are to be submitted.

Textbooks

Ragan R. Structural Geology 2nd ed Wiley
Rutley F. Elements of Mineralogy Read H. H. ed 26th ed Murby London
Park F. Jr Roy A. MacDiarmid Ore Deposits 2nd ed Freeman
Lawrence L. J. ed Exploration and Mining Geology Vol 2 8th Commonwealth Min and Met Congress 1965

25.1021
Geology for Mining Engineers (BSc(Tech) and BSc(Eng))

An abridged version of 25.102.


25.141
Advanced Engineering Geology

Prerequisites or co-requisites: 8.272 Civil Engineering Materials I.

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.

Textbook

Ragan D. M. Structural Geology 2nd ed Wiley
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—Microscopic 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.

Textbooks
Hurlbut C. S. ed Dana’s Manual of Mineralogy Wiley
Rutley F. Elements of Mineralogy Read H. H. ed 26th ed Murby

Graduate Study

25.121G
Engineering Geology

Textbook
Phillips F. C. The Use of the Stereographic Projection in Structural Geology Arnold

25.331G
Applied Geophysics I


Radioactive, Thermal and Other Ancillary Methods in Ground and Airborne Remote Sensing Techniques: The application of geophysical techniques to bore-hole logging in petroleum engineering and mineral exploration.

Textbooks
Keller G. V. & Frischknecht F. C. Electrical Methods in Geophysical Prospecting Pergamon

25.333G
Applied Geophysics IIA

Textbooks
Keller G. V. & Frischknecht F. C. Electrical Methods in Geophysical Prospecting Pergamon

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; computerised 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.

25.342G  
**Hydrogeology**

Surface and sub-surface methods of geological and geophysical investigation; well logging; lithology and structure of rocks in relation to groundwater storage and quality. Geological characteristics of aquifers. Hydrogeological maps. Hydrogeological systems analysis, including computer methods. Hydrogeology of arid and semi-arid zones. Groundwater resources evaluation. Case history studies. The laboratory work will include the study and interpretation of hydrogeological data. A field tutorial is included in the course.

Textbooks
Davis S. N. & De Wiest R. J. M. **Hydrogeology** Wiley
Heath R. C. & Trainor F. W. **Introduction to Groundwater Hydrology** Wiley

25.404G  
**Environmental Geology**


25.343G  
**Foundation Geology**


Textbook

25.701G  
**Subsurface Geology and Pollution Control**

Lithology of main rock types involved in subsurface waste disposal; mass properties of rocks affecting fluid flow, porosity, permeability, capillarity and their inter-relationships. Elements of structural geology, stratification, lenticularity, folding, faulting, unconformities; use of structural contours in subsurface geology; interpretation of simple geological maps. Hydrostatic and hydrodynamic conditions in subsurface flow of liquids and gases; reservoir engineering topics, compressibility, rock pressure. Design and cementation of casing strings; importance of preservation of subsurface waters, especially fresh water aquifers; rational exploitation of subsurface water for domestic and industrial use. Technology of subsurface disposal of wastes—liquid, gaseous and solid, including radioactive wastes. Some ethical considerations and statutory requirements of governmental bodies. Investigation of sedimentary basins and individual structures for waste injection. Case histories, e.g., Rocky Mountain Arsenal Well.
Subject Descriptions and Textbooks

School of Geography

Undergraduate Study

27.001
Applied Physical Geography  L2T4

Textbooks
Bridges E. M. World Soils C.U.P.*
Corbett J. R. The Living Soil Martindale
Miller A. Meteorology Merrill*
Twidale C. R. Geomorphology Nelson*
Whittaker R. H. Communities and Ecosystems Macmillan*

27.011
Applied Economic Geography I  L2T4
Part 1. (Session 1): Basic concepts and approaches employed in the study of space economy. Spatial interaction and the analysis of movement patterns; location, land use, rent theory and comparative advantage; location of manufacturing, location of service activities and the central place system; spatial aspects of economic growth and development. Australian case studies are stressed. Laboratory classes deal with acquisition and handling of data.

