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The University of New South Wales

# Sciences

Board of Studies in Science and Mathematics

Faculty of Biological Sciences

Faculty of Science

# 1984 Faculty Handbook

# How to use this Handbook

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

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

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

**Faculty Information.**

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

**Graduate Study** is about higher degrees.

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

Information includes:

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

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

**Staff** list.

For detailed reference, see the list of **Contents.**

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# Sciences

Board of Studies in Science and Mathematics
Faculty of Biological Sciences
Faculty of Science

# 1984 Faculty Handbook

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New South Wales is:

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

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

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# General Information

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

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

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

## Some people who can help you

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

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

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

The **Assistant Registrar (Admissions and Examinations)**, Mr Jack Hill, is located on the ground floor of the Chancellery. General inquiries should be directed to 3715. For information regarding examinations, including examination timetables and clash of examinations, contact the **Senior Administrative Officer**, Mr John Grigg, phone 2143.

The **Assistant Registrar (Student Records and Scholarships — Undergraduate and Postgraduate),** Mr Graham Mayne is located on the ground floor of the Chancellery. For particular enquiries regarding illness and other matters affecting performance in examinations and assessment, academic statements, graduation ceremonies, prizes, release of examination results and variations to enrolment programs, phone 3317.

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

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

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

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

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

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

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

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

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

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

# Calendar of Dates

## The Academic Year

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

Session 1 commences on the first Monday of March.

## 1984

### Faculties other than Medicine

| | |
|---|---|
| **Session 1** | 5 March to 13 May |
| **(14 weeks)** | *May Recess:* 14 May to 20 May |
| | 21 May to 17 June |
| | *Midyear Recess:* 18 June to 22 July |
| Examinations | 19 June to 4 July |
| **Session 2** | 23 July to 26 August |
| **(14 weeks)** | *August Recess:* 27 August to |
| | 2 September |
| | 3 September to 4 November |
| | *Study Recess:* 5 November to |
| | 11 November |
| Examinations | 12 November to 30 November |

### Faculty of Medicine

| | | |
|---|---|---|
| First and Second Years | As for other faculties | |
| Third and Fourth Years | Term 1 (10 weeks) | 23 January to 1 April |
| | Term 2 (9 weeks) | 9 April to 13 May |
| | *May Recess:* | 14 May to 20 May |
| | | 21 May to 17 June |
| | Term 3 (9 weeks) | 25 June to 26 August |
| | *August Recess:* | 27 August to 2 September |
| | Term 4 (10 weeks) | 3 September to 11 November |
| Fifth Year | Term 1 (8 weeks) | 23 January to 18 March |
| | Term 2 (8 weeks) | 26 March to 20 May |
| | Term 3 (8 weeks) | 28 May to 22 July |

| | | |
|---|---|---|
| | Term 4 (8 weeks) | 30 July to 23 September |
| | Term 5 (8 weeks) | 2 October to 25 November |
| **January** | | |
| Monday 2 | Public Holiday — New Year's Day | |
| Friday 13 | Last day for acceptance of applications by office of the Admissions Section for transfer to another undergraduate course within the University | |
| Monday 16 | Last day for applications for review of results of assessment | |
| Monday 30 | Public Holiday — Australia Day | |
| **February** | | |
| Wednesday 1 | Enrolment period begins for new undergraduate students and undergraduate students repeating first year | |
| Monday 20 | Enrolment period begins for second and later year undergraduate students and graduate students enrolled in formal courses | |
| Tuesday 28 | Last day for undergraduate students who have completed requirements for pass degrees to advise the Registrar they are proceeding to an honours degree or do not wish to take out the degree for which they have applied for any other reason | |
| **March** | | |
| Monday 5 | **Session 1 begins** — all courses except Medicine III, IV and V | |
| Wednesday 7 | List of graduands for April/May ceremonies and 1983 prizewinners published in *The Sydney Morning Herald* | |
| Monday 12 | Last day for notification of correction of details published in *The Sydney Morning Herald* on 7 March concerning April/May graduation ceremonies | |
| Friday 16 | Last day for acceptance of enrolment by new undergraduate students (late fee payable thereafter) | |
| Friday 30 | Last day for acceptance of enrolment by undergraduate students re-enrolling in second and later years (late fee payable thereafter) | |
| **April** | | |
| Thursday 19 | Last day for undergraduate students to discontinue without failure subjects which extend over Session 1 only | |
| Friday 20 | Good Friday — Public Holiday | |
| Saturday 21 | Easter Saturday — Public Holiday | |
| Monday 23 | Easter Monday — Public Holiday | |
| Wednesday 25 | Anzac Day — Public Holiday | |
| **May** | | |
| Wednesday 2 | *Confirmation of Enrolment* forms despatched to all students | |
| Friday 11 | Last day for acceptance of corrected *Confirmation of Enrolment* forms | |
| Monday 14 | **May Recess begins** | |
| Wednesday 16 | Last day for undergraduate students completing requirements for degrees at the end of Session 1 to submit *Application for Admission to Degree* forms | |
| Thursday 17 | Publication of provisional timetable for June/July examinations | |
| Sunday 20 | **May Recess ends** | |
| Friday 25 | Last day for students to advise of examination clashes | |
| **June** | | |
| Tuesday 5 | Publication of timetable for June/July examinations | |
| Monday 11 | Queen's Birthday — Public Holiday | |
| Sunday 17 | **Session 1 ends** | |
| Monday 18 | **Midyear Recess begins** | |
| Tuesday 19 | Examinations begin | |
| **July** | | |
| Wednesday 4 | Examinations end | |
| Monday 16 | Examination results mailed to students | |
| Tuesday 17 | Examination results displayed on University noticeboards<br>*To Friday 20 July:* Students to amend enrolment programs following receipt of June examination results | |
| Sunday 22 | **Midyear Recess ends** | |
| Monday 23 | **Session 2 begins** | |

**August**

| | |
|---|---|
| Friday 3 | Last day for students to discontinue without failure subjects which extend over the whole academic year |
| Monday 27 | **August Recess begins** |
| Tuesday 28 | Last day for undergraduate students who have completed requirements for pass degrees to advise the Registrar they are proceeding to an honours degree or do not wish to take out the degree for which they have applied for any other reason |

**September**

| | |
|---|---|
| Sunday 2 | **August Recess ends** |
| Wednesday 5 | List of graduands for October graduation ceremonies published in *The Sydney Morning Herald* |
| Monday 10 | Last day for notification of correction of details published in *The Sydney Morning Herald* on 5 September concerning October graduation ceremonies |
| Friday 14 | Last day for undergraduate students to discontinue without failure subjects which extend over Session 2 only |
| Monday 24 | *Confirmation of Enrolment* forms despatched to all students |
| Friday 28 | Last day to apply to UCAC for transfer to another tertiary institution in New South Wales |

**October**

| | |
|---|---|
| Monday 1 | Eight Hour Day — Public Holiday |
| Wednesday 3 | Last day for acceptance of corrected *Confirmation of Enrolment* forms |
| Thursday 4 | Publication of provisional examination timetable |
| Friday 5 | Last day for applications from undergraduate students completing requirements for degrees at the end of Session 2 to submit applications for *Admission to Degree* forms |
| Friday 12 | Last day for students to advise of examination timetable clashes |
| Thursday 25 | Publication of examination timetables |

**November**

| | |
|---|---|
| Sunday 4 | **Session 2 ends** |
| Monday 5 | **Study Recess begins** |
| Sunday 11 | **Study Recess ends** |
| Monday 12 | Examinations begin |
| Friday 30 | Examinations end |

**December**

| | |
|---|---|
| Monday 17 | Examination results mailed to students<br>List of graduands in Medicine for February Graduation Ceremony published in *The Sydney Morning Herald* |
| Tuesday 18 | Examination results displayed on University noticeboards |
| Tuesday 25 | **Christmas Day — Public Holiday** |
| Wednesday 26 | **Boxing Day — Public Holiday** |

## 1985

### Faculties other than Medicine and Military Studies

| | |
|---|---|
| **Session 1** (14 weeks) | 4 March to 12 May<br>*May Recess:* 13 May to 19 May<br>20 May to 16 June<br>*Midyear Recess:* 17 June to 21 July |
| Examinations | 18 June to 3 July |
| **Session 2** (14 weeks) | 22 July to 25 August<br>*August Recess:* 26 August to 1 September<br>2 September to 3 November<br>*Study Recess:* 4 November to 10 November |
| Examinations | 11 November to 29 November |

## Faculty of Medicine

| | |
|---|---|
| First and Second Years | As for other faculties |
| Third and Fourth Years | Term 1 (10 weeks) 21 January to 31 March<br>Term 2 (9 weeks) 9 April to 12 May<br>*May Recess:* 13 May to 19 May<br>20 May to 16 June<br>Term 3 (9 weeks) 24 June to 25 August<br>*August Recess:* 26 August to 1 September<br>Term 4 (10 weeks) 2 September to 10 November |
| Fifth Year | Term 1 (8 weeks) 21 January to 17 March<br>Term 2 (8 weeks) 25 March to 19 May<br>Term 3 (8 weeks) 27 May to 21 July<br>Term 4 (8 weeks) 29 July to 22 September<br>Term 5 (8 weeks) 30 September to 24 November |

| | |
|---|---|
| **January** | |
| Tuesday 1 | Public Holiday (New Year) |
| Friday 11 | Last day for acceptance of applications by office of the Admissions Section for transfer to another undergraduate course within the University |
| Monday 14 | Last day for applications for review of results of annual examinations |
| Monday 28 | Australia Day — Public Holiday |
| **February** | |
| Monday 19 | Enrolment period begins for second and later year undergraduate students and graduate students enrolled in formal courses |
| **March** | |
| Monday 4 | Session 1 begins — all courses except Medicine III, IV and V |
| **April** | |
| Friday 5 to Monday 8 | Easter — Public Holiday |
| Thursday 25 | Anzac Day — Public Holiday |

# Organization of the University

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

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

### Arms of the University of New South Wales

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

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

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

### The University Colours

The colours of the University are black and gold.

### The Council

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

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

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

The Chairman of the Council is the Chancellor, the Hon. Mr Justice Samuels.

### The Professorial Board

The Professorial Board is one of the two chief academic bodies within the University and includes all the professors from the various faculties, non-professorial Heads of Schools and Chairmen of Faculty, and several ex-officio and appointed members. It deliberates on all questions such as matriculation requirements, the content of courses, the arrangement of syllabuses, the appointment of examiners and the conditions for graduate degrees. Its recommendations on matters of major policy are presented to Council for its consideration and adoption.

### The Faculties/Boards of Studies

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

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

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

### The Schools

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

### Executive Officers

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

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

### General Administration

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

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

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

The Property division is responsible for the building program and the 'household' services of the University, including electricity, telephones, cleaning, traffic and parking control and maintenance of buildings and grounds.

### Student Representation on Council and Faculties/Boards

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

Students proceeding to a degree or a graduate diploma may elect members for appointment by the Council to their faculty or board of studies. Elections are for a one-year term of office.

*Open Faculty/Board Meetings*

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

### Award of the University Medal

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

### Identification of Subjects by Numbers

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

### Textbook Lists

Textbook lists are issued early in the year and are available from School and Faculty offices for re-enrolling students and from the Unisearch House Enrolment Centre for first year students.

**Textbook Costs and Course-Related Costs**
Students should allow quite a substantial sum for textbooks. This can vary from $250 to $600 per year depending on the course taken. These figures are based on the cost of new books. The Students' Union operates a secondhand bookshop. Information about special equipment costs, accommodation charges and cost of subsistence on excursions, field work, etc, and for hospital residence (medical students) are available from individual schools.

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

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

# Student Services and Activities

## Accommodation

### Residential Colleges

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

#### The Kensington Colleges

The Kensington Colleges comprise Basser College, Goldstein College and Philip Baxter College. They house 450 men and women students, as well as tutorial and administrative 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 154 male and female students from Australia and up to thirty other countries. Preference is given to more senior undergraduates and graduate students. Eight tutors are available to help students. Apply in writing to the Warden, International House, PO Box 1, Kensington, NSW 2033.

#### New College

New College is an Anglican college and it provides accommodation (with all meals) for 220 graduates and undergraduates, without regard to race, religion, or sex. The College has its own resident tutors, and sponsors a wide range of sporting and social activities. Apply to the Master, New College, Anzac Parade, Kensington 2033 (telephone 662 6066).

#### Shalom College

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

#### Warrane College

Warrane College provides accommodation for 200 men and is open to students of all ages, backgrounds and beliefs. The College offers a comprehensive tutorial program along with a wide range of activities, professional orientation and opportunities to meet members of the University staff informally. Non-resident membership is available to male students who wish to participate in College activities and to make use of its facilities. The general spiritual care of the College has been entrusted to Opus Dei. Enquiries: The Master, Warrane College, PO Box 123, Kensington 2033. Telephone (02) 662 6199.

*Creston Residence*

Creston Residence offers accommodation to 25 undergraduate and graduate women students. Activities and tutorials are open to non-resident students. The spiritual activities offered at Creston are entrusted to the Women's Section of Opus Dei. Enquiries: 36 High Street, Randwick 2031. Telephone (02) 398 5693.

### Other Accommodation

#### Off-campus Accommodation

Students requiring other than College accommodation may contact the Housing Officer in the Chancellery, Room 148E for assistance in obtaining suitable accommodation in the way of rooms with cooking facilities, flats, houses, share flats, etc. Extensive listings of all varieties of housing are kept up-to-date throughout the year and during vacations. Accom

modation in the immediate vicinity of the University is not usually easy to find at short notice, and is expensive.

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

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

## Associations, Clubs and Societies

### The Sports Association

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

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

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

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

### School and Faculty Associations

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

## Australian Armed Services

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

## Chaplaincy Centre

The University Chapel

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

Chaplaincy Service

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

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

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

## Deputy Registrar (Student Services)

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

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

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

## Sport and Recreation Section

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

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

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

## Physical Education and Recreation Centre

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

## Student Counselling and Research Unit

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

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

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

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

## Careers and Employment Section

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

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

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

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

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

## Student Health Unit

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

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

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

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

The Family Planning Association of NSW conducts clinics at the Student Health Unit and at the adjacent Prince of Wales Hospital which are available for both staff and students. Appointments may be made for the Student Health Unit clinic by telephoning 588 2833 or for the Prince of Wales Hospital clinics by telephoning 399 0111.

## The Students' Union

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

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

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

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

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

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

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

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

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

**1.** Publication of the Student Paper *Tharunka*.

**2.** Production of the student video program *Campuswide*.

**3.** A free legal service run by a qualified lawyer employed by the Students' Union Council.

**4.** The Secondhand Bookshop for cheap texts.

**5.** A child care centre, *House at Pooh Corner*.

**6.** CASOC (Clubs and Societies on Campus) which provides money from the SU for affiliated clubs and societies on campus.

**7.** A video service with access for students to equipment and advice.

**8.** A noticeboard for casual job vacancies.

**9.** Organization of orientation for new students.

**10.** Organization of Foundation Day.

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

## The University Library

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

For details consult **Faculty Information** in the relevant Faculty Handbook.

There are also library services at other centres:

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

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

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

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

## The University Union

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

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

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

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

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

## Financial Assistance to Students

### Tertiary Education Assistance Scheme

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

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

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

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

Tertiary students receiving an allowance, and prospective tertiary students, will be sent application forms in January 1984. Forms are also available from the Admissions Section *or* the Careers and Employment Section, *or* from the Director, Department of Education, 59 Goulburn Street, Sydney, NSW 2000 (telephone 218 8800). Continuing students should submit applications as soon as examination results are available. New students should do so as soon as they are enrolled. All students should apply by 31 March 1984, otherwise benefits will not be paid for the earlier months of the year.

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

### Other Financial Assistance

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

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

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

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

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

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

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

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

**Financial Assistance to Aboriginal Students**

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

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

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

# Rules and Procedures

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

## General Conduct

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

**Appeals**

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

## Admission and Enrolment

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

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

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

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

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

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

**First Year Entry**

Those seeking entry to first year courses in one or more of eighteen institutions in the State including the University of Wollongong and the three universities in the Sydney Metropolitan area (Macquarie University, the University of New South Wales and the University of Sydney) are required to lodge a single application form with the Universities and Colleges Admissions Centre, Challis House, 10 Martin Place,

Sydney 2000 (GPO Box 7049, Sydney 2001). On the application form provision is made for applicants to indicate preferences for courses available in any one of the three universities and fifteen other tertiary institutions. Students are notified individually of the result of their applications and provided with information regarding the procedures to be followed in order to accept the offer of a place at this university. Enrolment is completed at the Enrolment Bureau, Unisearch House, 221 Anzac Parade, Kensington.

**Deferment of First Year Enrolment**

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

## Enrolment Procedures and Fees Schedules 1984

### 1. Introduction

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

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

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

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

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

### 2. New Undergraduate Enrolments

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

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

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

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

### 3. Re-enrolment

**See also sections 4., 6. and 7. below.**

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

### 4. Restrictions Upon Re-enrolling

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

### 5. New Research Students

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

### 6. Re-enrolling Research Students

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

### 7. Submission of Project Report

Students registered for formal masters degree programs (course codes **8000-9999**) who at the commencement of Session 1 have completed all the work for a degree or diploma except for the submission of the relevant thesis or project report are required to re-enrol by the end of the

second week of Session 1. Completion of enrolment after then will incur a penalty (see section **16.** below).

Information about possible student activities fees exemption is set out in section **17.** (10) below.

## 8. Enrolments by Miscellaneous Students

Enrolments by Miscellaneous students are governed by the following rules:

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

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

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

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

## 9. Final Dates for Completion of Enrolment

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

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

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

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

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

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

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

New students are issued with cards on enrolment if eligible.

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

## 11. Payment of Fees

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

## 12. Assisted Students

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

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

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

## 13. Extension of Time

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

## 14. Failure to Pay Fees and Other Debts

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

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

## 15. Fees

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

**University Union Entrance Fee**

Payable on first enrolment $35

Students enrolling for only one session must pay the full University Union entrance fee.

**Student Activities Fees**

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

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

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

Student Activities Fees are adjusted annually by a system of indexation and those set out below are current in 1983 and are therefore subject to an increase in 1984.

University Union annual subscription $101

Sports Association annual subscription $21

Students' Union Annual Subscription

Students enrolling in full-time courses $30
Students enrolling in part-time courses or as miscellaneous students $25

These two fees will be increased for 1984; the amounts have yet to be determined at the time of publication.

Miscellaneous Fund annual fee $35

This fee is used to finance expenses generally of a capital nature relating to student activities and amenities. Funds are allocated for projects recommended by the Student Affairs Committee and approved by the University Council.

**Special Examination Fees**

Examinations conducted in special circumstances for each subject $20

Review of examination results for each subject $20

**Other Charges**

In addition to the fees outlined above and depending on the subject being taken, students may be required to make a payment for equipment; money so paid is, in general, refunded if the equipment is returned in satisfactory condition.

## 16. Penalties

(1) Failure to lodge enrolment form according to enrolment procedure $20

(2) Payment of fees after end of second week of session $20

(3) Payment of fees after end of fourth week of session $40

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

## 17. Exemptions — fees

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

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

Students who consider themselves eligible for life membership of the University Union, the Sports Association, or the Students' Union, should make enquiries about the matter at the offices of those bodies, not at the office of the Deputy Registrar (Student Services) or at the Cashier's office.

(2) Students enrolled in courses classified as *External* are exempt from all Student Activities Fees and the University Union Entrance Fee.

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

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

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

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

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

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

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

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

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

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

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

## 18. Variations in Enrolment (including Withdrawal)

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

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

(3) Enrolment in additional subjects

Applications for enrolment in additional subjects must be submitted by:

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

(4) Withdrawal from subjects

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

(a) for one session subjects, the end of the seventh week of that session (20 April or 7 September)

(b) for whole year subjects, the end of the second week of Session 2 (3 August).

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

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

(a) If notice of withdrawal from a course is received by the Student Records and Scholarships Office before the first day of Session 1, a refund of all Student Activities Fees paid will be made.

(b) If notice of withdrawal is received on or after the first day of Session 1, a partial refund of the University Union Entrance Fee will be made on the following basis: any person who has paid the entrance fee in any year and who withdraws from membership of the University Union after the commencement of Session 1 in the same year, or who does not renew membership in the immediately succeeding year may on written application to the Warden receive a refund of half the entrance fee paid.

(c) If the notice of withdrawal is given before the end of the fourth week of Session 1 (30 March 1984) a full refund of Student Activities Fees paid will be made; if notice is given before the end of the seventh week of Session 1 (20 April 1984) a refund of three-quarters of the Student Activities Fees paid will be made; if notice is given before the beginning of Session 2 (23 July 1984) a refund of one-half of the

Student Activities Fees paid will be made; if notice is given before the end of the seventh week of Session 2 (7 September 1984) a refund of one-quarter of Student Activities Fees paid will be made; thereafter no refund will be made except that provided for in (d) below.

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

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

(6) Acknowledgements

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

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

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

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

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

### 19. Exemption – Membership

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

## Leave of Absence

Leave of absence from an undergraduate course of study may be granted to students other than those in the first year of a course. Leave of absence has generally been restricted to one year but in special circumstances two years have been granted.

To apply for such leave of absence, a letter should be submitted to the Registrar immediately following the release of annual examination results and must include the student's full name, registration number, the course and stage in which enrolled in the previous year and, most important, the reason *why* leave is being sought. The letter advising the result of the application will provide details about how to re-enrol.

Students who withdraw from the first year of their course *are not* granted leave of absence and must again apply for a place through the Universities and Colleges Admissions Centre.

## Course Transfers

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

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

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

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

## Admission with Advanced Standing

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

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

**2.** where students transfer from another university such students shall not in general be granted standing in this Univer-

sity which is superior to what they have in the University from which they transfer;

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

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

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

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

## Resumption of Courses

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

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

## Examinations

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

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

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

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

### Assessment of Course Progress

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

### Examination Results

Grading of Passes

Passes are graded as follows:

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

Pass Conceded

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

Pass Terminating

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

### Availability of Results

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

also posted on School noticeboards and in the University Library. Results on noticeboards are listed *by Student Registration Number.*

*No examination results are given by telephone.*

**Review of Results**

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

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

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

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

**Special Consideration**

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

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

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

**Physical Disabilities**

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

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

**Use of Electronic Calculators**

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

**Examinations Held Away from the Campus**

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

**Arrival at Examinations**

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

**Use of Linguistic Dictionaries**

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

**Academic Misconduct**

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

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

**Conduct of Examinations**

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

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

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

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

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

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

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

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

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

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

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

### Acknowledgement of Sources

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

### Further Assessment

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

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

## Restrictions upon Student Re-enrolling

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

### First Year Rule

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

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

### Repeated Failure Rule

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

### General Rule

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

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

### The Session-Unit System

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

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

**Exemption from Rules by Faculties**

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

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

*Showing Cause*

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

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

**Appeal**

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

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

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

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

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

The decision of the Committee shall be final.

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

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

**Exclusion**

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

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

**Re-admission after Exclusion**

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

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

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

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

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

**10.** Students who fail a subject at the examinations in any year or session and re-enrol in the same course in the following year or session must include in their programs of studies for that year or session the subject which they failed. This requirement will not be applicable if the subject is not offered the following year or session, is not a compulsory component of a particular course, or if there is some other cause which is acceptable to the Professorial Board for not immediately repeating the failed subject.

**Restrictions and Definitions**

**11.** (1) These rules do not apply to students enrolled in programs leading to a higher degree or graduate diploma.

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

## Schedule A

(See First Year Rule **1.** above)

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

| Faculty/Board of Studies | Minimum Requirement | Course | Unit Values (UV) |
|---|---|---|---|
| Applied Science | Half the program | 3000-3220<br>4190-4220 | One-session subjects: UV 1<br>Two-session subjects: UV 2 |
| Architecture | Half the program | 3270, 3330 | Elective subjects: UV 0<br>All other subjects: appropriate UV corresponding to credit points* |
| | | 3320, 3360, 3380 | All subjects: UV equal to the allocated hours*<br>Elective subjects: UV 0<br>All other subjects: UV equal to the allocated hours* |
| Arts | 18 first-level credit points | 3400, 3420 | |
| Biological Sciences | | 3430 | Science subjects: appropriate UV*<br>Arts subjects:<br>• 6 credit points = UV 1<br>• 12 credit points = UV 2 |

*For details see the appropriate Faculty Handbook.

| Faculty/Board of Studies | Minimum Requirement | Course | Unit Values (UV) |
|---|---|---|---|
| Commerce | Three subjects | 3490-3595 FT in both sessions | |
| | Two subjects | 3490-3595 PT in either session | |
| Engineering | Half the program including Physics I or Mathematics I | 3610, 3660, 3680, 3700 | 5.061: UV 0<br>One-session subjects: UV 1<br>Two-session subjects: UV 2 |
| | Half the program including Mechanics of Solids or Mathematics I | 3620, 3730 | All subjects: UV equal to the allocated hours* |
| | Half the program including Physics I or Mathematics I | 3640, 3720 | One-session subjects: UV 1<br>Two-session subjects: UV 2 |
| | Half the program | 3740-3760 | One-session subjects: UV 1<br>Two-session subjects: UV 2 |
| Law | Half the program | 4710-4790 | One-session subjects: UV 1<br>Two-session subjects: UV 2 |
| Medicine | Half the program | 3800 | 80.010: UV 3<br>81.001: UV 3<br>81.002: UV 6<br>70.001: UV 4<br>General Studies: UV 1 |
| Military Studies | Half the program | BA, BSc | All subjects: UV 1 |
| | | BE | All subjects: appropriate weighted mark* |
| Professional Studies | Half the program | 4030, 4040 | All subjects: UV 1 |
| | | 4070-4080 | All subjects: appropriate UV*<br>One General Studies elective: UV1 |
| Science | Half the program | 3910, 3950 | All subjects: appropriate UV*<br>General Studies: UV 1 |
| Science and Mathematics | 2 units | 3970 | All subjects: appropriate UV*<br>One General Studies elective: UV 1 |

*For details see the appropriate Faculty Handbook.

## Admission to Degree or Diploma

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

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

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

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

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

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

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

## Attendance at Classes

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

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

**Absence from Classes**

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

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

## Student Records

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

## Release of Information to Third Parties

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

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

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

## Change of Address

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

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

## Ownership of Students' Work

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

## Notices

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

## Parking within the University Grounds

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

## Academic Dress

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

## Further Information

### Lost Property

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

### The Calendar

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

# Vice-Chancellor's Official Welcome to New Students

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

Faculties of Architecture, Arts, Biological Sciences, Commerce, Law:

Tuesday 28 February 1984
9 am in the Clancy Auditorium

Faculties of Applied Science, Engineering, Medicine, Professional Studies, Science, and the Board of Studies in Science and Mathematics:

Tuesday 28 February 1984
11 am in the Clancy Auditorium

**Meeting for Parents of New Students**

Friday 2 March 1984
7.30 pm in the Clancy Auditorium

# Introduction to the Sciences Handbook

This handbook has been designed to assist understanding of the academic activities of three inter-related groups within the university, namely the Board of Studies in Science and Mathematics, the Faculty of Biological Sciences and the Faculty of Science. The Board is responsible for the undergraduate studies of students majoring in disciplines associated with the two faculties and several schools from other faculties. The regulations governing the award of the degree of Bachelor of Science form a substantial part of the handbook. Other parts include details of the Science component of the combined degrees, Science/Law, Science/Civil Engineering, Science/Electrical Engineering, Science/Aeronautical Engineering, Science/Industrial Engineering, Science/Mechanical Engineering, Science/Naval Architecture, Science/Medicine, Science/Optometry, and of the two concurrent courses in Mathematics Education and Science Education.

Several specialist courses of study, also leading to the award of the degree of Bachelor of Science, are offered by the two faculties and the regulations covering these are given under the separate faculty sections. In addition the two faculties make available facilities to proceed to higher degrees and the conditions under which these awards are made are listed under the sections devoted to graduate study.

In the last part of the handbook there are brief statements of the syllabuses for units prescribed in the various regulations.

# Faculty Information

## Who to Contact

If you require advice about enrolment, degree requirements, progression within courses or any other general matters related to the Board, contact one of the following:

Ms Robyn Mulholland, Administrative Assistant

Dr B. J. Burn, Co-ordinator of Studies in Science and Mathematics
Room 211, Plaza Level, Mathews Building

For information regarding particular courses, advice may be obtained from staff members listed in the **Introduction** to each of the sections related to the Board, the Faculty of Biological Sciences and the Faculty of Science, later in this handbook.

**Important:** As changes may be made to information provided in this handbook, students should frequently consult the noticeboard of the Board of Studies in Science and Mathematics and the official noticeboards of the University.

## Enrolment Procedures

- **Faculty of Biological Sciences**
- **Faculty of Science**
- **Board of Studies in Science and Mathematics**

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

The subject timetable for the Science and Mathematics Course (Course 3970) is available in late October/early November from the Science and Mathematics Course Office, Room 211, Mathews Building. All re-enrolling students should collect one of these timetables along with a preliminary enrolment form (SM84). The preliminary enrolment form is to be completed and returned to the Science and Mathematics Office by the end of the first week in January.

## Sciences Library Facilities

Although any of the University Libraries may meet specific needs, staff and students of the Faculty of Biological Sciences are served mainly by the Biomedical and Undergraduate Libraries while those of the Faculty of Science are served mainly by the Physical Sciences and Undergraduate Libraries.

**The Biomedical Library**

This library is situated on Levels 2, 3 and 4 of the Mathews Building Annexe. It aims to serve the specialized reference and research needs of staff, graduate students and undergraduate students in the Biological Sciences.

Trained staff are available at all times in the Biomedical Library to assist staff and students in making best use of the library.

Biomedical Librarian — George Franki

**The Physical Sciences Library**

This library, situated on Levels 6 and 7 of the Library tower, caters for the information needs of staff, graduate students and senior undergraduate students in the pure and applied sciences, engineering and architecture. Details of the books, serials and microforms in the Physical Sciences Library are included in the microfiche monograph and serials catalogues, and the items themselves are identified by the prefix 'P'.

Serials with the prefix 'PJ' are not for loan but self-service photocopying facilities are available on Level 7.

This Library provides reference, reader assistance and reader education services and also, where appropriate, inter-library loan and literature-searching services.

Trained staff are always available on Level 7 to assist readers with their enquiries.

Physical Sciences Librarian — Marian Bate

**The Undergraduate Library**

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

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

Services of particular interest to undergraduates and academic staff are:

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

Undergraduate Librarian — Pat Howard

## Student Clubs and Societies

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

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

**The Psychology Society**

The Psychology Society aims to provide activities both educational and social for students of psychology, and, more generally, to act as an intermediary body between students and staff. While psychology is one of the most popular subjects available, many students have only a vague conception of psychology and are unsure where their courses will lead them.

One of the aims of the Psychology Society is to provide information relevant to these matters. In a large School it is difficult to develop contacts between students of different years and staff. The Society attempts to provide opportunities for such contact, to foster staff-student relations and to act in the interest of psychology students as a whole. Accordingly, we hope to provide staff-student luncheons, informal discussions and theatre parties. On the educational side there are film showings and occasional talks and seminars (eg on careers, course requirements). An activities fee enables the committee to meet any of the finances needed to support its functions.

## Statistical Society of Australia: New South Wales Branch

The Branch offers student membership to undergraduates who are following a recognized course of study which includes Statistics. The subscription for a student member is $15 per annum with a $4 rebate if paid before 1 March.

The Branch holds about four general meetings each year at the end of which two talks, one theoretical and the other applied, are given on the one topic. The Branch conducts a Research Section, and membership of this group is open to members of the Branch free of charge. Each year the Branch also conducts a symposium for the study and discussion of particular statistical techniques or of statistical methods in a specialized field; symposia are open to members at reduced rates.

Members of the Branch receive *The Australian Journal of Statistics,* which is published three times a year by the Statistical Society of Australia, together with the Society's *Newsletter.*

Applications and requests for further information should be sent to the Hon. Secretary, Dr H. M. Hudson, School of Economic and Financial Studies, Macquarie University, North Ryde, NSW 2113.

# Board of Studies in Science and Mathematics

**Board of Studies in Science and Mathematics**

# Introduction

The Science and Mathematics Course (3970) leads to the Bachelor of Science Degree on the completion of a three year program or a four year program chosen from specific programs approved by the Board of Studies in Science and Mathematics.

The Board of Studies in Science and Mathematics offers a wide choice of programs each designed to meet specific aims and objectives. Most programs are identified with a particular School or discipline but some are multi-disciplinary.

All students in the Science and Mathematics Course must enrol in two units of first year Mathematics; either Mathematics I or Higher Mathematics I or General Mathematics. Care must be taken in making the choice as, in general, General Mathematics considerably limits the choice of units in following years.

Some Schools do not offer a full range of Level III units in the evening. The Schools concerned are marked below with ‡.

Students seeking *general advice* should contact the Board of Studies in Science and Mathematics Office (Room 211, Mathews Building, map reference F23) and for *advice in specific disciplines* should contact the representative of the relevant School as listed below:

| | |
|---|---|
| First Year Biology Unit | Dr M. Augee |
| ‡ School of Anatomy | Dr B. W. Freeman (Year 2 and Year 3)<br>Professor F. W. D. Rost (Year 4) |
| ‡ School of Applied Geology | Mr G. J. Baldwin |
| ‡ School of Biochemistry | Professor W. J. O'Sullivan |
| ‡ School of Biotechnology | Dr N. W. Dunn |
| ‡ School of Botany | Associate Professor J. H. Palmer |
| ‡ School of Chemistry | Mr W. J. Dunstan |
| ‡ School of Community Medicine | Dr A. E. Stark |
| ‡ School of Electrical Engineering and Computer Science | Mr L. C. Hill |
| ‡ School of Geography | Mr N. Lonergan |
| ‡ School of History and Philosophy of Science | Dr D. R. Oldroyd |
| School of Mathematics | Associate Professor A. H. Low (Year 1)<br>Miss M. Potter |
| ‡ Marine Science | Dr P. Dixon |
| School of Mechanical and Industrial Engineering | Mr K. Kjorrefjord |

| | |
|---|---|
| ‡ School of Metallurgy | Dr P. G. McDougall |
| ‡ School of Microbiology | Dr E. H. Hegarty |
| ‡ School of Philosophy | Professor C. L. Hamblin |
| School of Physics | Dr G. J. Russell (Year 1)<br>Dr J. R. Hanscomb |
| ‡ School of Physiology and Pharmacology | Dr B. S. Nail *or*<br>Associate Professor M. J. Rowe |
| ‡ School of Psychology | Dr K. R. Llewellyn<br>Mr T. J. Clulow |
| ‡ School of Zoology | Dr Patricia Dixon |

**Board of Studies in Science and Mathematics**

The Board of Studies in Science and Mathematics includes all members of the Faculty of Biological Sciences* and the Faculty of Science* and some members of specific Schools in other faculties contributing to the Science and Mathematics Course: Applied Geology, Chemical Engineering and Industrial Chemistry, Geography, Metallurgy (Applied Science); History and Philosophy of Science, Philosophy (Arts); Accountancy, Economics (Commerce); Electrical Engineering and Computer Science, Mechanical and Industrial Engineering, Surveying (Engineering); Anatomy, Community Medicine, Physiology and Pharmacology (Medicine); Education (Professional Studies); and the Department of General Studies (Board of Studies in General Education).

The Dean is the Dean of the Faculty of Science, Professor V. T. Buchwald.

The Chairman is Professor A. J. Wicken.

The Co-ordinator of Studies in Science and Mathematics is Dr B. J. Burn. The Administrative Assistant is Ms Robyn Mulholland.

‡See text of **Introduction**, on previous page.
*See **Staff**, listed later in this handbook.

**Board of Studies in Science and Mathematics**

# 3970 Science and Mathematics Course

The Science and Mathematics Course, which leads to the Bachelor of Science degree, is administered by the Board of Studies in Science and Mathematics and offers a wide choice of programs, each designed to meet specific aims and objectives. Most programs are identified with a particular school or discipline but some are multi-disciplinary.

## Aims of the Science and Mathematics Course

The main aims of the Science and Mathematics Course, diverse and not necessarily exclusive, may be summarized as providing opportunities to students to prepare themselves for careers in:

- research
- technology
- science and mathematics education
- areas of management or public policy involving the use of science or mathematics

## Objectives of the Science and Mathematics Course

The important general objectives of most programs in the Science and Mathematics Course are:

**1.** To develop and sustain an interest in and knowledge of Science and Mathematics.

**2.** To develop a working knowledge of scientific methods of investigation and a favourable attitude towards them.

**3.** To encourage curiosity and creative imagination and an appreciation of the role of speculation in the selection and solution of problems, the construction of hypotheses, and the design of experiments.

**4.** To develop an appreciation of scientific criteria and a concern for objectivity and precision.

**5.** To develop confidence and skill in formulating problems and in treating both qualitative and quantitative data.

**6.** To develop the ability and disposition to think logically, to communicate clearly by written and oral means, and to read critically and with understanding.

**7.** To develop the habit of seeking and recognizing relationships between phenomena, principles, theories, conceptual frameworks and problems.

**8.** To promote understanding of the significance of science, technology, economics and social factors in modern society, and of the contributions they can make in improving man's material conditions and in widening his imaginative horizons and his understanding of the universe.

**9.** To provide opportunities for the development of a student's motivation and social maturity, and an awareness of his own capabilities in relation to a choice of career which will be fruitful to himself and to society.

There is a wide range of programs in single and multi-disciplinary areas leading to a three year degree or a four year degree.

## The Structure of the Science and Mathematics Course

The Science and Mathematics Course consists of a number of individual programs, based on units ranked as Level I, Level II, Level II/III, Level III and Level IV with a unit size varying from 56-84 hours.

The terms Levels I, II, III do not necessarily refer to the years in which the unit must be studied. Units at the various levels may be taken in other years provided the prerequisites are met. Level II/III units have only Level I prerequisites.

The Bachelor of Science degree is awarded on completion of

- **a three year program**

*or*

- **a four year program**

chosen from specific programs approved by the Board of Studies in Science and Mathematics.

The time specified is a minimum time required for completion of the degree. It may be taken over a longer period of time.

- A student must select and be enrolled in one of the prescribed programs.
- A student may not undertake more than 8 Science units in any one year unless approval is given by the Co-ordinator or the Dean of the Board of Studies in Science and Mathematics.
- With the approval of the Dean, a student may change from one selected program to another. A written application to make the change, together with details of any optional units selected in the new program, must be lodged at the office of the Board of Studies in Science and Mathematics, Room 211 (Mathews Building, map reference F23).
- The programs listed below are made up of a sequence of units. Where a choice of units is indicated within a program care must be taken to satisfy the requirements, such as prerequisites and co-requisites.
- A prerequisite unit is one which must be completed prior to enrolment in the unit for which it is prescribed.
- A co-requisite unit is one which must either be completed successfully before or be studied concurrently with the unit for which it is prescribed.
- An excluded unit is one which cannot be counted towards the degree qualification together with the unit which excludes it. In exceptional circumstances, on the recommendation of the head of the appropriate school, the Board of Studies in Science and Mathematics may waive or vary a particular prerequisite, co-requisite or exclusion.
- A single major is a program specifying only 4 Level III units in a discipline.
- A double major is a program specifying more than 6 Level III units in a discipline.
- Upon sufficient cause being shown in a particular case or cases, the Board of Studies in Science and Mathematics may vary any of these rules.

## The three year program

The three year program leading to the award of the pass degree consists of:

**1.** at least 23 units at Level I, II, II/III, III as specified in an individual program with the following requirements:

(1) *not less than* eight *nor more than* ten units may be from Level I;

(2) two of the Level I units must be 10.001 Mathematics I, 10.001 Higher Mathematics I or 10.021B and 10.021C†;

(3) *not less than* four units from Level III or as specified individual programs.

**2.** General Studies electives as specified in an individual program.

- In order to graduate a student must pass all the units specified in the program of his/her choice.

## The four year program

The four year program, leading to an Honours Class I, II/1, II/2, III or pass degree consists of:

**1.** at least 23 units at Level I, II, II/III, III as specified in an individual program, with the following requirements:

(1) *not less than* eight *nor more than* ten units may be from Level I;

(2) two of the Level I units must be 10.001 Mathematics I, 10.011 Higher Mathematics I or 10.021B and 10.021C.

(3) *not less than* eight units from Level III or as specified in an individual program.

**2.** 1. an approved honours program offered by one or more schools;

*or*

2. at least 10 units at Level IV as specified in an individual program;

**3.** General Studies electives as specified in an individual program.

- In order to graduate a student must pass all the units specified in the program of his/her choice.

Students are required:

- to have completed Years 1, 2 and 3 of the specific program and to have satisfied prerequisite requirements as specified in Table 3;
- to seek the guidance of the appropriate head of school at an early stage of study to ensure that the program being followed is best suited to lead to the Year 4 honours program;
- to have completed relevant subjects normally with better than passing grades;
- to have the approval of the appropriate head of school at the end of Year 3.

A person on whom the pass degree of Bachelor of Science of the University has been conferred may be admitted by the Board of Studies in Science and Mathematics, on the recommendation of the relevant Heads of Schools, to candidature for an honours degree conversion program with credit for all units completed, if during his studies for the pass degree, he has satisfied the prerequisites for proceeding to honours level laid down by the School or Schools concerned.

## Rules governing admission to the Science and Mathematics Course with advanced standing

Any person who makes application to enrol in the Science and Mathematics Course (course **3970**) or in a double degree course which includes the Science degree course administered by the Board of Studies in Science and Mathematics may be admitted to the course of study leading to such degree with such standing on the basis of previous attainment as may be determined by the Board of Studies in Science and Mathematics provided that:

(1) Where students transfer from another tertiary institution, such students shall not in general be granted standing in the course which is superior to that which they have enjoyed at the institution from which they transferred.

(2) The standing granted by the Board of Studies in Science and Mathematics in the case of any application based upon any degree(s) or other award held by applicants, should not be such as will permit the applicants to qualify for the science degree, without completing the course of instruction and passing examinations in at least those subjects comprising the latter half of the Science and Mathematics course, so that where such a program of study would involve the applicants in repeating courses of instruction in which the Board of Studies in Science and Mathematics deems the applicants to have already qualified, the Board may prescribe an alternative program of studies in lieu thereof.

(3) The standing granted by the Board of Studies in Science and Mathematics in the case of applications based on partial completion of the requirement for any degree or other award of another institution shall not be such that it will permit the applicants to qualify for the award of the science and mathematics degree by satisfactory completion of the program of study deemed by the Board to be less than that required for students in full time attendance in the final year of the Science and Mathematics Course (course **3970**).

(4) The standing granted by the Board of Studies in Science and Mathematics in the case of applications based upon the partial completion of the requirements for any degree or award of the University may be such as to give full credit in the Science and Mathematics Course (course **3970**) for work done in the course from which the students transfer.

## Programs

**Students are advised that it may not be possible to complete their studies by attendance at evening classes alone.**

Each program has a four-digit identifying number.

Most programs have been set out as Years 1, 2, 3 and 4 for the four year program and in these cases Years 1, 2 and 3 comprise a three year program. Some programs are designed as an integrated four year program leading to the award of the honours degree. A few programs are set out as Years 1, 2 and 3 and lead to the pass degree only.

To progress through a program a student must meet all the prerequisites and co-requisites as detailed in Tables 1, 2 and 3.