Textbook
Hurst M. E. A Geography of Economic Behaviour Duxbury

Part 2. (Session 2): The role of urban areas as focal points in the structure and organization of the space economy. The spatial structure and growth of urban networks and the internal characteristics of urban areas. Topics include: urbanization in developed and underdeveloped economies; the urban growth process; location, size and spacing of urban areas; the internal structure of cities; an economic analysis of urban problems. Laboratory classes deal with statistical methods in economic geography.

27.002
Applied Economic Geography II  L2T4
Classical and more recent adaptations of location theory, in particular those of Weber, Greenhut, Losch and isard; spatial price theory and the location of the firm. Methods of location analysis: comparative cost analysis, input-output, spatial interaction models, linear programming, resource assessment in economic terms. Location policies and problems in differing economic systems.

Textbook
Wilson A. G. Urban Regional Models in Geography Wiley

27.013
Advanced Methods in Economic Geography  L2T3/4
Student projects based on instruction in research design, data sources, field methods; collection, classification and analysis of data. Mathematical background to regression, multivariate techniques and linear models. Laboratory work includes use of CYBER and HP 30 digitizer and plotter.

27.003
Applied Economic Geography III  L2T3/4

Textbooks
Aigner D. J. Basic Econometrics Prentice-Hall
Edwards P. Flowcharting and FORTRAN IV McGraw-Hill
King L. J. Statistical Analysis in Geography Prentice-Hall
Nie N. H. et al Statistical Package for the Social Sciences McGraw-Hill*
Sterling T. D. & Pollock S. V. Introduction to Statistical Data Processing Prentice-Hall
Kerlinger R. Foundations of Social Research Holt Rinehart & Winston

27.014
Advanced Methods in Physical Geography  L1T1½
Student projects based upon instruction in research design, data sources, field methods, collection, classification and analysis of data. Includes a mathematical background to regression, multivariate techniques, linear models. Laboratory work includes use of CYBER and HP 30 digitizer and plotter.

Textbook
King L. J. Statistical Analysis in Geography Prentice-Hall

27.023
Population Geography  L2T3/4
Population growth and contrasts in growth patterns between underdeveloped, modernizing and developed countries. Growth dynamics and their relation to physical and human resources. The demographic transition as a unifying theme. Population densities in urban and rural areas: case studies are drawn mainly from Western Europe, Southeast Asia and Australia. Social and economic factors in international and internal migration. Spatial interaction between the populations of rural areas and cities, and between cities. Fertility and mortality variations within and between regions, countries and cities. Urbanization of population. Stable and stationary population theory. World population problems. Workshop tutorials are concerned with session projects.

Textbooks
Wilson M. G. A. Population Geography Nelson*
Zelinsky W. Kosinski L. A. & Mansell Prothero R. Geography and a Crowding World OUP

27.103
Climatology  L2T3½
Components of the radiation and heat balance of the earth's surface as affected by differing atmospheric, soil and surface cover conditions. Factors controlling evaporation and transpiration under freely-available conditions.
and restricted water supply conditions, and methods for the measurement and estimation of evapotranspiration. Characteristic patterns of energy and water exchange for differing types of natural or man-modified land surface. Man's modification of factors affecting the local climate in rural and urban settings.

Laboratory work is directed toward developing an appreciation of the operational principles and limitations of instruments commonly used in radiation and water balance studies. An introduction is given to the practical application of energy and water balance models for evaluation of the climatic environment as related to catchment hydrology, agricultural productivity and land resource management problems.

Textbook
Sellers W. D. Physical Climatology Chicago UP

27.104
Bioclimatology

Energy exchange between organism and environment in typical habitats of distinctive plant communities. Characteristics of water balance components as related to plant community attributes and meteorological factors. Wind profiles and aerodynamic characteristics as affected by height, density and structure of plant communities. The soil microclimate: thermal and moisture characteristics, soil aeration properties; their relation with biological processes. Periodic biological phenomena as related to climate (phenology), and climatic factors in the migration of organisms and the transport of insects, spores and pathogens. Models for assessment of plant growth and development. Climate as related to human physiology and comfort.