The range of programs has been designed to cover a wide variety of needs in the various areas of science and mathematics:

| | |
|---|---|
| Anatomy | *see programs* 7001, 7002, 7003, 1270, 4170, 4570, 6270, 7073 |
| Biochemistry | *see programs* 4101, 0241, 4142, 4143, 4144, 4145, 4162, 4170, 4173 |
| Biology | Biology is taught in Year 1 as a single discipline but in later years as specific subjects: biological technology, biochemistry, botany, entomology, genetics, immunology, microbiology and zoology |

| | |
|---|---|
| Biotechnology | *see programs* 4201, 0242, 4142, 4244 |
| Botany | *see programs* 4306, 4309, 2543, 2743, 4143, 4344, 4345, 4543, 6243 |
| Chemistry | *see programs* 0201, 0202, 0203, 0204, 0225, 0241, 0242, 0261, 0262, 7302 |
| Community Medicine | units *available in some programs* (the identifying number is 79) |
| Computer Science | *see programs* 0601, 0610, 0611, 0161, 0261, 1061, 1062, 4561 |
| Genetics | *see program* 6840 |
| Geography | *see programs* 2701, 2703, 2725, 2743 |
| Geology | *see programs* 2501, 2502, 2503, 0125, 0225, 1025, 2725, 2543, 6225 |
| History and Philosophy of Science | *see programs* 6200, 6201, 6225, 6243, 6245, 6270, 0162, 0262, 4162 |
| Information Systems | *see program* 1401 |
| Marine Science | *see programs* 6831, 6832, 6833, 6834 |
| Mathematics | *see programs* 1001, 1002, 1003, 1004, 1005, 1006, 1007, 1008, 1009, 1010, 1011, 1012, 1013, 1014, 1015, 1016, 1017, 1018, 1019, 1020, 1021, 1022, 1023, 1025, 1061, 1062, 0610, 0611 |
| Metallurgy | *see programs* 0401, 0402, 0403 |
| Microbiology | *see programs* 4401, 4402, 4403, 4404, 4144, 4244, 4344 |
| Philosophy | units *available in some programs* (the identifying number is 52) |
| Physics | *see programs* 0101, 0102, 0103, 0105, 0106, 0125, 0161, 2503, 0162, 6201 |
| Physiology | *see programs* 7301, 7302, 7303, 7312, 7345, 7073, 4173 |
| Psychology | *see programs* 1201, 1270, 7312 |
| Zoology | *see programs* 2543, 4501, 4502, 4508, 4509, 4514, 4543, 4145, 4345, 4561, 4570, 6245, 7345 |

In addition to Course 3970 programs are also included for Courses 3611 (Science/Aeronautical Engineering), 3661 (Science/Industrial Engineering), 3681 (Science/Mechanical Engineering), 3701 (Science/Naval Architecture), 3725 (Science/Electrical Engineering), 3730 (Science/Civil Engineering), 3820 (Science/Medicine), 3951 (Science/Optometry), 4070 (Mathematics/Education), 4080 (Science/Education), 4770 (Science/Law).

# Physics

It is appropriate that Physics should be allocated the first entries in this handbook since the subject is at the very basis of all science and technology. This is reflected in the various programs which the School offers and which range from those designed for the intending professional physicist to the many areas in which Physics combines with other disciplines. The following table serves to illustrate this fact and to summarize the several avenues open to the student for the study of Physics.

| *Professional Training in Physics* | *Physics with other Disciplines* |
|---|---|
| Program | Program (or Course) |
| 0101 Physics | 0125 Physics/Geology |
| 0102 Physics (Single Major) | 0161 Physics/Computer Science |
| 0103 Applied Physics | 0162 Physics and Science Policy Studies |
| 0105 Theoretical Physics | 2503 Geophysics |
| 0106 Biophysics | 6201 History and Philosophy of Science/Physics |
| | *Physics in other Courses* |
| | 3170 Textile Physics |
| | 3611 Aeronautical Engineering with Physics |
| | 3661 Industrial Engineering with Physics |
| | 3681 Mechanical Engineering with Physics |
| | 3701 Naval Architecture with Physics |
| | 3725 Electrical Engineering with Physics |
| | 3730 Civil Engineering with Physics and Mathematics |
| | 4770 Law with Physics |
| | 5801 |
| | 5802 Education with |
| | 5803 Physics |
| | 5805 |

*Professional Training*

Of these various programs all, except for 0102*, are designed to enable a student to proceed to Year 4 (Honours) and thence into professional employment or to the higher degrees MSc PhD. Program 0101 provides the greatest degree of flexibility in the choice of units. 0103 and 0105 recommend certain units (particularly in Year 3) which it is considered will best equip the student for entry into industry

or will enable him to specialize in the theoretical rather than the experimental aspects of the subject. The Biophysics program is more akin to those in the right hand column above and provides for earlier specialization leading to a career in biomedical physics.

Since Physics is expressed in the language of Mathematics a good grounding in this area is essential and students are encouraged to select higher level mathematics units wherever possible.

The subject descriptions of the units may be found in the latter section of this handbook. A study of these will show that it is possible to gain experience in a wide variety of areas representative of this School's interest in astrophysics, solid state physics and materials science, lasers and their applications, biophysics, etc.

*Physics with other Disciplines*
The right hand column above lists those programs which have been arranged with other Schools. Several of these can lead to honours in Physics or to joint honours with other Schools, eg 0125, 0161, 6201, 3725, 5801, so it must not be thought that the only avenue to specialization in Physics is via the professional programs 0101, etc.

Students should also bear in mind that prerequisites and corequisites can be waived in certain cases, eg when it is judged that an equivalent study has been undertaken in some other combinations of units. The possibility also exists of relaxing the requirements of programs to allow a student to select a unit in which he has a special interest but which is not a recommended one in the program.

*In certain circumstances students completing program 0102 may be accepted into honours Physics. Further detail is available from the School.

## 0101
## Physics

**Year 1**
1.001 *or* 1.011
10.001 *or* 10.011*
Choose 2 units from:
2.111, 2.121, 2.131, 2.141
Choose 2 Level I units from:
1.041, 1.061
5.010
6.611
10.081
17.031, 17.041
25.110, 25.120

**Year 2**
1.002, 1.012, 1.022, 1.032
10.1113*, 10.1114*, 10.2111*, 10.2112*
*1 General Studies elective*††
Choose 2 units from:
1.042, 1.052, Level II units in Table 1†

**Year 3**
1.0133, 1.0143, 1.023, 1.0333, 1.0343, 1.043
*1 General Studies elective*
Choose at least 3 units from:
Level III Physics units in Table 1, 10.111A*, 10.212A*, 10.412D*, including at least *one* of: 1.0533, 1.0543, 1.763‡

**Year 4**
1.104

*Students are encouraged to select higher level mathematics units where applicable.

††Enrolment in General Studies may be deferred until later years but a minimum of 112 general studies elective hours must be satisfactorily completed for degree requirements unless the program specifies otherwise.

†Students are reminded that for some recommended Level III Mathematics units, 10.111A is a prerequisite.

‡Students wishing to specialize in Laser and Advanced Optical Technology should consult the School to ascertain additional requirements.

## 0102
## Physics
## Single major†

**Year 1**
1.001 *or* 1.011
10.001 *or* 10.011
Choose 4 Level I units from Table 1 *and/or* Table 2 for program 0102

**Year 2**
1.012, 1.022, 1.032
10.2111 & 10.2112
*1 General Studies elective*††
Choose 4 units from Table 1 *and/or* Table 2 for program 0102*

**Year 3**
1.0133, 1.023, 1.0333, 1.043
*1 General Studies elective*
Choose at least 4 units from Table 1 *and/or* Table 2 for program 0102 to include at least *one* Level III Physics unit*

††See footnote to program 0101.

†Under exceptional circumstances students taking this program may be eligible for transfer into Year 4 of program 0101 *or* 0103 provided a satisfactory level is attained in a number of Mathematics units. Students should consult the School of Physics for further details.

*Students are advised that unit 1.002 is compulsory and must be taken in either Year 2 or Year 3.

## 0103
## Applied Physics

**Year 1**
1.001 *or* 1.011
10.001 *or* 10.011*
Choose 2 units from:
2.111, 2.121, 2.131, 2.141
Choose 2 Level I units from:
1.041, 1.061
5.010
6.611
10.081
17.031, 17.041
25.110, 25.120

**Year 2**
1.002, 1.012, 1.022, 1.032
10.1113*, 10.1114*, 10.2111*, 10.2112*
*1 General Studies elective*††
Choose 2 units from:
1.042, Level II units in Table 1**

**Year 3**
1.0133, 1.0143, 1.023, 1.0333, 1.0343, 1.043
*1 General Studies elective*
Choose at least 3 units from:**
1.0533, 1.0543, 1.133, 1.3033, 1.3133, 1.3233, 1.3333, 1.3533, 1.713, 1.763, 1.773
including at least *one* of:
1.0533, 1.0543, 1.763‡

**Year 4**
1.304

*††‡See footnote to program 0101.

**Consideration is given to the choice of units of an applied nature offered by other Schools (eg Engineering) which may be listed in Table 1 or in the handbooks of other Boards and Faculties. Students must consult the School of Physics in the first instance.

## 0105
## Theoretical Physics

**Year 1**
1.001 *or* 1.011
10.001 *or* 10.011*
Choose 2 units from:
2.111, 2.121, 2.131†, 2.141
Choose 2 Level I units from Table 1 *and/or* Table 2 for program 0105

**Year 2**
1.002, 1.012, 1.022, 1.032
10.111A*,
10.1113*, 10.1114*, 10.2111*, 10.2112*
*1 General Studies elective*††
Choose 1 unit from:
1.042, 1.052, 10.211E* or other Level II mathematics units in Table 1

**Year 3**
1.0133, 1.0143, 1.1133, 1.023, 1.0333, 1.043
10.412D*
*1 General Studies elective*
Choose at least 2 units from:**
1.5133, 1.5233, 1.5333, 1.5433, 1.5533, 1.0343, 1.1633

**Year 4**
1.504

*††See footnote to program 0101.

**With the approval of the School of Physics certain Level III Mathematics units may be substituted for some of the units listed.

## 0106
## Biophysics

**Year 1**
1.001 *or* 1.011
2.121, 2.131
10.001 *or* 10.011*
17.031, 17.041†

**Year 2**
1.012, 1.022, 1.032
2.002B
10.1113*, 10.1114*, 10.2111*, 10.2112*
73.111** *or* 73.121
*1 General Studies elective*††

**Year 3**
1.023, 1.0333, 1.1433, 1.1533
Choose 1½ units from Level III Physics units in Table 1***
Choose 2 units from:
1.041, Level II or Level III Mathematics units in Table 1
Choose 1 unit from Level II or Level III Biological units in Table 1
*1 General Studies elective*

**Year 4**
1.604

†Students with 2 unit biology HSC may take 1.041 in place of 17.041.

††*See footnote to program 0101.

**Entry to 73.111 requires the approval of the Head of School of Physiology and Pharmacology. If approved, the co-requisite 41.101 is waived.

***Recommended Physics units are 1.002, 1.0133.

## 0125
## Physics/Geology

**Year 1**
1.001 *or* 1.011
2.121 & 2.131 *or* 2.141
10.001 *or* 10.011*
25.110, 25.120

**Year 2**
1.002, 1.012, 1.022, 1.032
10.2111*, 10.2112*, 10.1113*, 10.1114*
*1 General Studies elective*
Choose 2 Geology units from Table 1 and/or Table 2 for program 0125

**Year 3**
1.0133, 1.023, 1.0333, 1.043, 1.0143, 1.0343
*1 General Studies elective*
Choose 4 Geology units from Table 1 and/or Table 2 for program 0125

**Year 4**
25.434 *or* 1.104 *or* 1.304
*or*
68.430 (a combined Geology and Physics program by arrangement with Heads of the two Schools)

††*See footnote to program 0101.

## 0161
## Physics/Computer Science

**Year 1**
1.001 *or* 1.011
10.001 *or* 10.011*
6.611
Choose 3 units from Table 1**

**Year 2**
1.012, 1.022, 1.032
6.621, 6.641
10.2111*, 10.2112*, 10.1113*, 10.1114*
*1 General Studies elective*††
Choose 1 unit from:
1.042, 1.052, 6.631***, 10.111A*

**Year 3**
1.002
Choose 3 Level III Physics units from Table 1 to include 1.0133, 1.023 and 1.0333
*1 General Studies elective*
Choose 4 units from:**
Level III Physics units in Table 1, 1.042, 6.631***, 10.212A*, 10.412D*, 10.612 including at least one Level III Computer Science unit from Table 1 or 2

**Year 4**
1.104** *or* 1.304** *or* 1.504**

††*See footnote to program 0101.

**Students intending to proceed to Year 4 are required to choose appropriate units. This choice is determined by the requirements of programs 0101, 0103 and 0105. Students are required to consult the School of Physics. It is also advised that quota restrictions apply to Computer Science Level III units. Application must be made in writing to the Head of School of Electrical Engineering and Computer Science before the end of Session 2 in the preceding year.

***Unit 6.631 must be taken in Year 2 or Year 3 but students should bear in mind that this unit is a prerequisite for 6.632 and 6.613.

## 0162
## Physics and Science Policy Studies§‡

**Year 1**
1.001 *or* 1.011
10.001 *or* 10.011
Choose 4 Level I units from Table 1 *and/or* Table 2 for program 0162

**Year 2**
1.012, 1.022, 1.032
10.2111, 10.2112
62.022, 62.052, 62.062
Choose 1 unit from:
62.012, 62.032

**Year 3**
1.0133, 1.023, 1.0333, 1.043, 1.002
*1 General Studies elective***††
Choose 3 units from:
62.012, 62.032†, 62.013, 62.033, 62.072, 62.082, 62.093
Choose 1 unit from:
15.001, 15.703, 15.753, 10.212A *or* 10.412D

**Year 4**
62.024

§This program is intended for students wishing to major in Physics and at the same time acquire an understanding of the social dimensions of science and the role of science in the economy. It also provides elements of a training in science policy studies, important for those wishing to engage in administration and policy-making in science and technology. Honours students will complete a thesis concerned with an aspect of science policy.

‡Under exceptional circumstances students taking this program may be eligible for transfer into Year 4 of program 0101 or 0103 or 0105.

**26.251, 26.2506, 26.561, 26.564, 26.817 may not be included in the program.

††See footnote to program 0101.

†See footnote to program 6200.

# Chemistry

The School of Chemistry is divided into four departments (Physical, Organic, Inorganic and Nuclear, and Analytical) and a First Year Teaching unit.

Each department contributes to first year teaching and offers specialty courses in its own area for the Science and Mathematics programs, Pure and Applied Chemistry and servicing to other faculties.

The course programs leading to a major in Chemistry are programs 0201 Chemistry (single major), 0202 Chemistry, 0203 Chemistry (double major), 0204 Chemistry/Chemical Engineering Science, 0225 Chemistry/Geology, 0241 Chemistry/Biochemistry, 0242 Chemistry/Biotechnology, 0261 Chemistry/Computer Science, 0262 Chemistry with Science Studies and 7302 Chemistry/Physiology.

The School also offers a program in the Faculty of Science called Pure and Applied Chemistry (course 3910) similar to 0203 and described later in this Handbook.

Program 0201 provides the opportunity for greater concentration on units offered by the School of Chemistry than is provided by program 0202. It also offers increased options in chemistry subjects in Year 3 (Level III units), whereas program 0202 allows for a wider choice from other selected fields in the Science and Mathematics course. With either it is possible to study chemistry and another branch of science to an advanced level. For example, a combination of Level III Chemistry and Mathematics units provide a useful basis for later specialization in X-ray crystallography or theoretical chemistry. Program 0225 contains a combination of Level III Chemistry and Geology units and is designed for those who wish to specialize later in Geochemistry. In Program 7302 a combination of Level III Chemistry and Physiology units could form the basis of later specialized studies of the chemical function of the control systems in the animal body.

Program 0203 is designed for major specialization in Chemistry at Level II and Level III and should be selected by students who wish to devote their studies at Level III almost entirely to chemical topics. (This program is similar to the Pure and Applied Chemistry course 3910, in the Faculty of Science.)

Program 0241 and 0242 are designed for those students who wish to undertake a co-major in Chemistry and Biochemistry or Biological Technology. The choice and direction of Honours and graduate work is thereby widened and such work may be undertaken in any of the fields covered by the co-major.

Program 0204 enables the inclusion of some elements of Chemical Engineering in Year 3 as well as Level III Chemistry units, whilst Program 6834 Marine Science also involves a substantial study of chemistry. Program 0261 includes Computing Science in each of Years 1, 2 and 3.

The programs are open to all students who have satisfied the requirement for entry into the Science and Mathematics course. However, those who have not studied sufficient science at school (see prerequisites under subject number) may be required to study a special introductory unit (2.111) before enrolling in the Level I Chemistry units (2.121, 2.131, 2.141) specified in the Chemistry programs. The Level I subject 2.141 is designed specifically for students intending to major in Chemistry. It covers the same material, at a similar level to that in 2.121 and 2.131, but is a full year subject and the order of treatment of the topics is different.

All Chemistry programs have a common first year of study which includes chemistry, physics, mathematics and an elective. It is thus not mandatory for a student to make a final choice of program before the commencement of Year 2. There is further, though limited, choice between programs after the prescribed Level II units have been completed.

Most of the Chemistry programs lead to studies at the Honours level (Level IV) and to graduate studies in Chemistry. The usual introduction to research in Chemistry is in Level IV and at this level the student devotes the major part of his time to research under the direction of a member of staff as supervisor. A small proportion of the time is taken up with formal course work. The Honours year (or its equivalent in qualifying studies) may be followed by a higher research degree. Further information about graduate courses is included in this handbook and in a booklet: 'Postgraduate Studies and Research in the School of Chemistry'.

## 0201 Chemistry* Single major

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
Choose 2 Level I units from Table 1

**Year 2**
2.002A, 2.002B, 2.042C, 2.002D
*1 General Studies elective*††
Choose 3 units from Table 1

**Year 3**
*1 General Studies elective*
Choose 8 units from Table 1 including 4 Level III Chemistry units

**Year 4**
2.004

*Students wishing to undertake a co-major in Chemistry and History and Philsophy of Science are advised that they may do so by enrolling in 0201 or 0202 and choosing appropriate History and Philosophy of Science units from Table 1. In such cases, 26.561, 26.564 and 26.817 may not be included in the choice of General Studies electives.

††See footnote to program 0101.

## 0202
## Chemistry*

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
Choose 2 Level I units from Table 1

**Year 2**
2.002A, 2.002B
*1 General Studies elective*††
Choose at least 5 units from Table 1 including at least one of:
2.042C *and* 2.002D

**Year 3**
*1 General Studies elective*
Choose 8 Level III units from Tabel 1 including only 4 Chemistry units

**Year 4**
2.004

*See footnote to program 0201.
††See footnote to program 0101.

## 0203
## Chemistry
## Double major

Students wishing to take 8 or more Level III Chemistry units are required to transfer to the Pure and Applied Chemistry Course (3910) before the commencement of Year 2. If Year 2 studied in the Science and Mathematics course is similar to Year 2 of Course 3910, the transfer may still be made before the commencement of Year 3.

The Pure and Applied Chemistry Course is described in detail later in this handbook (**Faculty of Science**) and enables specialization in Chemistry.

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
Choose 2 Level I units from Table 1

**Year 2**
2.002A, 2.002B, 2.042C, 2.002D, 2.003H
*1 General Studies elective*††
Choose 2 units from Table 1

**Year 3**
2.003B, 2.003C, 2.003D, 2.013A
*1 General Studies elective*
Choose 4 other Chemistry Level III electives from Table 1

**Year 4**
2.004

††See footnote to program 0101.

## 0204
## Chemistry/Chemical Engineering Science‡

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
Choose *either:*
**1.** 5.030 and 1 Level I unit from Table 1, *or*
**2.** 2 Level I units from Table 1

**Year 2**
2.002A, 2.002B, 2.042C, 2.002D
10.031
*or*
10.111A and 10.2111 and 10.2112*
48.023
*1 General Studies elective*††
Choose *either:*
**1.** 5.030 *or*
**2.** 1 Level II unit from Table 1

**Year 3**
48.037
*1 General Studies elective*
Choose 4 Level III Chemistry units from Table 1
Choose 2 units from Table 1

**Year 4**
2.004

*Students electing 10.111A and 10.2111 and 10.2112 need not make an election under Year 2 clauses **1.** and **2.**

††See footnote to program 0101.

‡Owing to timetabling difficulties this program could take longer than 3 years to complete.

## 0225
## Chemistry/Geology

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
25.110, 25.120

**Year 2**
2.002D, 2.042C
25.211, 25.221, 25.212
*1 General Studies elective*††
Choose 2 units from:
2.002A, 2.002B, 2.003E, 2.003H, 25.223

**Year 3**
25.311, 25.314, 25.321, 25.3261, 25.3271
*1 General Studies elective*
Choose 4 units from:
2.003B, 2.003C, 2.003D, 2.003E, 2.003H, 2.013D, 2.043A

**Year 4**
2.004 *or* 25.434

††See footnote to program 0101.

## 0241
## Chemistry/Biochemistry

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041

**Year 2**
2.002A, 2.002B, 2.042C, 2.002D
41.101, 41.111
*1 General Studies elective*††

**Year 3**
41.102A
*1 General Studies elective*
Choose 2 units from 4.102B, 41.102C, 41.102E
Choose 4 Chemistry Level III units from Table 1

**Year 4**
41.103 *or*
2.004

††See footnote to program 0101.

## 0242
## Chemistry/Biotechnology

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041

**Year 2**
2.002A, 2.002B
41.101
42.101
44.101
*1 General Studies elective*††
Choose 1 unit from:
2.042C, 2.002D

**Year 3**
42.102A, 42.102B
*1 General Studies elective*
Choose 6 units from Table 1 including 4 Chemistry Level III units; all should be Level III if proceeding to Year IV

**Year 4**
2.004 *or*
42.103

††See footnote to program 0101.

## 0261
## Chemistry with Computer Science

**Year 1**
1.001 *or* 1.011
2.121 *and* 2.131, *or* 2.141
10.001 *or* 10.011
6.611
Choose 1 Level I unit from Table 1*

**Year 2**
2.002A, 2.002B, 2.042C, 2.002D
6.621, 6.641
10.331**
Choose 1 unit from Table 1***
*1 General Studies elective*††

**Year 3**
6.646
Choose 4 Level III Chemistry units†
Choose 3 units††† from Table 1 or Table 2‡
*1 General Studies elective*

**Year 4**
2.004

*The unit 1.041 is recommended.
**Or other approved unit of statistics.
***The unit 6.631 is recommended. It is a prerequisite for 6.632 and 6.613.
†Students must consult the School of Chemistry for approval of their choice of Level III Chemistry units, before the end of Session 2 in the preceding year.
††See footnote to program 0101.
†††Students intending to proceed to Year 4 must choose appropriate units, as approved by the School of Chemistry.
‡Quota restrictions apply to Computer Science Level III units. Application must be made in writing to the Head of School of Electrical Engineering and Computer Science before the end of Session 2 in the preceding year.

## 0262
## Chemistry and Science Policy Studies§

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
2 Level I units from Table 1

**Year 2**
2.002A, 2.002B, 2.042C, 2.002D
62.022, 62.052, 62.062
Choose 1 unit from Table 1

**Year 3**
4 Chemistry Level III units from Table 1
*1 General Studies elective**††
Choose 3 units from:
62.012, 62.013, 62.032†, 62.033, 62.072, 62.082, 62.093
Choose 1 unit from:
15.001, 15.703, 15.753

**Year 4**
2.004 *or*
62.024

§This program is intended for students wishing to major in Chemistry and at the same time acquire an understanding of the social dimensions of science and the role of science in the economy. It also provides elements of a training in science policy studies, important for those wishing to engage in administration and policy-making in science and technology. Honours students will complete a thesis in either Chemistry or an aspect of science policy.
*26.251, 26.2506, 26.561, 26.564, 26.817 may not be included in program.
†See footnote to program 6200.
††See footnote to program 0101.

## 7302
## Chemistry/Physiology

See 7302 Physiology/Chemistry

# Metallurgy

## 0401
## Physical Metallurgy

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
Choose 2 Level I units from Table 1

**Year 2**
2.002A
4.402, 4.512
*1 General Studies elective*††
Choose 4 Level II units from Table 1 or 3 Level II units from Table 1 and 1 unit from Table 2 for program 0401

**Year 3**
4.403, 4.703, 4.522
*1 General Studies elective*
Choose 4 Level III units from Table 1 or 3 Level III units from Table 1 and 1 Level III unit from Table 2 for program 0401

**Year 4**
4.004

††See footnote to program 0101.

## 0402
## Chemical Metallurgy

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
Choose 2 Level I units from Table 1

**Year 2**
2.002A
4.302, 4.602, 4.412
*1 General Studies elective*††
Choose 4 Level II units from Table 1 or 3 Level II units from Table 1 and 1 Level II unit from Table 2 for program 0402

**Year 3**
4.303, 4.613*, 4.422
7.023*
*1 General Studies elective*
Choose 4 Level III units from Table 1 or 3 Level III units from Table 1 and 1 unit from Table 2 for program 0402

**Year 4**
4.004

*Students not proceeding to Honours may substitute another Level II or Level III unit from Table 1 for 4.613 and 7.023.
††See footnote to program 0101.

## 0403 Metallurgy

### Double major

Students wishing to take more than 4 Level III Metallurgy units are required to transfer to the four year Metallurgy BSc degree course (**3120**) before the commencement of Year 2. If Year 2 studied in the Science and Mathematics course is similar to Year 2 of Course **3120** the transfer may still be made before the commencement of Year 3.

The Metallurgy BSc degree course is described in detail in the Faculty of Applied Science Handbook and enables specialization in Metallurgy.

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
Choose *either:*
25.110, 25.120
*or*
5.010 *and* 5.030

**Year 2**
2.002A
4.302, 4.402, 4.502, 4.602, 4.802
10.031
25.523
*1 General Studies elective*††

**Year 3**
4.303, 4.403, 4.613, 4.703, 4.813,
7.023
*1 General Studies elective*

**Year 4**
4.024, 4.054, 4.314, 4.324, 4.414, 4.424, 4.504

††See footnote to program 0101.

## Computer Science

Computer Science involves the study of the design, construction and uses of computer systems. It is concerned with the representation of data and data structures in computer systems and the design of algorithms for automatic manipulation of this information by programming languages and machine systems. It is very much concerned with the design and development of hardware and software tools by which computer applications may be developed, but not so much with the applications themselves. At the University of New South Wales, particular emphasis is given to comprehension of the basic principles behind computing tools, operating systems, compilers and translators, and computer hardware.

Graduates who major in Computer Science frequently find employment where the requirement is for an expert knowledge of computer systems rather than extensive experience in a particular application area. Potential employers include the computer manufacturers, consulting companies, specialist companies marketing computer hardware and software services, and many large organizations with major computing establishments.

All Science students with the appropriate Mathematics prerequisites have entry into all Year 1 and Year 2 Computer Science units. Resources limit the number of students who may enter most Year 3 Computer Science units but other subjects are proposed which will allow computer applications majors to complete an appropriate course of study.

Entry to a Computer Science major is *either* by direct selection at university entry *or* by competitive entry at the end of Year 1 or Year 2. Students who wish to compete at the end of their first year for a place in Computer Science majors (programs 0601 (Computer Science), 0610 (Computer Science/Mathematics), or 0611 (Computer Science/Statistics)) enrol in their first year in program 6806. Students in program 6806 may also have the alternative of entering program 1401 (Commerical Information Systems with Computer Science) at the end of their first year. Acceptance into programs 0601, 0610, 0611 or 1401 is based on academic performance in Year 1 or Year 2.

Science/Law students may enrol directly into Year 1 of the Course 4770 Computer Science program. To progress into Year 2 of this program, these students must, at the end of Year 1, compete with students in Course 3970.

Students majoring in other disciplines may undertake all Level I and Level II and one of the Level III Computer Science units and thus undertake a substantial amount of Computing. Programs available are Physics/Computer Science (0161); Chemistry/Computer Science (0261) and Mathematics with Computer Science (1061). Students with very good academic records may be able to enrol in further Computer Science units by special permission from the Head of the Department of Computer Science.

There are many ways to study Computer Science and computer applications at this University, apart from the Science and Mathematics Course. Students may major in Computer Science as part of the 5 year combined degree programs in Electrical Engingeering, Aeronautical Engineering, Industrial

Engineering, Mechanical Engineering and Naval Architecture which leads to the award of the two degrees of BE and BSc (see under Courses **3725, 3611, 3661, 3681** and **3701** respectively and the Faculty of Engineering Handbook). Students may also major in Computer Science in the combined Science/Law degree course. A major sequence in Computer Science is also available in the Bachelor of Arts course (see the Faculty of Arts Handbook). Other courses and subjects which include computing and computing applications are available in other Schools, for example students may major in Computers and Information Systems in the Bachelor of Commerce degree course: see the Faculty of Commerce Handbook.

## 0601
## Computer Science

**Year 1***
10.001 *or* 10.011
6.611
Choose 5 units from:
**1.** Table 1 *&/or*
**2.** The BA course** *&/or*
**3.** Table 2 for program 0601**

**Year 2**
6.621, 6.631, 6.641
*1 General Studies elective*††
Choose 5 units from:
**1.** Table 1 *&/or*
**2.** The BA course** *&/or*
**3.** Table 2 for program 0601 (except 14.501)**

**Year 3†**
Choose 4 Level III Computer Science units
*1 General Studies elective*
Choose 3 units from:
**1.** Table 1 *&/or*
**2.** The BA course** *&/or*
**3.** Table 2 for program 0601**

**Year 4**
6.606

*In Year 1 students who have not gained direct entry to a Computer Science major program must enrol in Program 6806. Enrolment in Year 2 of Programs 0601, 0610 and 0611 is based on academic performance in Year 1.
††See footnote to program 0101.
**The program may include up to 8 units other than Computer Science units that are not in Table 1. Subjects chosen from the BA degree course are restricted to those offered by the following schools: Drama, Economics, English, French, German, History, Political Science, Russian, Sociology, Spanish and Latin American Studies. Upper Level subjects from the School of Economics are restricted to all those in Economic History plus 15.062, 15.072, 15.263 and 15.273. (6 BA degree credit points at Level I or 4 credit points at Upper Level are equivalent to 1 unit.)
†Students intending to proceed to honours in Computer Science should choose 8 Level III units including 6.613, 6.632, 6.642 and 6.643.

## 0610
## Computer Science/Mathematics

**Year 1***
10.001 *or* 10.011
6.611
Choose 5 units from:
**1.** Table 1 *&/or*
**2.** The BA course** *&/or*
**3.** Table 2 for program 0601 (except 14.501)**

**Year 2**
6.621, 6.631, 6.641
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2111 (*or* 10.2211), 10.2112 (*or* 10.2212)
*1 General Studies elective*††
Choose 2 units from:
**1.** Table 1 *&/or*
**2.** The BA course* *&/or*
**3.** Table 2 for program 0601*

**Year 3†**
*1 General Studies elective*
Choose at least 7 units including 4 (or 3) Level III Computer Science units and 3 (or 4) Level III Mathematics units

**Year 4**
6.606

* ** †See footnotes to program 0601.
††See footnote to program 0101.

## 0611
## Computer Science/Statistics

**Year 1***
10.001 *or* 10.011
6.611
Choose 5 units from:
**1.** Table 1 *&/or*
**2.** The BA course** *&/or*
**3.** Table 2 for program 6806 (except 14.501)**

**Year 2**
6.621, 6.631, 6.641
10.311A (*or* 10.321A), 10.311B (*or* 10.321B), 10.111A (*or* 10.121A), 10.1113 (*or* 10.1213)
Choose 1 Level II unit from Table 1
*1 General Studies elective*††

**Year 3†**
*1 General Studies elective*
Choose at least 7 units including 4 (or 3) Level III Computer Science units and 3 (or 4) Level III Statistics units

**Year 4**
6.606, or 10.323 if 4 Level III Higher Statistics units have been successfully taken

* ** †See footnotes to program 0601.
††See footnote to program 0101.

**0161**
**Computer Science/Physics**

See 0161 Physics/Computer Science

**0261**
**Computer Science/Chemistry**

See 0261 Chemistry with Computer Science

**1061**
**Computer Science/Mathematics**

See 1061 Mathematics and Computing

**1062**
**Computer Science/Statistics**

See 1062 Statistics and Computing

See also

**1401**
**Commercial Information Systems with Computer Science**

**4561**
**Computer Science/Zoology**

See 4561 Zoology with Computer Science

# Mathematics

The School of Mathematics is divided into Departments of Pure Mathematics, Applied Mathematics, Theoretical and Applied Mechanics, and Statistics. The School provides courses at the Pass and Honours levels based on the above departments and in specified interdisciplinary programs such as Mathematics of Management, Applied Mathematics (Economic Optimization). There is considerable overlap of interests and interaction between the departments; students in general will take units from more than one department.

Pure Mathematics is concerned with the whole structure of mathematics. Research focuses on the creation of new mathematical systems and the finer analysis of partially understood fields. Problems of mathematics come from many sources of science and industry but the pure mathematician is more concerned with the problems themselves than with the sources from which they arise. Courses in the Department of Pure Mathematics are designed to provide the necessary equipment for those who intend to use mathematics in any way, to give basic familiarity with the fundamental language of modern science and technology and to develop appreciation for and insight into one of our major cultural achievements.

Applied Mathematics and Theoretical Mechanics are concerned with the understanding of scientific phenomena by the construction, analysis, and interpretation of mathematical models. Problems may originate not only in the physical and engineering sciences, but also in the social, computing, biological, economic and management sciences.

The major interests of the Department of Applied Mathematics are:

**1.** Optimization and control theory, with special attention to social science applications (control of economic systems, resource allocation, etc)
**2.** Numerical analysis and computer-related mathematics
**3.** Modern theoretical physics

The department offers complete training to graduate research level in areas **1.** and **2.**; it provides some undergraduate training in area **3.** in collaboration with other Schools, and accepts higher degree candidates in that area.

The Department of Theoretical and Applied Mechanics is interested in mathematical techniques and applications of mathematics to problems in classical and engineering science. There is also some emphasis on the environmental sciences, such as meteorology and oceanography.

Statistics is the science and art of using factual material for modelling and inference. Its mathematical foundations are in the theory of probability and it deals with how to estimate and make decisions using knowledge which is uncertain or observational material which is subject to error. There is a rich interplay of ideas between the theory of statistics and fields such as engineering, medicine and biological and behavioural sciences where statistical problems constantly arise. The department has strong interest in the areas of applied statistics, stochastic processes, biometry, inference, design of experiments, sequential analysis, discrete distributions, nonparametrics and statistical computing.

## Programs of study

### Programs 1001-1010 (Mathematics)

These are general Mathematics programs which are chosen by students wishing to major in Mathematics with most of the supporting subjects being Science subjects.

There are four specific programs in this group each available at pass level (3 years) or at honours level (4 years). These are in Pure Mathematics, Applied Mathematics, Statistics and Theoretical and Applied Mechanics. There is also a three year program leading to a combined major in Applied Mathematics and Theoretical and Applied Mechanics. Students are able to combine courses in Pure Mathematics, Applied Mathematics, Theoretical Mechanics, Theory of Statistics and Computer Science in accordance with their future interests. Such combinations of courses are particularly suitable for students intending to become secondary school teachers.

### Programs 1011-1019 (Mathematics and Liberal Studies)

The Mathematics and Liberal Studies programs are aimed at encouraging students to see mathematics in a cultural and social setting. By combining mathematics units with suitable arts units, particularly those in Philosophy and History and Philosophy of Science, it is hoped that these programs will bring together the exactitude of mathematics with the freer creativity of the arts. It is expected that students would do History of Mathematics in their third year to provide an opportunity to bring together much of the 'mathematics' and 'liberal studies' of their earlier courses.

The liberal studies may be combined into a broad mathematics sequence or if students wish to specialize, then Pure Mathematics, Applied Mathematics, Theoretical Mechanics or Theory of Statistics sequences are available at pass or honours level.

### Interdisciplinary Programs

**Program 1061, Mathematics and Computing** will be of particular interest to students who wish to combine a mathematics major with a substantial component of computing.

**Programs 1020 and 1021, Applied Mathematics (Economic Optimization)** includes subjects offered by the School of Economics, as well as mathematics subjects with a particular emphasis on optimization, optimal control, and related areas. This program is intended for students who are good at mathematics and interested in applications of mathematics to economic problems, particularly problems of economic planning and macro-economic modelling. The degree is a mathematics degree, but there is enough economics in it to provide a very good introduction for work in the area of mathematical economics and its applications. Program 1021 is the honours version of 1020.

**Programs 1022 and 1023, Mathematics of Management** include subjects given by the Schools of Accountancy and of Economics. There has been an increasing trend towards more use of mathematics, and the use of more advanced mathematics, in scientific management. These programs are intended to train mathematicians with an interest in the

application of mathematics to management science. The mathematics content is very solid indeed, amounting to a full mathematics degree. *A student completing these courses with a good record is eligible for entry to the Master of Commerce graduate degree progam in the School of Accountancy. If appropriate subjects are selected, then this degree (MCom), which may be awarded by part-time study, qualifies the graduate for provisional membership of the Australian Society of Accountants; full membership is then granted after appropriate experience.*

Many units in the School of Mathematics are offered at two levels. The higher level caters for students with superior mathematical ability. Where both levels are offered grades higher than Credit are only awarded in the ordinary level in exceptional circumstances.

Students should note that all of the Mathematics honours programs require them to take most of their Mathematics units at higher level. However, students should not think that the higher level units are intended only for those in honours programs. Any student with the ability to undertake higher units benefits from so doing.

## 1001 Mathematics

**Year 1**
10.001 *or* 10.011
Choose 6 units* from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001 except 14.501

**Year 2**
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2111 (*or* 10.2211), 10.2112 (*or* 10.2212)
*1 General Studies elective*††
Choose 5 units from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001

**Year 3**
Choose 4 Level III§ Mathematics units other than 10.612 from Table 1 (or choose 5 if only 3 Level II Mathematics units taken)
*1 General Studies elective*
Choose 3 (*or* 2) units from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001

††See footnote to program 0101.
*It is strongly recommended that two of these units be 10.081 and 6.611.
**Up to 8 units of this program may be replaced by subjects offered in the BA degree course. (6 credit points at Level I or 4 credit points at Upper Level are equivalent to 1 unit.) The BA degree subjects are limited to those offered by the following schools: Drama, Economics, English, French, German, History, Political Science, Russian, Sociology, Spanish and Latin American Studies. Upper Level subjects from the School of Economics are restricted to all those in Economic History plus 15.062, 15.072, 15.263 and 15.273.
†Not more than 8 units that are not in Table 1 may be taken without the approval of the Head of the School of Mathematics.
§Not to include more than one Level II/III unit.

## Mathematics/Computer Science

See 0610 Computer Science/ Mathematics

## 1002 Pure Mathematics

**Year 1**
10.001 *or* 10.011
Choose 6 units* from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001 except 14.501

**Year 2**
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2111 (*or* 10.2211), 10.2112 (*or* 10.2212)
*1 General Studies elective*††
Choose 5 units from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001

**Year 3**
10.1111, 10.1112, 10.1121, 10.1128
Choose 2 units from:
10.1123, 10.1124, 10.1125, 10.1126, 10.1127, 10.1521, 10.1522, 10.1523
*1 General Studies elective*
If only 3 Level II Mathematics units taken in Year 2 choose 1 further Level II or Level III Mathematics unit
Choose 3 (*or* 2) units from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001

Note: 3rd Year Higher Pure Mathematics units may be substituted for equivalent pass units with the approval of the Head of School of Mathematics.

††See footnote to program 0101.

* **†See footnotes to program 1001.

## 1003
## Pure Mathematics Honours

**Year 1**
10.011
Choose 6 units* from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001 except 14.501

**Year 2**
10.121A, 10.1213, 10.1214, 10.2211, 10.2212
*1 General Studies elective*††
Choose 5 units from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001

**Year 3**
10.122B
Either 10.1321, 10.1322, 10.1323, 10.1324, 10.1325, 10.1326, *or* 10.1421, 10.1422, 10.1423, 10.1424, 10.1425, 10.1426
*1 General Studies elective*
Choose 3 units from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001, at least 1 of which must be a Mathematics unit and at least 2 of which must be Level III units.

**Year 4**
10.123

††See footnote to program 0101.
* **†See footnotes to program 1001.
Note: Where higher units are specified, suitable ordinary units may, in exceptional circumstances and at the discretion of the Head of School of Mathematics, be accepted as equivalent.

## 1004
## Applied Mathematics

**Year 1**
10.001 *or* 10.011
Choose 6 units* from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001 except 14.501

**Year 2**
10.2111 (*or* 10.2211), 10.2112 (*or* 10.2212), 10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2113‡ (*or* 10.2213‡), 10.2115‡‡ (*or* 10.2215‡‡)
*1 General Studies elective*††
Choose 4 units from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001

**Year 3**
10.212A (*or* 10.222A), 10.212L (*or* 10.222L), 10.212M (*or* 10.222M)
One unit from the Theory of Statistics Level III units or from the Theoretical Mechanics Level III units
*1 General Studies elective*
Choose 3 units from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001

††See footnote to program 0101.
* **†See footnotes to program 1001.
‡These ½ units are strongly recommended but not essential. If not taken, one additional Mathematics unit at Level II or Level III must be taken in either Year 2 or Year 3.
‡‡If already taken, 10.2114 and 10.2214 are acceptable in place of 10.2115 and 10.2215 respectively.

## 1005
## Applied Mathematics Honours

**Year 1**
10.011
Choose 6 units* from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001 except 14.501

**Year 2ϕ**
10.121A, 10.1213, 10.1214, 10.2211, 10.2212, 10.2213‡, 10.2215‡‡
*1 General Studies elective*††
Choose 4 units from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001

**Year 3**
10.222A, 10.222M
Choose 1 unit from:
10.222L, 10.222C, 10.222F
Choose 1 further Higher Level III§ Mathematics unit
*1 General Studies elective*
Choose 3 Level III§ units from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001

**Year 4**
10.223

Note: Where Higher units are specified, suitable ordinary units may, in exceptional circumstances and at the discretion of the Head of School of Mathematics, be accepted as equivalent.

††See footnote to program 0101.
* **† §See footnotes to program 1001.
‡These units are strongly recommended but not essential to be taken. If not taken one additional Mathematics unit at Level II or Level III must be taken in either Year 2 or Year 3.
‡‡If already taken, 10.2114 and 10.2115 are acceptable in place of 10.2115 and 10.2215 respectively.
ϕStudents should consult with a Professor of the Department before finalizing their Year 3 enrolment (see also * footnote for Table 3).

## 1006
## Statistics

**Year 1**
10.001 *or* 10.011
Choose 6 units* from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001 except 14.501

**Year 2**
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2112 (*or* 10.2212), 10.311A (*or* 10.321A), 10.311B (*or* 10.321B)
*1 General Studies elective*††
Choose 2½ units from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001

**Year 3**
Choose 4 units from:
10.312A (*or* 10.322A), 10.312B (*or* 10.322B), 10.312C (*or* 10.322C), 10.312D (*or* 10.322D), 10.312E (*or* 10.322E)
*1 General Studies elective*
Choose 3 Level III Mathematics *and/or* Computer Science units from Table 1

††See footnote to program 0101.
* ** †See footnotes to program 1001

## 1007
## Statistics Honours

**Year 1**
10.011 *or* 10.001
Choose 6 units* from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001 except 14.501

**Year 2**
10.121A (*or* 10.111A), 10.1213 (*or* 10.1113), 10.1214 (*or* 10.1114), 10.2212 (*or* 10.2112), 10.321A, 10.321B
*1 General Studies elective*††
Choose 2½ units from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001

**Year 3**
Choose 4 units from:
10.322A, 10.322B, 10.322C, 10.322D, 10.322E
*1 General Studies elective*
Choose 3 Level III Mathematics *and/or* Computer Science units from Table 1

**Year 4**
10.323

Note: Where Higher units are specified, suitable ordinary units may, in exceptional circumstances and at the discretion of the Head of School of Mathematics, be accepted as equivalent.
††See footnote to program 0101.
* ** †See footnotes to program 1001

## 0611
## Statistics/Computer Science

See 0611 Computer Science/Statistics

## 1008
## Theoretical Mechanics

**Year 1**
10.001 *or* 10.011
1.001 *or* 1.011
Choose 4 units* from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001 except 14.501

**Year 2**
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2111 (*or* 10.2211), 10.2112 (*or* 10.2212), 10.4112 (*or* 10.4212), 10.4111 (*or* 10.4211)
*1 General Studies elective*††
Choose 4 units from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001

**Year 3**
10.412A (*or* 10.422A), 10.412D (*or* 10.422D)
*1 General Studies elective*
Choose 2 units from:
10.212A (*or* 10.222A), 10.212L (*or* 10.222L), 10.212M (*or* 10.222M), (10.1125 and 10.1126) (*or* 10.1425 and 10.1426), 10.412B (*or* 10.422B)
Choose 3 units from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001

††See footnote to program 0101.
* ** †See footnotes to program 1001.