Laboratory work consists of measurements and observations of the aerial and soil microclimate and interpretation of environmental data for purposes of bioclimatic assessment and classification.

27.113
Urban Geography

The geography of cities in the context of economic and cultural systems, social and political processes, and historical perspectives. Foundations of urban geography; the city in under-developed countries and planned economies; the city as an eco-system; distributions; problems and policies of urban size; growth centres and urban planning; inter-urban and intraurban movement and linkages; urban residential preferences and spatial differentiation, urban environmental quality and the perceived urban environment. Weekly seminars, and laboratory and field work of a practical nature to include urban survey techniques.

27.123
Social Geography†

The relationship of spatial and social structures in rural and urban contexts. Emphasis on social processes producing spatial patterns, with themes such as 'community', 'neighbourhood', urbanization, social deprivation, inequality and segregation of minorities, and the results of social area studies. Cultural influences in the rate and form of urbanization. Rurality and urbanism as ways of life. Relation of overseas experience to Australian society.

Laboratory sessions include census data handling, questionnaire construction, interviewing, participant observation and other unobtrusive techniques.

27.124
Geographic Thought and Perspectives L1T2

A series of seminars throughout the year on the development of geographic thought and ideas. In Session 1 the seminars are concerned with topics related to students' projects, while in Session 2 the major geographic traditions and emergent theories related to students' special interests are discussed.

27.203
Biogeography


Quantitative sampling, measurement and description of vegetation. Spatial distribution (pattern) of individual species. Association between species.


Fieldwork forms an integral part of the course.

Textbooks
Kershaw K. A. Quantitative and Dynamic Plant Ecology 2nd ed Arnold
Odum E. P. Fundamentals of Ecology 3rd ed Saunders

27.204
Advanced Biogeography


Two field tutorials: a field project of about one week to investigate plant communities in a selected environment and a two-day excursion for comparative study of a contrasting environment.

Textbooks
Good R. The Geography of the Flowering Plants 3rd ed Longman
Greg-Smith P. Quantitative Plant Ecology 2nd ed Butterworths
Oifoci, L. Multivariate Analysis in Vegetation Research W. Junk The Hague

Usner M. Biological Management and Conservation: Ecological Theory, Application, Planning Chapman & Hall

27.303
Transportation Geography

The analysis of the transportation system in terms of its relationships with economic and geographic indicators. Focus on network analysis, flow studies, nodal 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.

Textbook
Eliot-Hurst M. E. Transportation Geography McGraw-Hill*
27.304 Advanced Economic Geography L2T4
Approaches to the study of the space economy with emphasis on the spatial problems of economic growth and development. Problems raised are viewed from a planning perspective.

Textbooks
Richardson H. Regional Growth Theory Macmillan
Leven C. L. Legler J. B. & Shapiro P. An Analytical Framework for Regional Policy MIT Press

27.313 Location Analysis L2T4
Classical and more recent adaptations of location theory, in particular those of Weber, Greenhut, Losch and Isard; spatial price theory and the location of the firm. Methods of location analysis: comparative cost analysis, input-output, spatial interaction models, linear programming, resource assessment in economic terms. Location policies and problems in differing economic systems.

Textbook
Wilson A. G. Urban Regional Models in Geography Wiley

27.323 Marketing Geography L2T3/4
The relationship between consumer spatial behaviour and the pattern or structure of marketing establishments. Organization and operation of the marketing function with emphasis upon the pattern of consumer oriented enterprises and the structure of market areas in intra-urban areas. Spatial behaviour of consumers including search and decision processes. Workshop seminars on term project, analytical techniques and issues raised in lectures.