## 1009
## Theoretical Mechanics Honours

**Year 1**
10.011, 1.001 (*or* 1.011)
Choose 4 units* from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001 except 14.501

**Year 2**
10.121A (*or* 10.111A), 10.1213, 10.1214, 10.2211, 10.2212, 10.4212, 10.4211
*1 General Studies elective*††
Choose 4 units from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001

**Year 3**
10.422A, 10.422B, 10.222C, 10.422D
*1 General Studies elective*††
Choose 2 units from:
10.412A, 10.222A (*or* 10.212A), 10.222M (*or* 10.212M), 10.2213 (*or* 10.2113), 10.2215‡‡ (*or* 10.2115‡‡), 10.122B, (10.1425 and 10.1426), (10.1125 and 10.1126)
Choose 1 unit from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001

**Year 4**
10.423
*1 General Studies elective*

Note: Where Higher units are specified, suitable ordinary units may, in exceptional circumstances and at the discretion of the Head of School of Mathematics, be accepted as equivalent.
††See footnote to program 0101.
* ** †See footnotes to program 1001.
‡‡If already taken, 10.2114 and 10.2214 are acceptable in place of 10.2115 and 10.2215 respectively.

## 1010
## Applied Mathematics and Theoretical Mechanics

**Year 1**
10.001 (*or* 10.011), 1.001 (*or* 1.011)
Choose 4 units* from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001 except 14.501

**Year 2**
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2111 (*or* 10.2211), 10.2112 (*or* 10.2212), 10.4112 (*or* 10.4212), 10.4111 (*or* 10.4211), 10.2113 (*or* 10.2213), 10.2115‡‡ (*or* 10.2215‡‡)
*1 General Studies elective*††
Choose 3 units from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001

**Year 3**
10.412A (*or* 10.422A), 10.412D (*or* 10.422D), 10.212A (*or* 10.222A), 10.212L (*or* 10.222L), 10.212M (*or* 10.222M)
Choose one other Level III Mathematics unit from Table 1
*1 General Studies elective*
Choose 1 unit from:
**1.** Table 1 *&/or*
**2.** The BA course**† *&/or*
**3.** Table 2† for program 1001

††See footnote to program 0101.
* ** †See footnotes to program 1001.
‡‡If already taken, 10.2114 and 10.2214 are acceptable in place of 10.2115 and 10.2215 respectively.

## 1011
## Mathematics and Liberal Studies§

**Year 1**
10.001 *or* 10.011
Choose 6 units* ** from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 2**
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2111 (*or* 10.2211), 10.2112 (*or* 10.2212)
Choose 5 units from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 3**
Choose 4 Level III‡ Mathematics units other than 10.612 from Table 1 (or choose 5 if only 3 Level II Mathematics units taken)
Choose 5 (*or* 4) units from:
**1.** Table 1† *&/or*
**2.** The BA course§

Note: The program consists of at least 25 units of which not less than eight nor more than ten units may be from Level I; there is no General Studies requirement.
*Except for Mathematics units, not more than 2 Level I units may be taken in one subject.
**It is strongly recommended that two of these units be 10.081 and 6.611.
†Geography, History and Philosophy of Science, and Philosophy shall be from the BA degree course.
§At least 6 units of this program must come from subjects offered in the BA degree course (6 credit points at Level I or 4 credit points at Upper Level are equal to 1 unit). The BA degree subjects are limited to those offered by the following schools: Drama, Economics, English, French, Geography, German, History, History and Philosophy of Science, Philosophy, Political Science, Russian, Sociology, Spanish and Latin American Studies. Upper Level subjects from the School of Economics are restricted to those in Economic History plus 15.062, 15.072, 15.263 and 15.273.
‡Not to include more than one Level II/III unit.

## 1012
## Pure Mathematics and Liberal Studies§

**Year 1**
10.001 *or* 10.011
Choose 6 units* ** from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 2**
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2111 (*or* 10.2211), 10.2112 (*or* 10.2212)
Choose 5 units from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 3**
10.1111, 10.1112, 10.1121, 10.1128
Choose 2 units from:
10.1123, 10.1124, 10.1125, 10.1126, 10.1127, 10.1521, 10.1522, 10.1523
If only 3 Level II Mathematics units were taken choose 1 further Level II or Level III Mathematics unit
Choose 5 (*or* 4) units from:
**1.** Table 1† *&/or*
**2.** The BA course§

Note: **1.** The program consists of at least 25 units of which not less than eight nor more than ten units may be from Level I; there is no General Studies requirement.
**2.** 3rd year Higher Pure Mathematics units may be substituted for equivalent pass units with the approval of the Head of School of Mathematics.
* ** † §See footnotes to program 1011.

## 1013
## Pure Mathematics Honours and Liberal Studies§

**Year 1**
10.011
Choose 6 units* ** from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 2**
10.121A, 10.1213, 10.1214, 10.2211, 10.2212
Choose 5 units from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 3**
10.122B
*Either* 10.1321, 10.1322, 10.1323, 10.1324, 10.1325, 10.1326, *or* 10.1421, 10.1422, 10.1423, 10.1424, 10.1425, 10.1426
Choose 5 units from:
**1.** Table 1† *&/or*
**2.** The BA course§, at least 1 of which must be a Mathematics unit

**Year 4**
10.123

Note: **1.** The first three years of the program consist of at least 25 units of which not less than eight nor more than ten units may be from Level I; there is no General Studies requirement.
**2.** Where Higher units are specified, suitable ordinary units may, in exceptional circumstances and at the discretion of the Head of School of Mathematics, be accepted as equivalent.
* ** † §See footnotes to program 1011.

## 1014
## Applied Mathematics and Liberal Studies§

**Year 1**
10.001 *or* 10.011
Choose 6 units* ** from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 2**
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2111 (*or* 10.2211), 10.2112 (*or* 10.2212), 10.2113‡ (*or* 10.2213‡), 10.2115‡ ‡‡ (*or* 10.2215‡ ‡‡)
Choose 4 units from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 3**
10.212A (*or* 10.222A), 10.212L (*or* 10.222L), 10.212M (*or* 10.222M)
Choose 1 unit from the Theory of Statistics Level III units or from the Theoretical Mechanics Level III units
Choose 5 units from:
**1.** Table 1† *&/or*
**2.** The BA course§

Note: The program consists of at least 25 units of which not less than eight nor more than ten units may be from Level I; there is no General Studies requirement.
* ** † §See footnotes to program 1011.
‡This unit is strongly recommended but not essential. If not taken one additional Mathematics unit at Level II or Level III must be taken in either Year 2 or Year 3.
‡‡If already taken, 10.2114 and 10.2214 are acceptable in place of 10.2115 and 10.2215 respectively.

## 1015
## Applied Mathematics Honours and Liberal Studies§

**Year 1**
10.011
Choose 6 units* ** from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 2**
10.121A, 10.1213, 10.1214, 10.2211, 10.2212, 10.2213, 10.2215‡‡
Choose 4 units from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 3**
10.222A, 10.222L, 10.222M
Choose 2 further Higher Level III‡ Mathematics units one of which must not be a Pure Mathematics unit and one of which is recommended to be 10.122B
Choose 4 units from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 4**
10.223

Note: **1.** The first three years of the program consist of at least 25 units of which not less than eight nor more than ten units may be from Level I; there is no General Studies requirement.
**2.** Where Higher units are specified, suitable ordinary units may, in exceptional circumstances and at the discretion of the Head of School of Mathematics, be accepted as equivalent.
***†§‡See footnotes to program 1011.
‡‡If already taken 10.2114 and 10.2214 are acceptable in place of 10.2115 and 10.2215 respectively.

## 1016
## Statistics and Liberal Studies§

**Year 1**
10.001 *or* 10.011
Choose 6 units* ** from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 2**
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2112 (*or* 10.2212), 10.311A (*or* 10.321A), 10.311B (*or* 10.321B)
Choose 2½ units from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 3**
Choose 4 units from:
10.321A (*or* 10.322A), 10.321B (*or* 10.322B), 10.321C (*or* 10.322C), 10.312D (*or* 10.322D), 10.312E (*or* 10.322E)
Choose 3 Level III Mathematics *and/or* Computer Science units from Table 1
Choose 2 units from:
**1.** Table 1† *&/or*
**2.** The BA course§

Note: The program consists of at least 25 units of which not less than eight nor more than ten units may be from Level I; there is no General Studies requirement.
* **†§See footnotes to program 1011.

## 1017
## Statistics Honours and Liberal Studies§

**Year 1**
10.011 *or* 10.001
Choose 6 units* ** from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 2**
10.121A (*or* 10.111A), 10.1213 (*or* 10.1113), 10.1214 (*or* 10.1114), 10.2212 (*or* 10.2112), 10.321A, 10.321B
Choose 2½ units from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 3**
Choose 4 units from:
10.322A, 10.322B, 10.322C, 10.322D, 10.322E
Choose 3 Level III Mathematics *and/or* Computer Science units from Table 1
Choose 2 units from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 4**
10.323

Note: **1.** The first three years of the program consist of at least 25 units of which not less than eight nor more than ten units may be from Level I; there is no General Studies requirement.
**2.** Where Higher units are specified, suitable ordinary units may, in exceptional circumstances and at the discretion of the Head of School of Mathematics, be accepted as equivalent.
***†§See footnotes to program 1011.

## 1018
## Theoretical Mechanics and Liberal Studies§

**Year 1**
10.001 *or* 10.011
1.001 *or* 1.011
Choose 4 units* ** from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 2**
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2111 (*or* 10.2211), 10.2112 (*or* 10.2212), 10.4112 (*or* 10.4212), 10.4111 (*or* 10.4211)
Choose 4 units from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 3**
10.412A (*or* 10.422A), 10.412D (*or* 10.422D)
Choose 2 units from:
10.212A (*or* 10.222A), 10.212L (*or* 10.222L), 10.212M (*or* 10.222M), 10.412B (*or* 10.422B), (10.1125 and 10.1126), (10.1425 and 10.1426)
Choose 5 units from:
**1.** Table 1† *&/or*
**2.** The BA course§

Note: The program consists of at least 25 units of which not less than eight nor more than ten units may be from Level I; there is no General Studies requirement.

***†§See footnotes to program 1011.

## 1019
## Theoretical Mechanics Honours and Liberal Studies§

**Year 1**
10.011
1.001 *or* 1.011
Choose 4 units* ** from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 2**
10.121A (*or* 10.111A), 10.1213, 10.1214, 10.2211, 10.2212, 10.4212, 10.4211
Choose 4 units from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 3**
10.422A, 10.422B, 10.222C, 10.422D
Choose 2 units from:
10.412A, 10.212A (*or* 10.222A), 10.222M (*or* 10.212M), 10.2213 (*or* 10.2113), 10.2215‡‡ (*or* 10.2115‡‡), 10.122B, (10.1425 and 10.1426), (10.1125 and 10.1126)
Choose 3 units from:
**1.** Table 1† *&/or*
**2.** The BA course§

**Year 4**
10.423

Note: **1.** The first three years of the program consist of at least 25 units of which not less than eight nor more than ten units may be from Level I; there is no General Studies requirement.
**2.** Where Higher units are specified, suitable ordinary units may, in exceptional circumstances and at the discretion of the Head of School of Mathematics, be accepted as equivalent.
*,**,†,§See footnotes to program 1011.
‡‡If already taken, 2114 and 2214 are acceptable in place of 10.2115 and 10.2215 respectively.

## 1020
## Applied Mathematics (Economic Optimization)

**Year 1**
10.001 *or* 10.011
15.001, 15.011
Choose 4 units from:
**1.** Table 1 *&/or*
**2.** **The BA course *&/or*
**3.** Take 2 for program 1020 except 14.501

**Year 2**
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2111 (*or* 10.2211), 10.2112 (*or* 10.2212), 10.2113 (*or* 10.2213), 10.2115‡‡ (*or* 10.2215‡‡)
15.002, 15.042
*1 General Studies elective*††
Choose *either* 10.331 *and* 1 unit from:
**1.** Table 1 *&/or*
**2.** **The BA course *&/or*
**3.** Table 2 for program 1020
*or*
Choose both:
10.311A, 10.311B
*or*
Choose both:
10.321A, 10.321B

**Year 3**
10.212L (*or* 10.222L), 10.212M (*or* 10.222M)
15.003, 15.413, 15.423
Choose 2 Level III* Mathematics units from Table 1 *if* 10.331 was chosen and *otherwise* choose 1 Level III* Mathematics unit from Table 1 excluding 10.312C *and* 10.322C
*½ General Studies elective*

Note: Only 1½ General Studies electives are required in this program. Each of 14.601, 15.601 and 15.611 (Table 2) may be substituted for a General Studies elective but may not then count as a qualifying unit.
*The two half units 10.1125 and 10.1126 are recommended.
**Six credit points at Level I or 4 credit points at Upper Level equals 1 unit.
††See footnote to program 0101.
‡‡If already taken, 10.2114 and 10.2214 are acceptable in place of 10.2115 and 10.2215 respectively.

## 1021
## Applied Mathematics Honours (Economic Optimization)

**Year 1**
10.011
15.001, 15.011
Choose 4 units from:
**1.** Table 1 *&/or*
**2.** *The BA course *&/or*
**3.** Table 2 for program 1021 except 14.501

**Year 2**
10.121A (*or* 10.111A), 10.1213, 10.1214, 10.2211, 10.2212, 10.2213, 10.2215‡‡, 10.331 *or both* 10.311A *and* 10.311B *or both* 10.321A *and* 10.321B
15.012, 15.052
*1 General Studies elective*††

**Year 3**
10.222A, 10.222L, 10.222M, 10.122B
15.013, 15.033, 15.413, 15.423
*½ General Studies Elective*

**Year 4**
10.233
15.024, 15.034

Note: **1.** Only 1½ General Studies electives are required in this program. Each of 14.601, 15.601 and 15.611 (Table 2) may be substituted for a General Studies elective but may not then count as a qualifying unit.
**2.** Where Higher units are specified, suitable ordinary units may, in exceptional circumstances and at the discretion of the Head of School of Mathematics, be accepted as equivalent.
*Six credit points at Level I or 4 credit points at Upper Level equals 1 unit.
††See footnote to program 0101.
‡‡If already taken, 10.2114 and 10.2214 are acceptable in place of 10.2115 and 10.2215 respectively.

## 1022
## Mathematics of Management**

**Year 1**
10.001 *or* 10.011
14.501, 14.511
15.001, 15.011
Choose 2 units from:
**1.** Table 1 *&/or*
**2.** Table 2 for program 1022

**Year 2**
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2111 (*or* 10.2211), 10.2112 (*or* 10.2212), 10.2113 (*or* 10.2213), 10.2115‡‡ (*or* 10.2215‡‡), 10.311A (*or* 10.321A)
14.522, 14.602
Choose at least one of:
14.542, 14.603, 14.613
15.042
*1 General Studies elective*††

**Year 3**
14.583
Choose at least 4 Level III Mathematics units from Table 1, of which at least 2 shall be selected from:
10.212A (*or* 10.222A), 10.412D (*or* 10.422D), 10.212L (*or* 10.222L), 10.212M (*or* 10.222M), 10.311B (*or* 10.321B), 10.312A (*or* 10.322A)
Choose at least one unit from:
14.604, 14.608, 14.614, 14.615
Choose any remaining units from:
**1.** Table 1 *&/or*
**2.** Table 2 for program 1022
*½ General Studies elective*

Note: Only 1½ General Studies electives are required in this program. Each of 14.601, 15.601 and 15.611 (Table 2) may be substituted for a General Studies elective but may not then count as a qualifying unit.
**Enrolment in this program requires approval of the Chairman of the Board of Studies in Science and Mathematics and the Head of the School of Accountancy.
††See footnote to program 0101.
‡‡If already taken, 10.2114 and 10.2214 are acceptable in place of 10.2115 and 10.2215 respectively.

## 1023
## Mathematics of Management**
Honours Program

**Year 1**
10.011
14.501, 14.511
15.001, 15.011
Choose 2 units from:
**1.** Table 1 *&/or*
**2.** Table 2 for program 1023

**Year 2**
10.121A (*or* 10.111A), 10.1213, 10.1214, 10.2211, 10.2212, 10.2213, 10.2215‡‡, 10.331*
14.532, 14.552
Choose *either:*
15.062 *and* 15.072
*or*
15.042 *and* 15.002
*1 General Studies elective*††

**Year 3**
10.222A, 10.222L, 10.222M, 10.122B
14.573, 14.593
Choose 1 Level III unit from:
**1.** Table 1 *&/or*
**2.** Table 2 for program 1023
*½ General Studies elective*

**Year 4**
10.233
14.852
14.851 *or* one Accountancy Honours Option

Note: **1.** Only 1½ General Studies electives are required in this program. Each of 14.601, 15.601, 15.611 (Table 2) may be substituted for a General Studies elective but may not then count as a qualifying unit.
**2.** Where Higher units are specified, suitable ordinary units may, in exceptional circumstances and at the discretion of the Head of School of Mathematics, be accepted as equivalent.
††See footnote to program 0101.
**Enrolment in this program requires approval of the Chairman of the Board of Studies in Science and Mathematics and the Head of the School of Accountancy.
*May be taken in Year 3.
‡‡If already taken, 10.2114 and 10.2214 are acceptable in place of 10.2115 and 10.2215 respectively.

## 1025
## Mathematics/Geology

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
25.110, 25.120

**Year 2**
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2111 (*or* 10.2211)
10.2112 (*or* 10.2212)
Choose 1 unit from:
10.211E, 10.331
*1 General Studies elective*††
Choose 4 Geology units from Table 1 *and/or* Table 2 for program 1025

*For Year 3, Year 4 and footnotes, see overleaf*

**Year 3**
Choose 4 Level III Mathematics units from Table 1
*1 General Studies elective*
Choose 4 Level III Geology units from Table 1 *and/or* Table 2 for program 1025.

**Year 4**
25.434 *or* 10.123* *or* 10.223* *or* 10.423*

††See footnote to program 0101.
*Provided students have taken appropriate Higher Mathematics units in earlier years.

## 1061
## Mathematics and Computing

**Year 1**
10.001 (*or* 10.011)
6.611
5 further units from:
**1.** Table 1 (10.081 is strongly recommended) *and/or*
**2.** The BA course **† *and/or*
**3.** Table 2† for program 1001 (except 14.501)

**Year 2**
10.111A (*or* 10.121A)
10.1113 (*or* 10.1213)
10.1114 (*or* 10.1214)
10.2111 (*or* 10.2211)
10.2112 (*or* 10.2212)
6.621
6.641
Choose 2 further units from Level II Mathematics Subjects *or* 6.631 *or* Level II Information Systems*, and 1 unit from Table 1 to make 8 units in all
*1 General Studies elective*††

**Year 3**
10.612
4 further units from Level III Mathematics units in Table 1
1 unit from Level III Computer Science
1 further unit from *either* Level III Mathematics *or* Level III Computer Science‡, *or* Level III Information Systems*
Note: Students with appropriate units in Years 1, 2 and 3 may transfer to one of the honours programs 1003, 1005 or 1009 in Year 4. Students with this in mind should consult with a Professor of the relevant Department as early as possible.
*1 General Studies elective*

*Quotas may apply to some Information Systems units. Application must be made in writing to the Head of the School of Accountancy before the end of the second session in the preceding year.
† **See footnote to program 1001.
‡Quotas may apply to some Computer Science Level III units. Application must be made in writing to the Head of the School of Electrical Engineering and Computer Science before the end of the second session in the preceding year.
††See footnote to Program 0101.

## 1062
## Statistics with Computer Science*

**Year 1**
10.001 *or* 10.011
6.611
Choose 5 units from:
**1.** Table 1 (10.081 is strongly recommended) *and/or*
**2.** The BA course**† *and/or*
**3.** Table 2† for program 1001 (except 14.501)

**Year 2**
10.311A (*or* 10.321A), 10.311B (*or* 10.321B)
6.621, 6.641
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2112 (*or* 10.2212)
*1 General Studies elective*††
Choose ½ unit from Table 1

**Year 3**
10.312F (*or* 10.322F)
Choose 4 units from:
10.312A (*or* 10.322A), 10.312B (*or* 10.322B), 10.312C (*or* 10.322C), 10.312D (*or* 10.322D), 10.312E (*or* 10.322E)
*1 General Studies elective*
Choose 2 units, at least one of which must be a Computer Science unit from Table 1*

**Year 4 (Honours)**
10.323

*Quota restrictions may apply to some Computer Science Level III units. Application must be made in writing to the Head of School of Electrical Engineering and Computer Science before the end of Session 2 in the preceding year.
**†See footnotes to program 1001.
††See footnote to program 0101.

## Mathematics/Marine Science

See 6831 Marine Science (Physical Oceanography) and attached note relation to dual major with Mathematics

## Mathematics/Marine Science Honours

See 6831 Marine Science (Physical Oceanography) and attached note relating to dual major with Mathematics

# Psychology

Modern psychology is both a basic discipline and a field of professional practice. As a science, psychology is concerned with the study of both the more complex forms of behaviour, and associated mental processes. It seeks to understand the basic psychological processes such as learning, memory, perception and motivation; the biological basis of behaviour; the development and decline of behavioural capacities from infancy to old age; individual differences in behaviour; social influences on behaviour; and the collective behaviour of social groups. In addition, disorders of behaviour form an important part of the subject matter of psychology.

In the Science and Mathematics course there are three programs which lead to a major in Psychology after 3 years or to honours after 4 years. These programs are 1201 Psychology, 1270 Psychology/Anatomy and 7312 Physiology/Psychology. There is also a four year full-time professional science degree course (Course **3430**) which is described in detail later in this handbook (see **Faculty of Biological Sciences**).

Students who wish to obtain qualifications that will allow them to practise psychology need to complete one of the above four year honours programs. The present minimum qualifications for membership of the Australian Psychological Society (the professorial body of Australian psychologists) require a degree (with a major in psychology) and a fourth year of study of psychology, followed either by further graduate study or two years of supervised experience in some practical field of psychology. A professional qualification in psychology leads to careers in research, teaching and applied fields such as personnel selection and management, vocational guidance, advertising and clinical practice.

## 1201 Psychology

**Year 1**
10.001 *or* 10.011
*or*
10.021B and 10.021C
12.100
Choose 4 Level I units from Table 1 or Table 2 for program 1201

**Year 2**
12.200
Choose 2 units from:
12.201, 12.202, 12.204, 12.205
*1 General Studies elective*††
Choose 5 units from Table 1

**Year 3**
*1 General Studies elective*
Choose at least 7 units from Table 1 including at least 4 Level III Psychology units*

**Year 4**
12.403 *or* 12.404

††See footnote to program 0101.
*Students taking honours in Psychology must have completed 8 Level III units of Psychology including 12.300, 12.305 and *either* 12.304 *or* 12.322 from Group A. Additionally, students intending to take the research alternative in Psychology IV are required to include 12.301 from Group B.

## 1270 Psychology/Anatomy

**Year 1***
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B and 10.021C
12.100
17.031, 17.041

**Year 2**
12.200, 12.201, 12.202
70.011A, 70.011C
73.121 *or* 73.111§
*1 General Studies elective*††
Choose*** 70.011B *or* 70.012B *or* 70.304 *or* choose 1 unit from Table 1

**Year 3**
70.012C, 70.306, 70.307
*1 General Studies elective*††
Choose at least 4 Psychology Level III units†, *or*
Choose*** 4 Psychology Level III units *and* 70.011B *or* 70.012B *or* 70.304 *or* 70.305

**Year 4**
12.403 *or* 12.404 *or* 70.013***

*In Year 1, students must enrol in program 6801. Enrolment in Year 2 of program 1270 is based on academic performance in Year 1.
††See footnote to program 0101.
***Students taking Honours in Anatomy must have completed at least 4 Anatomy units at Level III. This requires one elective unit chosen from 70.011B, 70.012B, 70.304, or 70.305.
§Entry to 73.111 requires the approval of the Head of the School of Physiology and Pharmacology.
†Students taking Honours in Psychology must have competed 8 Level III units of Psychology including 12.300, 12.305 and *either* 12.304 *or* 12.322 from Group A.
Additionally, students intending to take the research alternative in Psychology IV are required to include 12.301 from Group B.

## 7312 Psychology/Physiology

See 7312 Physiology/Psychology

## 1401
## Commercial Information Systems with Computer Science

**Year 1***
6.611
10.001 (*or* 10.011)
5 further units from Table 1 or Table 2 excluding 14.501 for program 1401 (strongly recommended is 10.081)

**Year 2**
6.621
6.641
14.501
14.511
14.602
14.603
10.331 (*or* 10.311A)
*1 General Studies elective*††
Further units from Table 1 *or* Table 2 for 1401 to make 8 in all

**Year 3**
14.605
14.607
14.608
14.522
*1 General Studies elective*
3 further units, with at least one at Level III, from Table 1 *or* Table 2 for program 1401, *or* 14.611

*In Year 1 students must enrol in program 6806. Enrolment in Year 2, in program 1401 is based on academic performance in Year 1.
††See footnote to program 0101.

# Geology

Geology is 'the science of the earth' and covers a broad range of topics that involve the sciences of physics, chemistry, biology and mathematics. Resource geology is the foundation on which much of mankind's well-being is now built. Thus geology has an applied, professional function as well as being a scientific discipline.

Program 2501 is a three-year program designed to prepare graduates for employment in some field of resource geology. The demands of industry are such that further training is desirable for a graduate geologist and suitable students may progress towards an honours degree by following a program identical to the one specified for fourth year in course 3000 in the Faculty of Applied Science. Training to meet this objective demands a thorough understanding of basic geological principles; accordingly, in the early part of the course students receive instruction in standard fundamental geological subjects. As the course progresses, increasing emphasis is placed on practical applications in engineering and environmental geology, mineral and energy exploration and development and mineral exploration techniques including geochemical and geophysical methods.

Program 2502 is designed for a single major in geology. Program 2503 prepares students in the fundamentals of geophysics, an essential aspect of modern resource exploration and development geology. Programs 0125, 0225, 1025 and 2543 provide opportunities to study the interrelationships between geology and physics, chemistry, mathematics, and the biological sciences, respectively. Programs 2703 and 2725 supply the link between the past and the present by associating geology with geography. Program 6225 affords the opportunity to study the historical, philosophical and sociological aspects of geology. Program 6833 is concerned with aspects of earth sciences, including geology, that concern the marine environment. Selected students who have completed these programs may read for an honours degree that includes geological studies.

Programs in geology are also offered in the combined Science/Civil Engineering course **3730**, the Science Education Course **4080** and the combined Science/Law Course **4770**.

## 2501
## Geology
## Double major

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
25.110, 25.120

**Year 2**
25.211, 25.221, 25.212, 25.223, 25.2261
*1 General Studies elective*††
Choose 3 units from Table 1

**Year 3**
25.311, 25.321, 25.312, 25.3162, 25.314, 25.324, 25.325, 25.3261, 25.3271, 25.333
*1 General Studies elective*

**Year 4**
25.410, 25.4101, 25.420
Choose 1 unit from:
25.412, 25.414, 25.415, 25.931

††See footnote to program 0101.

## 2502
## Geology
Single major

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
25.110, 25.120

**Year 2**
25.211, 25.221, 25.212, 25.223, 25.2261
*1 General Studies elective*††
Choose 3 units from Table 1

**Year 3**
25.311, 25.312
Choose two units from:
25.333, 25.314, 25.3162, 25.3261, 25.3271, 25.321, 25.324, 25.325
*1 General Studies elective*
Choose 4 units from Table 1

**Year 4**
25.434

††See footnote to program 0101.

## 2503
## Geophysics

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
25.110, 25.120

**Year 2**
1.002, 1.012, 1.022, 1.032
10.2111, 10.2112, 10.331
25.5212, 25.223, 25.2261
*1 General Studies elective*††

**Year 3**
25.9311, 25.9312, 25.9313,
25.9314, 25.9321, 25.3162, 25.333
*1 General Studies elective*
Choose 4 units from Table 1 &/or Table 2 for program 2503, selecting at least 2 units from:
1.042 and Level III Physics units

**Year 4**
25.434

††See footnote to program 0101.

## 2543
## Geology with Botany & Zoology

**Year 1**
2.121 & 2.131
10.001 *or* 10.011 *or*
10.021B & 10.021C
17.031 & 17.041
25.110 & 25.120

**Year 2**
25.211, 25.221, 25.212
43.111
45.101, 45.201, 45.301
*1 General Studies elective*††
Choose 1 unit from:
17.012
43.112* (*or* 43.162*), 43.131

**Year 3**
25.311, 25.312, 25.324, 25.321 (*or* 25.325)
45.302
*1 General Studies elective*
Choose 2 units from 43.152, 43.162* (*or* 43.112*), 43.172, 45.112, 45.121, 45.402

**Year 4**
25.434

††See footnote to program 0101.
*These subjects are offered in alternate years; 43.112 requires the waiving of the co-requisite 43.101.

## 0125
## Geology/Physics

See 0125 Physics/Geology

## 0225
## Geology/Chemistry

See 0225 Chemistry/Geology

## 1025
## Geology/Mathematics

See 1025 Mathematics/Geology

## 2725
## Science Geography/Geology

See 2725 Geology/Science Geography

# Geography

## 2701
## Science Geography

**Year 1**
10.001 *or* 10.011
*or*
10.021B + 10.021C
27.111*
*or*
27.301* & 27.302*
Choose 4 Level I units from Table 1

**Year 2**
27.311*, 27.312*, 27.2813, 27.2814
*1 General Studies elective*††
Choose 4 units from Table 1 including not more than 2 Level I units

**Year 3**
*1 General Studies elective*
Choose 8 units from Table 1 including at least 4 Level III Geography units

**Year 4**
27.604

*Students who choose 27.111 instead of 27.301 and 27.302 in Year 1 should omit 27.301 and 27.311 from their program and complete 27.302 and 27.312 in Years 2 and 3 respectively.
††See footnote to program 0101.

## 2703
## Science Geography with Geology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B + 10.021C
25.110, 25.120
27.111
*or*
27.301* & 27.302*

**Year 2**
1.001
25.211, 25.221, 25.212
27.311*, 27.312*, 27.2813, 27.2814
*1 General Studies elective*††

**Year 3**
25.311, 25.312
27.183, 27.133
*1 General Studies elective*
Choose 3 units from:
*Either*
25.325 (*or* 25.314 *or* 25.324), 27.153, 27.143, 27.862

**Year 4**
27.604

*Students who choose 27.111 instead of 27.301 and 27.302 in Year 1 should omit 27.301 and 27.311 from their program and complete 27.302 and 27.312 in Years 2 and 3 respectively.
††See footnote to program 0101.

## 2725
## Science Geography/Geology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
25.110, 25.120
27.111
*or*
27.301* & 27.302*

**Year 2**
1.001
25.211, 25.221, 25.212, 25.223
27.311*, 27.2813, 27.2814
*1 General Studies elective*††

**Year 3**
27.183, 27.133, 27.312*
25.311, 25.312
Choose 2 units from:
25.333, 25.314, 25.321, 25.324, 25.325, 25.3162, 25.3271, 25.3261
*1 General Studies elective*
Choose 1 unit from:
27.153, 27.143, 27.862

**Year 4**
27.604 *or* 25.434

*Students who choose 27.111 instead of 27.301 and 27.302 in Year 1 should omit 27.301 and 27.311 from their program and complete 27.302 and 27.312 in Year 2.
††See footnote to program 0101.

## 2743
## Science Geography/Botany

**Year 1**
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
27.111
*or*
27.301* & 27.302*
Choose 2 units from:
2.111, 2.121, 2.131, 2.141

**Year 2**
1.001
27.311*, 27.312*, 27.2813, 27.2814
43.101, 43.111
*1 General Studies elective*††
Choose 1 Level II unit from Table 1

**Year 3**
27.153, 27.143
43.112 *or* 43.162, 43.142
*1 General Studies elective*
Choose 3 units from:
27.183, 27.133
43.102, 43.152, 43.172

**Year 4**
27.604 *or* 43.103

*Students who choose 27.111 instead of 27.301 and 27.302 in Year 1 should omit 27.301 and 27.311 from their program and complete 27.302 and 27.312 in Years 2 and 3 respectively.
††See footnote to program 0101.

# Biochemistry

Biochemistry means 'chemistry of life' and is a key subject in biological studies. Initially the approaches of chemistry were applied to biological systems but now Biochemistry has achieved its own techniques, approaches and body of knowledge and its ideas pervade the whole of biology. It, however, retains a molecular basis and is an ideal study for those interested in understanding and appreciating biological processes at the basic rather than descriptive level.

Study of Biochemistry begins at Level II (41.101 Biochemistry) building on a base of Level I Chemistry and Biology. The material in this double unit introduces the basic concepts of the subject, describes biological molecules, their reactivities and interconversions in cells and tissues. It is followed by the single unit 41.111 Biochemical Control that illustrates and amplifies the molecular control of cellular processes with particular emphasis on enzymes, hormones and nucleic acids.

At Level III further double units are offered at a more advanced level: 41.102A Biochemistry of Macromolecules; 41.102B Physiological Biochemistry; 41.102C Plant Biochemistry; 41.102E Molecular Biology of Higher Organisms.

Program 4101 Biochemistry leads to a single major in Biochemistry. The program contains provision for considerable choice of non-biochemical units. Frequently Biochemistry is studied with another discipline as co-major. These programs cater for students' interests and outline how to achieve a double major. Thus there are available Biochemistry courses co-majoring with Chemistry (0241), Biotechnology (4142), Botany (4143), Microbiology (4144), Zoology (4145), Science Policy Studies (4162), Anatomy (4170) and Physiology (4173). Program 4101 Biochemistry single major, could be used to take two minors, eg Chemistry and Microbiology or Chemistry and Botany, with Biochemistry.

In Year 4 the Honours course in Biochemistry (41.103) offers the opportunity for students to carry out a project and to receive training in research techniques.

## 4101 Biochemistry

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
2.002B
41.101, 41.111
*1 General Studies elective*††
Choose at least 3 units from Table 1

**Year 3**
41.102A
Choose at least 6 units from Table 1, including at least 2 units from 41.102B, 41.102C and 41.102E; all should be at Level III if proceeding to Honours.
*1 General Studies elective*

**Year 4**
41.103

††See footnote to program 0101.

## 0241 Biochemistry/Chemistry

See 0241 Chemistry/Biochemistry

## 4142 Biochemistry/Biotechnology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
2.002B
41.101, 41.111
42.101
44.101
*1 General Studies elective*††
Choose 1 unit from Table 1

**Year 3**
41.102A
42.102A, 42.102B
*1 General Studies elective*
Choose 4 units from Table 1 including at least 2 units from 41.102B, 41.102C and 41.102E; all should be Level III if proceeding to Year IV

**Year 4**
41.103 *or*
42.103

††See footnote to program 0101.

## 4143 Biochemistry/Botany

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011

*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
2.002B
41.101, 41.111
43.111
*1 General Studies elective*††
Choose at least 2 units from:
43.101, 43.131, 17.012

**Year 3**
41.102A, 41.102C, 41.102E
43.122
*1 General Studies elective*
Choose 3 Level III Botany units

**Year 4**
41.103 *or* 43.103

††See footnote to program 0101.

## 4144
## Biochemistry/Microbiology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
2.002B
41.101, 41.111
44.101, 44.121
*1 General Studies elective*††
Choose 1 unit from Table 1

**Year 3**
41.102A
44.102, 44.112
*1 General Studies elective*
Choose *either* 41.102B *or* both 41.102C and 41.102E

**Year 4**
41.103 *or* 44.103

††See footnote to program 0101.

## 4145
## Biochemistry/Zoology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
2.002B
41.101, 41.111
45.101, 45.201, 45.301
*1 General Studies elective*††
Choose one unit from:
2.002A, 2.002D, 2.042C
17.012
43.101

**Year 3**
41.102A, 41.102B
*1 General Studies elective*
Choose 4 Level III Zoology units from Table 1

**Year 4**
41.103 *or*
45.103

††See Footnote to program 0101.

## 4162
## Biochemistry and Science Policy Studies§

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
41.101, 41.111
2.002B
62.052, 62.062
Choose 1 unit from:
62.012, 62.022, 62.032†
*1 General Studies elective*††
Choose 1 unit from Table 1

**Year 3**
41.102A
41.102B *or both* 41.102C + 41.102E
*½ General Studies elective**
Choose 3 units from:
62.012, 62.032, 62.033, 62.072, 62.082, 62.093, 62.106
Choose 1 unit from:
15.001, 15.703, 15.753

**Year 4**
41.103 *or*
62.024

§This program is intended for students wishing to major in Biochemistry and at the same time acquire an understanding of the social dimensions of science and the role of science in the economy. It also provides elements of a training in science policy studies, important for those wishing to engage in administration and policy-making in science and technology. Honours students may complete a thesis in either Biochemistry or an aspect of science policy.
†See this footnote to program 6200.
*26.251, 26.2506, 26.561, 26.564, 26.817 may not be included in program.
††See footnote to program 0101.

## 4170
## Biochemistry/Anatomy†

**Year 1***
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
2.002B
41.101, 41.111
70.011A, 70.011C
*1 General Studies elective*††
73.121 *or* 73.111** *or* choose 1 or 2 units from:
2.002A, 2.002D, 2.042C, 70.011B

**Year 3**
41.102A, 41.102B
70.012B, 70.304
*1 General Studies elective*
Choose 2 units from:
70.011B, 70.305, 70.306, 70.307, 70.012C

**Year 4**
41.103 *or* 70.013

*In Year 1 students must enrol in program 6801. Enrolment in Year 2 of program 4170 is based on academic performance in Year 1.
**Entry to 73.111 requires the approval of the Head of the School of Physiology and Pharmacology.
†Owing to timetabling difficulties this program may take longer than minimum time to complete.
††See footnote to program 0101.

## 4173
## Biochemistry/Physiology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
2.002B
41.101, 41.111
73.111
*1 General Studies elective*††
Choose 2 units from Table 1

**Year 3**
41.102A, 41.102B
73.012
*1 General Studies elective*

**Year 4**
41.103 *or* 73.103

††See footnote to program 0101.

# Biotechnology

Students wishing to undertake training in biotechnology may do so by combining such training with a major in microbiology (Program 4244), biochemistry (Program 4142), chemistry (Program 0242) or another discipline (Program 4201).
All four programs can be extended to a fourth (honours) year which comprises further formal training, as well as research, in biotechnology. Alternatively, students with no previous training in biotechnology may undertake the honours year provided they have completed the necessary background training in biochemistry and microbiology. In such cases, Level III biotechnology units constitute the formal component of the honours year.

## 4201
## Biotechnology (General)

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
41.101
42.101
44.101
*1 General Studies elective*††
Choose 3 units from Table 1

**Year 3**
42.102A, 42.102B
*1 General Studies elective*
Choose 6 units from Table 1, at least two of which are Level III; all should be Level III if proceeding to Year IV

**Year 4**
42.103

††See footnote to program 0101.

## 0242
## Biotechnology/Chemistry

See 0242 Chemistry/Biotechnology

## 4142
## Biotechnology/Biochemistry

See 4142 Biochemistry/Biotechnology

## 4244
## Biotechnology/Microbiology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
41.101
42.101
44.101, 44.121
*1 General Studies elective*††
Choose 2 units from Table 1

**Year 3**
42.102A, 42.102B
44.102, 44.112
*1 General Studies elective*
Choose 2 units from Table 1; these should both be Level III if proceeding to Year IV

**Year 4**
42.103 *or* 44.103

††See footnote to program 0101.

# Botany

## 4306
## Botany with Zoology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
43.111
45.101, 45.201, 45.301
*1 General Studies elective*††
Choose at least 2 of:
17.012 (*or* 27.111)
43.101, 43.131
Choose remaining units from Table 1

**Year 3**
*1 General Studies elective*
Choose at least 7 units from Table 1 including at least 4 Level III Botany units. Students wishing to enter the Honours program must complete 8 Level III units.

**Year 4**
43.103

††See footnote to program 0101.

## 4309
## Botany

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
43.111
*1 General Studies elective*††
Choose at least 2 of:
17.012 (*or* 27.111)
43.101, 43.131
Choose other units from Table 1

**Year 3**
*1 General Studies elective*
Choose at least 7 units from Table 1 including at least 4 Level III Botany units. Students wishing to enter the Honours program must complete 8 Level III units.

**Year 4**
43.103

††See footnote to program 0101.

## 2543
## Botany & Zoology/Geology

See 2543 Geology with Botany & Zoology

## 2743
## Science Geography/Botany

See 2743 Botany/Geography

## 4143
## Botany/Biochemistry

See 4143 Biochemistry/Botany

## 4344
## Botany/Microbiology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
41.101
44.101, 44.121
*1 General Studies elective*††
Choose at least 2 units from:
17.012
43.111, 43.101

**Year 3**
43.131, 43.102 &/*or* 43.132 &/*or* 43.192
44.102, 44.112
*1 General Studies elective*
Choose other Level III units in Botany to complete a total of 7 Level III units. Students wishing to enter the Honours program must complete 8 Level III units.

**Year 4**
43.103 *or* 44.103

††See footnote to program 0101.

## 4345
## Botany/Zoology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
43.111 and 2 of 43.101, 43.131, 17.012
45.101, 45.201, 45.301
*1 General Studies elective*††
Choose *either* 41.101 *or* at least 2 Level II units from one of the following Schools: Chemistry, Physics, Geography, Geology, or Mathematics

**Year 3**
*1 General Studies elective*
Choose 8 Level III units, 4 from Botany and 4 from Zoology. Students wishing to enter the Honours program must complete 8 Level III units.

**Year 4**
43.103 *or* 45.103

††See footnote to program 0101.

# Microbiology

The discipline of microbiology encompasses the scientific study of the smallest forms of life, namely bacteria, viruses, algae, fungi and protozoa. Microorganisms are probably best known as agents of disease in man, in other animals and in plants. Other microorganisms cause food spoilage, as well as serious deterioration in textiles and structural materials. Not all microorganisms are harmful. We depend on microorganisms for the recycling of organic wastes, for the maintenance of soil fertility, and for the production of foods, beverages, pharmaceuticals (especially antibiotics), and other industrially important materials.

All programs in microbiology require students to take basic courses in Chemistry, Mathematics and Biology in Year 1, as well as 41.101 Introductory Biochemistry in Year 2. Program 4401 includes the maximum number of units of microbiology whereas program 4404 gives a minimum program for a major in the subject with the maximum opportunity for choice of other subjects. Other single major (4402 and 4403) and double major (4144, 4244 and 4344) programs are available.

## 4401 Microbiology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
2.002B
41.101
44.101, 44.121
*1 General Studies elective*††
Choose 2 units from Table 1

**Year 3**
41.102A
44.102, 44.112, 44.132
*1 General Studies elective*
Choose 1 unit from:
42.102
44.122

**Year 4**
44.103

††See footnote to program 0101.