Textbooks
Scott P. Geography and Retailing Hutchinson*

27.333 Agricultural Geography L2T3/4
Physical, economic, political, and other cultural factors involved in origin and change of agricultural landscapes. Spatial patterns of agriculture as the result of individual and group decisions. Innovation diffusion as the process of farming change. Problems of agricultural modernization in South East Asia. Planning in rural areas, especially the impact on agriculture of competing land uses. Examples mainly drawn from Australia. Workshop/seminar classes include treatment of methods of inquiry into agricultural geographical problems and discussion of selected topics.

Textbooks
Morgan W. B. & Marton R. J. C. Agricultural Geography Methuen*
Powell J. M. ed The Making of Rural Australia Sorrett*

27.413 Geomorphology L2T2½
Advanced work in selected areas of coastal and fluvial geomorphology. The characteristics of waves in deep and shallow water. Beaches and coastal barrier systems; lagoons and estuaries. Rock platforms. Continental shelf. Physical and chemical aspects of soil formation; rock weathering, silicate formation, clay mineral transformations. Drainage and sedimentation. Drainage basins. Hillslope processes; movement of water and sediments; river networks; landforms. Sedimentation and deposition. Geomorphology and pedology: an area study introducing soils-landscape relationships in a dynamic or chronologic sense; or a

Textbooks
Bird E. F. C. Coasts ANUP*
Gregory K. J. & Walling D. E. Drainage Basin Form and Process Arnold

27.423 Pedology L2T2½
History of Pedology. Morphological, physical and chemical properties of soil. Soil forming processes; rock weathering, silicate formation. Great Soil Groups; soil classification; soil-landscape relations and periodicity. Physical and chemical aspects of soil fertility; nutrient cycles; soil microbiology. Laboratory classes upon the measurement of soil properties; soil profile description; soil survey and mapping; analysis of soil maps. Up to five days field tutorials are an essential part of the course.

27.404 Advanced Geomorphology and Pedology L3T6
The monitoring of process and change in, and application of model studies to hillslope and fluvial environments. Absolute dating of landform and soils and determination of rates of denudation and pedogenesis. Soil erosion and its control. The history of geomorphology and pedology, and related current problems. Soil stratigraphy, mineralogy, micro-morphology and fabric analysis. Laboratory classes include the study of correlative sediments, soils, and depositional environments, soil mineralogy and soil physical properties. A field tutorial of about one week before the beginning of first session traverses geomorphic and pedologic environments in south-eastern Australia.

27.414 Advanced Geomorphology† L3T4
The history of geomorphology and the development of geomorphic thought. The application of model studies and the monitoring of process and change in hillslope, shoreline, fluvial or dune environments. Studies of correlative sediments. Absolute dating of landforms and determination of rates of denudation with special reference to Australian geochronology. Applied geomorphology. There will be supporting laboratory and tutorial classes, and a field tutorial of about one week before the beginning of first session, traversing geomorphic environments in south-eastern Australia.

27.424 Advanced Pedology† L3T4
Experimental pedology including clay mineral transformations and micromorphology. Soil physical and chemical properties; their interrelationships, including physical and chemical stability of soil aggregates, soil water and its movement, soil strength. Soil erosion and its control. Modern techniques of mapping and classifying soil; land assessment. Practical applications of soil studies to environmental problems.

27.504 Projects in Applied Geography Biogeography and Bioclimatology: study of the vegetation in an area, and detailed consideration of a problem arising from this survey, preferably with an applied aspect, or a study of the climate of some well defined plant or animal habitat as related to characteristics of the vegetative cover and substrate. Economic Geography: a problem in applied economic geography involving experimental design; the acquisition and manipulation of field data, and the presentation of a report. Geomorphology and pedology: an area study introducing soils-landscape relationships in a dynamic or chronologic sense; or a

* Paperback.
† Not offered in 1976.
systematic study which may be primarily geomorphic or pedologic, but with some interdisciplinary aspect.

To include a field element and a supporting laboratory program.

27.801
Introduction to Physical Geography  L2T2½
The mechanism of the physical environment, with particular exemplification within the Sydney region. Geologic controls of landform development; fluvial, slope and coastal processes and landforms; cyclic and equilibrium approaches to landform studies. The global radiation budget and atmospheric circulation; weather and climatic controls in the Sydney region. The hydrologic cycle. Processes and factors of soil formation and the mature soil profile. Controls of vegetation in the Sydney region. The ecosystem.
Laboratory classes include: study and use of geologic and topographic maps and air photographs; use of climatic data and the weather map. Soil profile description. Two field tutorials, equivalent to 16 tutorial hours, are a compulsory part of the course.

Textbook
Van Riper J. E. Man’s Physical World McGraw-Hill

27.862
Australian Environment and Land Resources  L2T3
Regional patterns of natural land resources of Australia. Climatic, geomorphic, soil and biotic factors affecting past, present and potential modes of land use and stability of primary production. Physical environmental conditions favouring or impeding productive utilization and further development of land resources under a changing technology. Problems of avoiding degradation of land quality and natural ecosystems. Case studies from distinctive environmental settings in Australia. Laboratory/workshop sessions include study of maps and air photos of typical environments.

Textbook
CSIRO The Australian Environment MUP

Graduate Study

27.901G
Geomorphology for Hydrologists  L1½T1½

Textbooks
Gregory K. J. & Walling D. E. Drainage Basin Form and Process Arnold
Leopold L. B. Wolman M. G. & Miller J. P. Fluvial Processes in Geomorphology Freeman
Morisawa M. Streams McGraw-Hill*

27.902G
Meteorological and Hydrological Principles  L3T0

27.904G
Geomorphology for Engineering Geologists  L1½T1½

Textbooks
Mitchell C. Terrain Evaluation Longman
Thornbury W. D. Principles of Geomorphology Wiley

School of Marketing

Undergraduate Study

28.012
Marketing Systems
Marketing from various perspectives. Marketing as an economic and social phenomenon, a management discipline and a ‘science’. The respective roles of products, prices, promotion and distribution in affecting economic exchange.

Textbook
Gist R. R. Marketing and Society 2nd ed Holt Rinehart & Winston

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.

Textbook
King W. R. Quantitative Analysis for Marketing Management McGraw-Hill*

28.032
Behavioural Science
Major concepts and research in the behavioural sciences which reveal the dynamics of human behaviour and the variety of viewpoints that can* Paperback.

* Paperback.
Subject Descriptions and Textbooks

be adopted in explaining behaviour. The nature and scope of
behavioural science; concepts of man in psychology and sociology;
culture; social institutions; groups; social class; interpersonal and mass
media communication; learning; perception; personality.

Textbooks
Broom L. & Seznick K. Sociology: A Text with Adapted Reading 5th
ed Harper & Row
Fabun D. Communications: The Transfer of Meaning Glencoe
Kassarjian H. H. & Robertson T. S. eds Perspectives in Consumer
Behaviour Scott Foresman

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: proximal and
distal environmental inputs; motivation and arousal; consumer
behaviour as a decision process: problem recognition; search
behaviour; choice behaviour; purchasing processes; post-purchase
behaviour.

Textbooks
Rinehart & Winston
Kassarjian H. H. & Robertson T. S. eds Perspectives in Consumer
Behaviour Rev ed Scott Foresman

School of Town Planning

Undergraduate Study

36.411
Town Planning

School of Biochemistry

Undergraduate Study

41.101A
Chemistry of Biologically Important Molecules
The chemical properties of amino acids, peptides and proteins, carbohyrdates, nucleic acids, and lipids, and the biological roles of these compounds. The nature and function of enzymes. Practical work to amplify the lecture course.

Textbook
Stryer L. Biochemistry Freeman

41.101B
Metabolism
The intermediary metabolism of carbohydrates, lipids and nitrogenous compounds. The molecular mechanism of gene expression and protein synthesis. Photosynthesis. Practical work to amplify the lecture course.

Textbook
As for 41.101A.