## 4402 Microbiology (Immunology)

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
2.002B
41.101
44.101, 44.121
70.011A
*1 General Studies elective*††
Choose 1 unit from Table 1

**Year 3**
41.102A
44.102, 44.112, 44.122
*1 General Studies elective*
Choose 1 unit from Table 1 *or* 70.304

**Year 4**
44.103

††See footnote to program 0101.

## 4403 Microbiology (Ecology)

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
17.012
41.101
44.101, 44.121
45.201
*1 General Studies elective*††
Choose 1 unit from:
43.111, 43.131

**Year 3**
43.132, 43.142, 43.172
44.102, 44.112
45.112
*1 General Studies elective*

**Year 4**
44.103

††See footnote to program 0101.

## 4404
## Microbiology (General)

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
41.101
44.101, 44.121
*1 General Studies elective*††
Choose 3 units from Table 1

**Year 3**
44.102, 44.112
*1 General Studies elective*
Choose 4 units from Table 1

**Year 4**
44.103

††See footnote to program 0101.

## 4144
## Microbiology/Biochemistry

See 4144 Biochemistry/Microbiology

## 4244
## Microbiology/Biotechnology

See 4244 Biotechnology/Microbiology

## 4344
## Microbiology/Botany

See 4344 Botany/Microbiology

# Zoology

The study of zoology as such does not begin until the second year of the Science and Mathematics course, but is built on a foundation of the two biological units: Biology A and Biology B, supported by chemistry and mathematics. The three Level II units are Invertebrate Zoology, Vertebrate Zoology, and Biometry (ie statistical methods and their application to biology).

Zoology Level III units cover a wide range of topics: eg marine ecology, evolutionary theory, animal behaviour, ecological physiology, comparative physiology, vertebrate zoogeography and evolution, population and community ecology and insects.

There are many programs leading to a major in zoology in the Science and Mathematics course. The individual programs are constructed either on a broad zoological base with some degree of specialization at Level III (eg 4502 Entomology, 4508 Zoology (Population Biology), 4514 Zoology (Fisheries and Wildlife Biology)), or constructed to give a useful combination of Zoology with some other discipline (eg 4509 Zoology with Mathematics, 4145 Zoology with Biochemistry, 4570 Zoology with Anatomy).

Students who are unsure of their area of specialization are advised to enrol in 4501 Zoology (General) as this is the most flexible of the Zoology programs.

A Level II, students usually take Biometry, Vertebrate Zoology and Invertebrate Zoology. Students are also required to study two Level II units of either Biochemistry or Chemistry, or Mathematics or Physics. Students whose interests are mainly biological are encouraged to make their choice Biochemistry. Other units are then chosen to make up a total of at least seven for the year. The areas from which these units are chosen will depend mainly on the student's interests and on the specific program being undertaken. Examples of some of the units which Zoology students often include in their programs are: General Ecology, Introductory Microbiology, Flowering Plants, Plant Physiology, Genetics, Control Mechanisms, Organic Chemistry, Analytical Chemistry, Physiology and Mathematics.

A major in zoology requires the study of at least four zoology units at Level III. Again the nature of these is determined by the program being followed. For instance, those who are interested in Physiology, would probably include Ecological Physiology, Comparative Physiology and Animal Behaviour among their units; those interested in Entomology would include Economic Zoology and those interested in Ecology might include Marine Ecology, Population and Community Ecology, Evolutionary Theory and Vertebrate Zoogeography and Evolution. Additional units may be chosen either from those offered by the School of Zoology or by other schools to make up the total of seven or eight units required by the regulations of the Science and Mathematics course. The above are only a few suggestions as to the choices that might be made.

For students who achieve above average results in their studies a fourth year (honours) is available. The honours year is made up of formal course work on Concepts in Biology and a research project.

## 4501
## Zoology (General)

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
45.101, 45.201, 45.301, 17.012
*1 General Studies elective*††
Choose 4 units from Table 1 including at least 2 Level II units from one of the following Schools:
Biochemistry, Chemistry, Physics or Mathematics

**Year 3**
*1 General Studies elective*
Choose 3 units from 45.121, 45.122, 45.142, 45.402
Choose one more Level III Zoology unit
Choose at least 3 units from Table 1 which may include additional Zoology units
Students wishing to enter the Honours program must complete 8 Level III units

**Year 4**
45.103

††See footnote to program 0101.

## 4502
## Entomology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
41.101
45.101
45.201, 45.301
*1 General Studies elective*††
Choose 3 Level II units from: Zoology, Botany, Microbiology or Mathematics

**Year 3**
45.402, 45.422
Choose 2 units from 45.121, 45.122, 45.142
*1 General Studies elective*
Choose 3 Level III units from: Zoology, Botany, Microbiology, Mathematics or 79.201
Students wishing to enter the Honours program must complete 8 Level III units

**Year 4**
45.103

††See footnote to program 0101.

## 4508
## Zoology (Population Biology)

**Year 1**
2.121 & 2.131, *or* 2.141
6.611
10.001 *or* 10.011
17.031, 17.041
Choose 1 unit from Table 1*

**Year 2**
6.621
17.012
43.101
45.301
45.101 *or* 10.331
*1 General Studies elective*††
Choose 3 units from:
10.031
43.111
44.101
45.201

**Year 3**
43.152
45.121, 45.122, 45.152, 45.302, 45.402
79.201
*1 General Studies elective*
Choose 1 unit from:
6.646
10.032
43.102, 43.172
45.112
79.302
Students wishing to enter the Honours program must complete 8 Level III units

**Year 4**
45.103

††See footnote to program 0101.
*A laboratory computing unit is preferred.

## 4509
## Zoology with Mathematics

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
10.111A, 10.1113 & 10.1114, 10.2111 & 10.2112
45.201, 45.301
*1 General Studies elective*††
Choose 3 units from Table 1 including at least 1 Level II Statistic unit

**Year 3**
*1 General Studies elective*
Choose 4 Level III Zoology units
Choose at least 3 Level III Mathematics units
Students wishing to enter the Honours program must complete 8 Level III units

**Year 4**
45.103

††See footnote to program 0101.

## 2543
## Zoology & Botany/Geology

See 2543 Geology with Botany & Zoology

## 4514
## Zoology (Fisheries and Wildlife Biology)

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
17.012
43.111
45.101, 45.201, 45.301
*1 General Studies elective*††
Choose 3 units from Table 1, including at least 2 Level II units from one of the following Schools:
Biochemistry, Chemistry, Physics *or* Mathematics

**Year 3**
Choose at least 4 units from:
45.112, 45.121, 45.152, 45.302, 45. 422
*1 General Studies elective*
Choose at least 2 units from:
43.152, 43.172, 45.122, 45.132, 45.402 to make a total of at least 7 Level III units
Students wishing to enter the Honours program must complete 8 Level III units

**Year 4**
45.103

††See footnote to program 0101.

## 4543
## Entomology and Plant Pathology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
41.101
43.101, 43.131
44.101
45.101
45.201, 45.301
*1 General Studies elective*††

**Year 3**
43.132, 45.402, 45.422
*1 General Studies elective*
Choose 2 units from 45.121, 45.122, 45.142
Choose 3 Level III Zoology or Botany units
Students wishing to enter the Honours program must complete 8 Level III units

**Year 4**
45.103 *or* 43.103

††See footnote to program 0101.

## 4145
## Zoology/Biochemistry

See 4145 Biochemistry/Zoology

## 4561
## Zoology with Computer Science*

**Year 1**
1.001 *or* 1.011
10.001 *or* 10.011
6.611
17.031 and 17.041
68.451

**Year 2**
6.621, 6.631, 6.641
10.2112, 10.2115
45.101 *or* 10.331, 45.201, 45.301
*1 General Studies elective*††

**Year 3**
45.121, 45.122, 45.302, 45.152
Choose at least two units from 6.632, 6.633, 6.642, 6.643, 6.646, 6.649 and the remainder from Level III units listed in Table 1, to complete 8 units
*1 General Studies elective*
Students wishing to enter the Honours program must complete 8 Level III units

**Year 4**
45.103

*Quota restrictions apply to some Computer Science Level III units. Application must be made in writing to the Head of School of Electrical Engineering and Computer Science before the end of Session 2 in the preceding year.
††See footnote to program 0101.

## 4570 Zoology/Anatomy

**Year 1***
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
45.101, 45.301
70.011A, 70.011C
*1 General Studies elective*††
Choose 3 units from Table 1 *or* Table 2 for program 4570, including 2 units from one of the following Schools: Biochemistry, Chemistry, Mathematics or Physics

**Year 3**
70.021B
*1 General Studies elective*
Choose 4 units from:
70.011B, 70.012C, 70.304, 70.305, 70.306, 70.307
Choose 4 Level III Zoology units from Table 1

**Year 4**
45.103 *or*
70.013

*In Year 1 students must enrol in program 6801. Enrolment in Year 2 of program 4570 is based on academic performance in Year 1.
††See footnote to program 0101.

## 7345 Physiology/Zoology

See 7345 Zoology/Physiology

# History and Philosophy of Science

Students may take courses within the School of History and Philosophy of Science leading to the award of pass or honours degrees in History and Philosophy of Science. There are also programs leading to joint majors in HPS with Physics, Geology, Botany, Zoology or Anatomy, and students in such programs may proceed to honours level in either HPS or the relevant science subject. In addition, there are programs (0162, 0262, 4162) in which students may combine courses in Science Policy Studies with science subjects.

Courses in HPS are quite different from ordinary science subjects. They involve thinking *about* science, from historical, philosophical and sociological perspectives. They consider the historical development of the various sciences, but not merely as the series of intellectual steps leading to the present state of scientific knowledge. Rather, the history of science is seen in relation to cultural history and to forces of social change, and to the parallel development of philosophical thought.

Philosophical problems engendered by science are also discussed, and considerable attention is given to the social structure of science and the ways in which science and technology fit into modern society, both in industrial and developing countries.

The programs where emphasis is laid on science policy issues are intended for students wishing to qualify themselves as science policy advisers. Training is provided therefore in both science, social studies of science, and science policy theory and practice.

Broadly speaking, students wishing to make their careers in areas related to HPS or Science Policy Studies (for example, museum work, science journalism, tertiary teaching, government administration, etc) will need to pursue their studies at graduate level, but there are some career opportunities for those who have bachelor degrees only.

Some students may wish to take a small number of HPS subjects, where their programs allow sufficient flexibility, as complements to their usual experimentally-based science subjects.

The School of History and Philosophy of Science offers a course-work program leading to the degree of Master of Science and Society, and research degrees at the Master and Doctoral level may also be undertaken. Interested students should enquire at the School.

## 6200**
## History and Philosophy of Science

**Year 1**
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose at least 6 Level I units from Table 1

**Year 2**
62.012, 62.022, 62.032†
*1 General Studies elective**††
Choose at least 4 units from Table 1

**Year 3**
*1 General Studies elective**
Choose 8 units from Table 1 including 4 units from:
History and Philosophy of Science units
52.218,
*or* 52.2030 *and* 52.2031

**Year 4**
62.014

*26.251, 26.2506, 26.561, 26.564, 26.568, 26.817 may not be included in this program.
**Students wishing to undertake a co-major in History and Philosophy of Science *and* Chemistry may do so by enrolling in program 6200 and choosing appropriate Chemistry units from Table 1.
†62.552 should be substituted for 62.032, which is not available this year. The prerequisite for 62.552 is waived for this year.
††See footnote to program 0101.

## 6201
## History and Philosophy of Science/ Physics

**Year 1**
1.001 *or* 1.011
10.001 *or* 10.011
2.121 & 2.131, *or* 2.141
Choose 2 Level I units from:
5.010, 5.030
17.031, 17.041
25.110, 25.120

**Year 2**
1.002, 1.012, 1.022, 1.032
10.2111 *and* 10.2112
*1 General Studies elective**††
62.012, 62.032†, and 1 additional HPS unit from Table 1**

**Year 3**
1.0133, 1.0143, 1.023, 1.0333, 1.0343, 1.043
*1 General Studies elective**
Choose 3 HPS units from Table 1**
*or*
Choose 2 HPS units from Table 1 and 10.1113 and 10.1114

**Year 4**
*Either*
1.104***
*or*
62.014***

*26.251, 26.2506, 26.561, 26.564, 26.568, 26.817 may not be included in this program.
**62.033, which is normally only available in alternate years, must be taken in *either* Year 2 *or* Year 3.
††See footnote to program 0101.
***Students taking Honours Physics are required, as part of their program, to undertake a project under the aegis of the School of History and Philosophy of Science. Students taking Honours History and Philosophy of Science are required, as part of their program, to undertake a project under the aegis of the School of Physics.
†See footnote to program 6200.

## 6225
## History and Philosophy of Science/ Geology

**Year 1**
1.001 (*or* 1.011) *or* 17.031 & 17.041
2.121 & 2.131, *or* 2.141
10.001 (*or* 10.011) *or* 10.021B & 10.021C
25.110, 25.120

**Year 2**
25.211, 25.221, 25.212
62.012, 62.032†, 62.103
*1 General Studies elective**††
Choose 2 units from Table 1

**Year 3**
*1 General Studies elective*
25.311, 25.312, 25.314 (*or* 25.324 *or* 25.325)
Choose *either* 4 HPS units from Table 1
*or*
3 HPS units from Table 1 and *one of* 25.314, 25.324 *or* 25.325 (other than that already chosen)

**Year 4**
62.014

†See footnote to program 6200.
††See footnote to program 0101.
*26.251, 26.2506, 26.561, 26.564, 26.568, 26.817 may not be included in this program.

## 6243
## History and Philosophy of Science/ Botany

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 (*or* 10.011) *or* 10.021B and 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
43.101, 43.111
62.012, 62.032†, 62.104 and one additional unit from Table 1
*1 General Studies elective*††
Choose 2 units from Table 1

**Year 3**
Choose 4 Botany Level III units from Table 1
Choose 4 HPS units from Table 1
*1 General Studies elective*

**Year 4**
*Either*
62.014
*or* 43.103

†See footnote to program 6200.
*26.251, 26.2506, 26.561, 26.564, 26.568, 26.817 may not be included in this program.
††See footnote to program 0101.

## 6245
## History and Philosophy of Science/ Zoology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 (*or* 10.011) *or* 10.021B and 10.021C
17.031, 17.041
Choose 2 Level units from Table 1

**Year 2**
45.101, 45.201 (*or* 45.402), 45.301, 43.101
62.012, 62.032†
62.106 *or* 62.109 *or* 62.104
*1 General Studies elective*††

**Year 3**
45.121, 45.302, 45.422
Choose 1 Level III Zoology unit from Table 1
Choose 4 HPS units from Table 1
*1 General Studies elective**

**Year 4**
*Either*
62.014
*or*
43.103

†See footnote to program 6200.
*26.251, 26.2506, 26.561, 26.564, 26.568, 26.817 may not be included in this program.
††See footnote to program 0101.

## 0162
## Science Policy Studies and Physics

See 0162 Physics and Science Policy Studies

## 0262
## Science Policy Studies and Chemistry

See 0262 Chemistry and Science Policy Studies

## 4162
## Science Policy Studies and Biochemistry

See 4162 Biochemistry and Science Policy Studies

## 6270
## History and Philosophy of Science/Anatomy

**Year 1***
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
62.012, 62.032†, *and either* 62.104 *or* 62.106** *or* 62.109**
70.011A, 70.011B, 70.011C
*1 General Studies elective****††
Choose 1 unit from Table 1

**Year 3**
70.021B
*1 General Studies elective****
Choose 4 History and Philosophy of Science units from Table 1
Choose 3 units from:
70.012, 70.304, 70.305, 70.306, 70.307

**Year 4**
*Either*
62.014
*or*
70.013

*In Year 1 students must enrol in program 6801. Enrolment in Year 2 of program 6270 is based on academic performance in Year 1.
†See footnote to program 6200.
**62.106 *or* 62.109 must be taken in Year 3 unless completed in Year 2.
††See footnote to program 0101.
***26.251, 26.2506, 26.561, 26.564, 26.568, 26.817 may not be included in this program.

## Board of Studies in Science and Mathematics

### 6801
### For Anatomy Programs

**Year 1**
10.001 *or* 10.011
*or*
10.021B and 10.021C
Choose 6 appropriate Level I units from Table 1

Enrolment in Year 2 of programs 1270, 4170, 4173, 4570, 6270, 7001, 7002, 7003, 7073, 7301, 7302, 7303, 7312, 7345 is based on academic performance in Year 1. Students should select the units specified in the program they wish to pursue in Year 2.

Students may obtain advice from the Office of the Board of Studies in Science and Mathematics in the Mathews Building.

### 6806
### For Computer Science Programs

**Year 1**
10.001 *or* 10.011
6.611
Choose 5 units from:
**1.** Table 1 *&/or*
**2.** The BA course** *&/or*
**3.** Table 2 for program 6806**

**In Year 1 students must enrol in program 6806. Enrolment in Year 2 of program 0601, 0610, 0611 and 1401 is based on academic performance in Year 1. Students may obtain advice from the office of the Board of Studies in Science and Mathematics in the Mathews Building.

## Marine Science

The Marine Science programs are designed to provide opportunities for students to specialize in selected areas of marine science, yet ensure that they receive an adequate exposure to other pertinent disciplines within this broad field. The programs have been constructed from subjects currently available in the faculties of Science, Biological Sciences and Applied Science. Introductory Marine Science is a subject common to all these programs, and unique to them, having been designed for and offered only in Marine Science Programs.

All students in the Marine Science programs must select *one major sequence* from the following options: 6831 Physical Oceanography, 6832 Biological Oceanography, 6833 Earth Science Oceanography and 6834 Enviromental Chemistry. In addition, all students must select *two minor sequences* from the Physical, Biological, Earth Science, and Chemical minor sequences offered. A minor sequence in the same area as that selected for the major sequence is excluded.

*Physical Oceanography* includes units of basic and advanced Mathematics and Physics, as well as units in 10.412A Dynamical and Physical Oceanography and 10.4112 Hydrodynamics.

*Biological Oceanography* includes basic Mathematics, Chemistry and Biology as well as advanced courses in 43.111 Flowering Plants, 45.201 Invertebrate Zoology, 43.172 Phycology and Marine Botany, 45.112 Marine Ecology and 44.101 Introductory Microbiology. Further options include 17.012 General Ecology, 10.331 Statistics and 41.101 Biochemistry.

*Earth Science Oceanography* consists of basic geology and mathematics, and advanced units in geology and geography leading to 25.613 Geological Oceanography, 25.612 Estuarine Geology, 25.6341 Marine Mineral Deposits, 25.6342 Exploration & Seismic methods and 25.622 Hydrological and Coastal Surveying.

*Environmental Chemistry* includes basic chemistry and mathematics, and 2.002A Physical Chemistry, 2.002D Analytical Chemistry, 2.043A Environmental Chemistry and 2.003D Instrumental Analysis.

All programs offer some optional units to allow students a degree of freedom of choice of subjects. A fourth (Honours) year in Marine Science is available in all programs.

## Mathematics/Marine Science

## Mathematics/Marine Science Honours

See 6831 Marine Science (Physical Oceanography) and attached note relating to dual major with Mathematics

## 6831
## Marine Science (Physical Oceanography)

**Year 1**
1.001 *or* 1.011
10.001 *or* 10.011
1.041 *or* 6.611
Choose 2 units from one of the groups **1., 2., 3.**
**1.** 2.121 & 2.131, *or* 2.141
**2.** 17.031, 17.041
**3.** 25.110, 25.120
Choose 10.081 *or* one extra unit from groups **1., 2.** *or* **3.**

**Year 2**
68.302
10.2111 and 10.2112
10.1113 & 10.1114
1.002 *or* 10.4111
*1 General Studies elective*††
Choose at least 4 units from Table 1 (4½ units if 10.4111 is chosen) including the units required from one of the groups **1., 2.** and **3.** chosen in Year 1:
**1.** 2.002A
**2.** At least one unit from 17.012 *or* 45.152 *or* 43.111
**3.** 25.621

**Year 3**
68.313
10.4112 *or* 10.4212
25.6342
10.412D *or* 10.422D
10.412A
*1 General Studies elective*
Choose 3 units from:
1.022, 1.032, 1.3533, 1.042, 1.133
10.212A, 10.412B, 10.422A*, 10.331, 10.422B, 10.4129, 10.4331
45.112 *or* 25.631 *or* 25.632 *or* 2.043A
*or* 43.172 *or* 25.635

**Year 4**
68.304

*Prerequisite for Year 4 in this program.
Note: Students may fulfil requirements of a Marine Science Mathematics program by completing 10 mathematics units in the above program.
††See footnote to program 0101.

## 6832
## Marine Science (Biological Oceanography)

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 units from group **1.** *or* **2.**
**1.** 1.001 *or* 1.011 *or* 1.021
**2.** 25.110, 25.120

**Year 2**
2.002A
43.111
44.101
45.201 *or* 41.101
68.302
*1 General Studies elective*††
Choose at least 1 unit from:
17.012, 41.101, 44.121, 45.101, 45.201, 45.301
*Choose 1 unit from subjects related to units of groups **1.** and **2.** chosen in Year 1:
**1.** 10.031 *or* 10.331 *or* 10.301
**2.** 25.622

**Year 3**
43.172
45.112
*1 General Studies elective*
*Choose at least 5 units from Table 1, at least 2 of which are Level III which *may* include subjects related to units from the groups **1.** and **2.** chosen in Year 1:
**1.** 68.313, 10.032
**2.** 25.632

**Year 4**
68.304

*A total of at least 23 units must be completed in Years 1-3 in this program.
††See footnote to program 0101.