41.101C
Control Mechanisms
The relation between structure and function of enzymes, hormones, vitamins and membranes. Metabolic networks and control mechanisms. Practical work to amplify the lecture course.

Textbooks
As for 41.101A, plus
McGraw-Hill

Student Descriptions and Textbooks

School of Surveying

Undergraduate Study

29.441
Engineering Surveying
Part A. Ordinary levelling. Angle measurement. Linear measurement
(bands). Theodolite traversing. Tacheometry. Contour and detail sur-
veys. Areas and volumes.
Part B: Levelling (other methods). Linear measurement (electronic).
Applications of survey techniques: control surveys, provision of inform-
ation for design, setting out, engineering works, etc. Outline of
photogrammetry.

Textbooks
Bannister A. & Raymond S. Surveying Pitman* Seven Figure Mathematical Tables Chambers 1958 (full edition)

29.491
Survey Camp
A one-week field camp for students studying 29.441 Engineering
Surveying.

* Paperback.
41.102A
Biochemistry of Macromolecules and Cell Biochemistry
Polysaccharides and glycoproteins including bacterial cell walls. Chemistry and biology of polynucleotides. Methods of amino acid and nucleic acid sequence analysis. Protein structure and synthesis. Active centres of some proteins. Sub-Unit organization of proteins. Membrane structure. Cellular degradation. Practical work to illustrate the lecture course and to provide experience in modern biochemical techniques.

Textbooks
Scientific American The Chemical Basis of Life. An Introduction to Molecular and Cell Biology Freeman

41.102B
Metabolic Pathways and Control Mechanisms
Haemoproteins, and electron transport, photosynthesis, photophosphorylation and oxidative phosphorylation. The nature and function of co-enzymes. Inter-relationships in mammalian intermediary metabolism. Biochemical control mechanisms including hormones and allosteric interactions. Enzyme kinetics. Selected aspects of differentiation and development in higher organisms. Practical work to illustrate the lecture course and to provide experience in modern biochemical techniques.

Textbooks
As for 41.102A.

42.102
Fermentation Technology
The basic factors involved in the operation of microbial processes on an industrial scale, including: the selection, maintenance and improvement of micro-organisms; the influence of physical and chemical factors on the microbial environment; the control of environmental factors; the effects of operational patterns in batch and continuous flow cultivation; the harvesting, purification and standardization of products; process optimization; disposal of waste materials; an examination of selected microbial processes for chemical, pharmaceutical and food production, against the basic characteristics of large-scale fermentation processes; practical exercises, including the operation of various types of fermenters, to illustrate the principal aspects of the lecture course.

Textbooks
Abba S. Humphrey A. E. & Millis N. Biochemical Engineering 2nd ed Academic
Casida L. E. Jr Industrial Microbiology Wiley
Kubitschek, H. E. Introduction to Research with Continuous Cultures Prentice-Hall

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.

Textbook
Vilcis C. A. Biology 6th ed Saunders

42.212G
Principles of Biochemistry
A condensed treatment of biochemistry comprising the following aspects: the elemental and molecular composition of living organisms; the chemistry and roles of the biological elements and molecules; the thermodynamics and enzymatic catalysis of metabolism; catabolic, anabolic, amphibolic and anaplerotic processes, with emphasis on hydrolysis and synthesis of polymers, glycolysis and gluconeogenesis of glucose, 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.

Textbook
Conn E. E. & Stumpf P. K. Outlines of Biochemistry 3rd ed Wiley

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.

Textbook
Montgomery R. & Swenson C. A. Quantitative Problems in the Biochemical Sciences Freeman

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.

Textbook
Abba S. Humphrey A. E. & Millis N. Biochemical Engineering Academic
Casida L. E. Jr Industrial Microbiology Wiley
Kubitschek H. E. Introduction to Research with Continuous Cultures Prentice-Hall
Subject Descriptions and Textbooks

School of Botany

Undergraduate Study

43.101 Genetics
Various aspects of molecular, organismal and population genetics, including: meiotic and non-meiotic recombination, genome variations, mutagens and mutation rates, cytoplastic inheritance, gene function, genetic code, gene structure, collinearity of polynukleotide and polypeptide, control of gene action, genes and development, population genetics, genetics and improvement of plants and animals.

Textbook
Patt D. I. & Patt G. R. An Introduction to Modern Genetics Addison-Wesley

43.111 Flowering Plants
The vegetative and floral morphology of Angiosperms with special reference to variations in morphology, evolutionary trends, elements of biological classification, nomenclature and identification of native plants: Field work is part of the course.

Textbooks
Beadle N. C. W. Evans O. D. & Carolin R. C. Flora of the Sydney Region
Reed
Esau K. The Anatomy of Seed Plants Wiley

43.112 Plant Taxonomy
The assessment, analysis and presentation of data for classifying plants both at the specific and supra-specific level; with emphasis on vascular plants. Field work is part of the course.

Textbooks
Beadle N. C. W. Carolin R. C. & Evans O. D. Handbook of the Vascular Plants of the Sydney District and Blue Mountains
Jeffrey C. An Introduction to Plant Taxonomy Churchill
Jeffrey C. Biological Nomenclature Arnold
Sporne K. R. The Morphology of the Gymnosperms Hutchinson

43.121 Plant Physiology
The physiology of the whole plant: photosynthesis, the role of phytochrome in plant morphogenesis and flowering, inorganic nutrition transport, translocation, physiology of growth and development, seed physiology and plant growth substances and their application in agriculture.

Textbooks
Galston A. W. & Davies P. J. Control Mechanisms in Plant Development Prentice-Hall
Richardson M. Translocation In Plants Arnold
Sutcliffe J. Plants and Water Arnold
Whittingham C. P. Photosynthesis OUP

43.142 Environmental Botany
The marine, 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 up to three full-day Saturday field excursions as part of the practical course.

School of Microbiology

Undergraduate Study

44.111 Microbiology
The general nature, occurrence and importance of microorganisms. A systematic review of the major groups of microorganisms: the eucaryotic protista (microalgae, protozoa and fungi); procaryotic protista (blue-green algae, "higher" bacteria, typical unicellular bacteria and small bacteria-like forms); plant, animal and bacterial viruses. The relationship between microorganisms and their environment; ecological considerations. Interactions between microorganisms and higher organisms. This is a course for those who do not wish to take further courses in microbiology and who may have less biological and biochemical background than is required for other microbiology courses.

Textbooks
Brock T. D. Biology of Microorganisms Prentice-Hall
or
Mitchell, R. Introduction to Environmental Microbiology
or

44.141 Introductory Microbiology for Food Technologists
Prerequisites: 17.011 and 17.021.
The general nature, occurrence and importance of microorganisms. A short systematic review of the major groups of microorganisms; the eucaryotic protista (microalgae, protozoa and fungi); procaryotic protista (blue-green algae, "higher" bacteria, typical unicellular bacteria and small bacteria-like forms); viruses. Microbial growth and physiology. Principles of sterilization and disinfection. Groups of bacteria of importance in the food industry. Bacterial endospores. Industrial uses of microorganisms. Microbial food spoilage, Food intoxications and infections. Microbial ecology.

Textbooks
Brock T. D. Biology of Microorganisms Prentice-Hall
or
Stanier R. Y. Doudoroff M. & Adelberg E. A. General Microbiology 3rd ed Macmillan (also published as The Microbial World 3rd ed Prentice-Hall
or

44.142 Microbiology for Food Technologists
Prerequisite: 44.141.
A laboratory course of six hours per week (Session 1), covering the following topics: microscopy, choice and preparation of media, application of aseptic techniques, quantification of microbiological growth, isolation and identification of micro-organisms important to food processing. Principles of sterilization, heat resistance of vegetative cells and spores, food spoilage, food-borne organisms.
Assessment is continuous and grading is based upon the number of objectives achieved.

Textbooks
No set texts, but specific reading assignments are given.
School of Sociology

Undergraduate Study

53.101 Sociology 1A
An introduction to sociology, with particular reference to the history and development of social thought. Students are required to read basic texts and to submit related written work.

53.102 Sociology 1B
An introduction to the institutions, processes and belief systems of modern industrial society, with special emphasis on Australia; reading and written work related to basic texts, and an introduction to research methods in the social sciences.

53.206 Science, Technology and Society
The attention of students is drawn to the course on "Science, Technology and Society" given in the School of Sociology. Details of this course are given in the Faculty of Arts Handbook. This course 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.

School of Education

58.061 Methods of Teaching I
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
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.

58.512 Introduction to Education
An examination of the view commonly held by prospective teachers that their task in the classroom will be simply to teach specific subject matter. Some of the difficulties encountered in the communication of ideas to pupils, developing a broader view of the educational process. Psychological, philosophical and sociological perspectives of the teaching-learning situation.

The subject serves as a basis for study in greater depth of educational psychology, philosophy and theory of education and sociology of education in succeeding years and shows the contribution of each to the practice of teaching. Lectures and seminars are closely related to a series of school visits extending throughout the year.

58.513 Education IA
Educational Psychology: Learning, motivation, child and adolescent development, group processes, personality and other psychological factors related to learning and instruction. 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: The theory and practice of research methods in education in both the parametric and non-parametric fields, including: measures of central tendency and dispersion, graphical representation of data, normal curve theory, reliability of difference between statistics, correlation, tests and examinations, analysis of variance, regression and the nature of experiments. 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
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.

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 educationalists and some attempts to apply them. Progressive theories and schools, and the de-schooling movement.

Philosophy of Science and the Teaching of Science: The first stage in a two-stage course. Session 1: 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. Session 2: The social dimensions of science and recent work on values, goals, purposes in scientific activity, encompassing wide ranging issues from rationality in science; religion and science, Are Marxism and Freudianism scientific enterprises? What bases are there for the “Science for the People” movement? What influences science in a capitalist society?

Science and Religion in Education: Comparison of religious beliefs with science, the place of science and religion in the school. Do science and religion conflict? Are religious beliefs like scientific beliefs? Are they rational? How can they be supported? Can faith replace reason? Is there a God? Can there be miracles? Has the teaching of religion a place in schools? Should a science teacher avoid disturbing religious belief? Has the teacher a right to argue for a religious or atheistic viewpoint? The problem of evil.

Option in Research Methods in Education

Educational Research II: Provides a basis in some depth for applied educational research. It forms a sequence with the research methods strand in 56.513 Education IA.

Options in Sociology of Education

Australian Education Systems: An Historical and Sociological Analysis: The historical development of Australian education and the application of the sociological perspective to investigate whether Australian education systems are meeting the needs of Australian society.

Society Today and Tomorrow: Implications for Education: Some major characteristics of and trends in society, such as urbanization, social change, bureaucratic organization, the counter culture, community vs. association, and work and leisure patterns, with special reference to the ecological situation and to the significance of values and value transfer. Possible curriculum implications and some of the fundamental questions these social issues raise concerning the role education plays in society.

Socio-cultural Influences on the Education of Adolescents: The application of the sociological perspective to the education of adolescents.

The Education of Disadvantaged Groups: The education of disadvantaged groups in Australia, in particular women and migrants.
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This Handbook has been specially designed as a source of reference for you and will prove useful for consultation throughout the year.

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

Separate Handbooks are published for the Faculties of Applied Science, Architecture, Arts, Commerce, Engineering, Law, Medicine, Professional Studies, Science (including Biological Sciences) and the Board of Studies in General Education.

The Calendar and Handbooks are available from the Cashier's Office. The Calendar costs $3 (hard cover) and $2.50 (soft cover) (plus postage and packing, 90 cents). The Handbooks vary in cost. Applied Science, Arts, Commerce and Science are $1.50: Architecture, Engineering, Law, Medicine and Professional Studies are $1.00. Postage is 40c in each case. The exception is General Studies, which is free.