## 6833
## Marine Science (Earth Science Oceanography)

**Year 1**
10.001 *or* 10.011
*or*
10.021B & 10.021C
25.110, 25.120
Choose 4 units from 2 of the groups **1., 2.** and **3.**
**1.** 1.001 *or* 1.011 *or* 1.021
**2.** 17.031, 17.041
**3.** 2.121 & 2.131, *or* 2.141

**Year 2**
68.302
25.621, 25.622
*1 General Studies elective*††
Choose at least 4 units from Table 1 including the units required from 2 of the groups **1., 2.** and **3.** chosen in Year 1:
**1.** 10.031 *or* 10.331 *or* 10.301
**2.** At least 1 unit from:
17.012
43.111
45.201
**3.** 2.002A

*For Year 3, Year 4 and footnotes, see overleaf*

**Year 3**
25.631, 25.632, 25.6341, 25.6342, 25.635*
*1 General Studies elective*
Choose 4 units from Table 1 which *may* include units from 2 of the groups **1.**, **2.** and **3.** chosen in Year 1:
**1.** 68.313, 10.032
**2.** 43.172
45.112
**3.** 2.043A

**Year 4**
68.304

††See footnote to program 0101.
*If 25.635 is not available, choose some other appropriate unit in consultation with the Course Authority.

## 6834
## Marine Science (Evnironmental Chemistry)

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
Choose 4 units from 2 of the groups **1.**, **2.** and **3.**
**1.** 1.001 *or* 1.011
**2.** 17.031, 17.041
**3.** 25.110, 25.120

**Year 2**
68.302
2.002A, 2.002D
*1 General Studies elective*††
Choose at least 4 units from Table 1 including the units required from 2 of the groups **1.**, **2.** and **3.** chosen in Year 1:
**1.** 10.031 *or* 10.331
**2.** At least 1 unit from:
17.012
43.111
45.201
**3.** 25.622

**Year 3**
2.043A, 2.003D
*1 General Studies elective*
Choose 6 units including at least 2 at Level III which *may* include units required from 2 of the groups **1.**, **2.** and **3.** chosen in Year 1:
**1.** 68.313, 10.032
**2.** 43.172
45.112
**3.** None

**Year 4**
68.304

††See footnote to program 0101.

## Genetics

The Genetics program is designed to provide students with firm foundation of genetical knowledge and also give them experience in pertinent related areas.

Because the subject matter of Genetics ranges from the structure of viruses to the co-evolution of populations, students are encouraged to choose between three sequences: molecular and microbial, population and ecological, and classical andd organismal. The three groups in secopnd year correspond to these sequences; the combination of subjects chosen then will determine the choices available in Year 3.

The choice of Year 1 subjects available include Physics, Psychology, Geography, and units in the laboratory applications of computers. Experience with laboratory computers is an asset in many areas of genetics.

Entry into a fourth (Honours) year is available, for above-average students, upon application to the Genetics Program Committee.

## 6840
## Genetics

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011†
*or*
10.021B *and* 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1 (68.451 is strongly recommended as one of these units)

**Year 2**
41.101
43.101*
44.101
*1 General Studies elective*††
Choose 1 unit from:
43.111, 43.131, 44.121
45.201, 45.301, 45.402
Choose 1 unit from:
10.331
45.101
Choose 2 units from one of the groups **1.**, **2.** *or* **3.**
**1.** 2.002B
41.111
**2.** 6.611
17.012
68.601
**3.** 43.111 *or* 43.131
45.201 *or* 45.402
45.301 *or* 9.801
62.104
68.601

**Year 3**
*1 General Studies elective*
Choose 8 units from:
6.621, 6.646
9.802, 9.811
41.102A, 41.102E
42.102A
43.102, 43.112
44.102, 44.122
45.121
68.602
79.201, 79.202, 79.302

**Year 4**
68.404

†Choosing 10.001 or 10.011 gives a wider choice of subjects in later years.
††See footnote to program 0101.
*Students who complete the subject 43.101 in Year 1 of the program should choose a replacement in Year 2.

## 6870
## Hydrographic Studies

**Year 1**
1.001
2.121 *and* 2.131
10.001 *or* 10.011
25.601 (25.110 *and* 25.120 for Kensington students)

**Year 2**
10.031
25.621 *and* 25.622
29.001, 29.002, 29.191
Choose 2 appropriate units from the School of Geography
1 Level II unit from Table 1**
*1 General Studies elective*††

**Year 3**
10.331
25.631, 25.632, 25.6341, 25.6342, 25.635 *or* an appropriate unit from the School of Applied Geology
68.313
2 Level II *or* Level III units from Table 1
*1 General Studies elective*

††See footnote to program 0101.
**Students who have not taken 25.601 are strongly recommended to take 68 302 from Table 2.

# Chemical Physics

**Note: The Chemical Physics programs are not available to new enrollees after 1983.**

The development of modern chemistry and physics has been such that there is no clearly defined boundary between the two subjects and problems inone area frequently require a thorough knowledge of the other. To cater for this situation, a set of programs in the subject area of Chemical Physics has been included in the Science and Mathematics Course 3970. These programs enable specialization in experimental and theoretical aspects of such topics as: structure and properties of materials, atoms and molecules; quantum theory and statistical mechanics; spectroscopic techniques; lasers and their applications in physics and chemistry; physical processes at interfaces (solid/gas, liquid/gas, and solid/liquid). The programs also incorporate a solid background of mathematics to support the theoretical component of the programs.

There are three programs:

- 6851 Chemical Physics (Chemistry/Physics)
- 6852 Chemical Physics (Chemistry/Mathematics)
- 6853 Chemical Physics (Physics/Mathematics)

After a common first year, the threee programs diverge in Year 2 to enable emphasis on subjects from two of the three contributing Schools (Physics, Chemistry, and Mathematics). Units 1.012, 1.022, 2.002A, 10.111A/10.121A, 10.2111/10.2211, and 10.2112/10.2212 form a core for all programs in Year 2. In Year 3, a core of four subjects (1.023, 2.023A, 2.063A, 68.503) is presented together with 3 or more Level III units offered by the three contributing Schools. The programs lead directly to a fourth (honours) year of study and research which may be taken in either of the Schools of Physics or Chemistry.

## 6851
## Chemical Physics (Chemistry/Physics)

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
Choose 2 Level 1 units from Table 1

*For Year 2, Year 3, Year 4 and footnotes, see overleaf*

**Year 2**
1.012, 1.022, 1.032
2.002B *or* 2.002D *or* 2.042C
2.002A, 2.013A
10.111A *or* 10.121A
10.2111 *and* 10.2112
*or*
10.2211 *and* 10.2212
*1 General Studies elective*††

**Year 3**
1.023
2.023A, 2.063A
68.503
*1 General Studies elective*
Choose at least 3 Level 3 units, offered by Schools of Physics, Chemistry and Mathematics, from Table 1*

**Year 4**
68.504

††See footnote to program 0101.
*The minimum of 7 Level III units may not include 1.0133 *or* 2.003A. Students intending to proceed to Year 4 are required to consult with the Chemical Physics Program Committee and with the appropriate schools in order to receive approval for the units selected.

## 6852
## Chemical Physics (Chemistry/ Mathematics)

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
Choose 2 Level I units from Table 1

**Year 2**
1.012, 1.022
2.002B *or* 2.002D *or* 2.042C,
2.013A, 2.002A
10.111A *or* 10.121A,
10.1113 *and* 10.1114,
*or* 10.1213 *and* 10.1214,
10.2111 *and* 10.2112,
*or* 10.2211 *and* 10.2212
*1 General Studies elective*††

**Year 3**
1.023
2.023A, 2.063A
68.503
*1 General Studies elective*
Choose at least 3 Level III units, offered by Schools of Physics, Chemistry and Mathematics, from Table 1*

**Year 4**
68.504

††See footnote to program 0101.
*See footnote to program 6851.

## 6853
## Chemical Physics (Physics/ Mathematics)

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
Choose 2 Level I units from Table 1

**Year 2**
1.012, 1.022, 1.032
2.002A, 2.013A
10.111A *or* 10.121A,
10.1113 *and* 10.1114
*or* 10.1213 *and* 10.1214,
10.2111 *and* 10.2112,
*or* 10.2211 *and* 10.2212
*1 General Studies elective*††

**Year 3**
1.023
2.023A, 2.063A
68.503
*1 General Studies elective*
Choose at least 3 Level III units, offered by Schools of Physics, Chemistry and Mathematics from Table 1*

**Year 4**
68.504

*See footnote to program 6851.
††See footnote to program 0101.

# Anatomy

There are 8 Anatomy programs: double major in Anatomy (7001), single majors in Anatomy (7002, 7003), and double majors with Psychology (1270), Biochemistry (4170), Zoology (4570), History and Philosophy of Science (6270) and Physiology (7073).

Entry to Anatomy programs is limited to a quota of approximately 80. Students in Year 1 should enrol in Program 6801, and apply in October for entry to Anatomy the following year. Selection is based on academic merit. Allowance is made for the relative difficulty of first year units in Mathematics and Physics. Part-time students are advised to seek advice from the School.

Students should note that the Cumberland College of Health Sciences no longer offers a diploma course in either Physiotherapy or Occupational Therapy for students graduating with an Anatomy major. The College may, however, offer some exemptions to students entering the College with an Anatomy major. Students should seek advice from the School or the College for details. To gain maximum exemptions students should enrol in either program 7003 (for Physiotherapy) or program 1270 (for Occupational Therapy). Chiropractic students should enrol in 7002, choosing options as required by the Chiropractic College.

All Anatomy units are in Table 2, and in Course 3970 are unavailable outside Anatomy programs, except for students who:

- are enrolled in programs 4402 (Immunology) or 6840 (Genetics) who may take 70.011A and either 70.304 or 70.3041; or
- obtain special permission.

Students studying paramedical subjects (eg Biochemistry, Psychology, Physiology) and who wish to take one or more Anatomy units as options should consult the Head of School.

## 7001
## Anatomy
## Double major

**Year 1***
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or* 10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
70.011A, 70.011B, 70.011C
*1 General Studies elective*††
Choose at least 4 units from Table 1

**Year 3**
70.012B, 70.012C, 70.304, 70.305, 70.306, 70.307
*1 General Studies elective*
Choose at least 2 units from Table 1

**Year 4**
70.013

*In Year 1 students must enrol in program 6801. Enrolment in Year 2 of program 7001 is based on academic performance in Year 1.
††See footnote to program 0101.

## 7002
## Anatomy
## Single Major

**Year 1***
10.001 *or* 10.011
*or* 10.021B & 10.021C
17.031, 17.041
Choose 4 Level I units from Table 1

**Year 2**
70.011A, 70.011C
*1 General Studies elective*††
Choose at least 5 units from Table 1 *and/or* Table 2†

**Year 3**
*1 General Studies elective*
Choose 8 units, including at least 4 units from:
70.011B, 70.012B, 70.012C, 70.304, 70.305, 70.306, 70.307
and the remainder from Table 1

**Year 4**
70.013

*In Year 1 students must enrol in program 6801. Enrolment in Year 2 of program 7002 is based on academic performance in Year 1.
††See footnote to program 0101.
†Table 2 Anatomy units only.

## 7003
## Anatomy (Kinesiology)

**Year 1***
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or* 10.021B & 10.021C
17.031, 17.041
Choose 2 units from 1 of the groups **1.** *and* **2.**
**1.** 1.001, 1.021
**2.** 12.100

**Year 2**
70.011A, 70.011B, 70.011C
73.121 *or* 73.111†
*1 General Studies elective*††
Choose 1 unit from Table 1 (not Level I)
Choose 2 units from the appropriate group:
**1.** 1.001, 1.021
**2.** 12.100

*For Year 3, Year 4 and footnotes, see overleaf*

**Year 3**
70.012B, 70.012C, 70.306, 70.307
*1 General Studies elective*
Choose at least 3 units from Levell II *or* Level III Table 1, *or* 70.304, 70.305

**Year 4**
70.013

*In Year 1 students must enrol in program 6801. Enrolment in Year 2 of program 7003 is based on academic performance in Year 1.
††See footnote to program 0101.
†Entry to 73.111 requires the approval of the Head of the School of Physiology and Pharmacology.

## 1270 Anatomy/Psychology

See 1270 Psychology/Anatomy

## 4170 Anatomy/Biochemistry

See 4170 Biochemistry/Anatomy

## 4570 Anatomy/Zoology

See 4570 Zoology/Anatomy

## 6270 Anatomy/History and Philosophy of Science

See 6270 History and Philosophy of Science/Anatomy

## 7073 Anatomy/Physiology

**Year 1***
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
41.101
41.111
70.011A, 70.011C
73.111
*1 General Studies elective*††
Choose 70.011B, 70.012B, 70.304 *or* 1 unit from Table 1

**Year 3**
††73.012
*1 General Studies elective*
Choose 4 units from:
70.011B, 70.012B, 70.012C, 70.304, 70.305, 70.306, 70.307

**Year 4**
70.013 *or* 73.013

*In Year 1 students must enrol in program 6801. Enrolment in Year 2 of program 7073 is based on academic performance in Year 1.
††See footnote to program 0101.

# Physiology and Pharmacology

Physiology, the study of the processes and mechanisms which serve and control the various functions of the body, begins at the second year level with the full year subject Physiology IA (the core subject for students who intend to proceed to the study of Physiology at a higher level), or Physiology IB.

Prior to commencing these subjects, students are required to have satisfactorily completed Level I courses in Mathematics, Cell Biology and Chemistry, as a background in these subjects is considered essential to an understanding of how the body functions. In addition, Physiology IA students are normally required to enrol concurrently in the second year level, Session 1 subject, Biochemistry.

Physiology II is a major (third year level) subject in Physiology and in this subject various systems of the body are treated in considerable detail. Progression to this full year subject normally requires the satisfactory completion of Physiology IA (rather than IB), and of both of the Level 2 Biochemistry subjects. Physiology II provides the 4 units at third year level required for a degree with a single major in Physiology. Alternatively it may be undertaken concurrently with a Level 3 subject offered by other schools in allied disciplines, such as Chemistry, Psychology, Zoology, Biochemistry or Anatomy, to form a program leading to the award of a degree with a double major.

The School also offers the third year level subject Pharmacology, which includes a study of the uptake, distribution and excretion of drugs within the body, and of mechanisms by which drugs, and various endogenous chemicals, alter body function. This 2 unit subject is normally taken concurrently with Physiology II, or with Level 3 Biochemistry or Chemistry subjects. Pharmacology is also a full year subject.

Physiology II and Pharmacology are the most advanced undergraduate courses offered by the School which are conducted by way of formal lectures, tutorials and laboratory practical classes. Selected students who have satisfactorily completed one of these subjects may be permitted to enrol in a further year of study of either Physiology or Pharmacology which normally leads to their being awarded their degree with honours.

The honours year program, as presently conducted in this School, requires the student to complete a full year research project on a specific topic under the supervision of a member of staff, and to submit a thesis based on this work. The level of honours awarded is determined on the basis of the thesis, and on course work activities such as the preparation of literature reviews, and participation in semimar programs.

## 7301 Physiology
Single Major

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
41.101, 41.111
73.111
*1 General Studies elective*††
Choose 3 units from Table 1

**Year 3**
73.012
*1 General Studies elective*
Choose 3-4 units from Table 1

**Year 4**
73.013

††See footnote to program 0101.

## 7302 Physiology/Chemistry

**Year 1**
2.121 & 2.131, *or* 2.141
1.001 *or* 1.011
10.001 *or* 10.011 *or* 10.021B & 10.021C
17.031, 17.041

**Year 2**
73.111
2.002A, 2.002B,
2.042C *or* 2.002D
*1 General Studies elective*††
Choose either 41.101 & 41.111
*or* 2.003J & 10.2111 & 10.2112

**Year 3**
73.012
2.003A, 2.003B, 2.033A, 2.053A
*1 General Studies elective*

**Year 4**
73.013 *or*
2.004

††See footnote to program 0101.

## 7303
## Pharmacology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
73.111 *or* 73.121
*1 General Studies elective*††
Choose 6 units from Table 1

**Year 3**
73.022
*1 General Studies elective*
Choose 5 *or* 6 units from Table 1, including *either*
41.102A and 41.102B *or*
2.003J and 2.033A *or*
73.012

**Year 4**
73.023

††See footnote to program 0101.

## 7312
## Physiology/Psychology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
12.100

**Year 2**
73.111
12.200, 12.201, 12.202
41.101, 41.111
*1 General Studies elective*††

**Year 3**
73.012
*1 General Studies elective*
Choose 4 Level III units of Psychology†

**Year 4**
73.013 *or*
12.403

††See footnote to program 0101.
†Students intending to take the honours course 12.403 Psychology IV (Research) must have these four Level III units approved by the Head of the School of Psychology.

## 7345
## Physiology/Zoology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
Choose 2 Level I units from Table 1

**Year 2**
73.111
45.101, 45.201, 45.301
41.101, 41.111
*1 General Studies elective*††

**Year 3**
73.012
45.142, 45.132
*1 General Studies elective*
Choose 2 units from:
45.402, 45.121, 45.122

**Year 4**
73.013 *or*
45.103

††See footnote to program 0101.

## 4173
## Physiology/Biochemistry

See 4173 Biochemistry/Physiology

## 7073
## Physiology/Anatomy

See 7073 Anatomy/Physiology

# 3611 Combined Science/ Aeronautical Engineering Course
# 3661 Combined Science/ Industrial Engineering Course
# 3681 Combined Science/ Mechanical Engineering Course
# 3701 Combined Science/ Naval Architecture Course

These combined courses of five years full time study enable a student in the School of Mechanical and Industrial Engineering to qualify for the award of the two degrees of Bachelor of Engineering and Bachelor of Science (BE BSc). The courses enable such combined degree students to major in the areas of computer science, materials science, mathematics, physics or statistics in addition to studying their chosen engineering speciality. The course is administered by the Faculty of Engineering.

All students who are accepted into the first year 'science compatible' course in the School of Mechanical and Industrial Engineering may enrol directly into these combined degree courses. Continued enrolment in Year 2 requires a pass at first attempt in all subjects of Year 1 and students who fail to achieve this will automatically be disenrolled from these courses and be enrolled in their respective engineering programs (**3610, 3660, 3680** or **3700**). Alternatively, students may transfer into Year 2 of these courses, provided they have obtained a clear pass in the Year 1 'science compatible' course.

Normally, students enrolled in these BE BSc courses will be awarded their degrees at the conclusion of five years study. However, it is possible for students to take out the Science degree prior to the Engineering degree provided they have: **1.** completed the requirements for Years 1, 2 and 3, **2.** completed the General Studies requirements for the Science degree, and **3.** obtained approval from the Board of Studies in Science and Mathematics.

Students may also undertake an additional honours year in Science and Mathematics and automatically re-enter the combined Science/Engineering course without having to re-apply for admission. To undertake such an honours year in Science and Mathematics, permission is to be obtained, at the end of Year 3, both from the Head of the School in which the honours year is to be undertaken and from the Head of the School of Mechanical and Industrial Engineering.

Students who commence the course and do not complete the Engineering component may take out a BSc degree on completion of one of the approved programs in the Science and Mathematics course. Similarly, students not wishing to complete the BSc degree course may revert to their respective Engineering programs (**3610, 3660, 3680** or **3700**) with appropriate credit for subjects satisfactorily completed.

Having completed the first three years as outlined below, students in Years 4 and 5 do Year 3 and Year 4 of their respective Engineering programs (**3610, 3660, 3680** or **3700**), except that significant repetition of subject material is not allowed. Instead, students are required to substitute either an appropriate Technical Elective or an appropriate Level II or III subject from Table 1 or Table 2, or in exceptional circumstances, some other equivalent subject with the permission of the School of Mechanical and Industrial Engineering. For more details of these combined courses, refer to the Faculty of Engineering Handbook.

**Year 1**
1.001 (*or* 1.011)
2.951 **14.** (*or* 2.121)
5.010, 5.020 (5.0201 **1.** *plus* 8.171 **3.** *or* 5.421), 5.030, 5.0303, 5.061, 5.0721
10.001 (*or* 10.011)

**Year 2**
5.300 **1.**, 5.422 **5.**
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214)
10.2111 (*or* 10.2211), 10.2112 (*or* 10.2212) } **4.**
18.020
Choose 4 **2.** Level II units from Table 1 or Table 2 for course 3681

**Year 3**
5.043, 5.122, 5.622
Choose 5 [2]. Level II or III units from Table 1 or Table 2 for course 3681, of which at least 4 must be Level III
*1 General Studies elective* [6].

**Years 4 and 5**
Years 3 and 4 of respective Engineering programs 3610, 3660, 3680, 3700

Subject selections which satisfy the specific requirements for the various majors are summarized below. Provided co- and prerequisites are satisfied, there is scope for some subjects to be taken either in Year 2 or Year 3.

## Computer Science Majors [13].

**Year 2**
5.0201, 5.300, 5.422
6.621, 6.631 [7]., 6.641
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2111 (*or* 10.2211), 10.2112 (*or* 10.2212), 10.331
18.020

**Year 3**
1.9222 *and* 1.9322 (recommended), *or* 1.032, *or* 2.002A
5.043, 5.122, 5.622
6.646 [8]. *plus* 3 Level III units from Table 2 offerings of School of Electrical Engineering and Computer Science for course 3681
*1 General Studies elective* [6].

## Materials Science Majors

**Year 2**
2.002A
4.402, 4.502
5.300, 5.4221
18.020
*and either*
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2111 (*or* 10.2211), 10.2112 (*or* 10.2212)
*or*
4.302 [9]., 4.602 [9].
10.022

**Year 3**
4.403, 4.703, 4.802 [9].
5.043, 5.122, 5.622
10.331 [10].
*1 General Studies elective*

## Mathematics Majors

**Year 2**
Same Year 2 as for Computer Science or Materials Science (3 units of Level II mathematics option) *or* Physics *or* Statistics majors
*or*
1.9222 *and* 1.9322 (recommended), *or* 1.032 *or* 2.002A
5.300, 5.422
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2111 (*or* 10.2211), 10.2112 (*or* 10.2212)
3 units from 10.1115, 10.1116, 10.2113 (*or* 10.2213), 10.2115 (*or* 10.2215), 10.4112 (*or* 10.4212), 10.4111 (*or* 10.4211) *or* from any other appropriate Level II units from Table 1 or Table 2 for course 3681
18.020

**Year 3**

5.043, 5.122, 5.622
10.331 [12].
4 Level III units from School of Mathematics offerings in Table 1
*1 General Studies elective* [6].

## Physics Majors

**Year 2**
1.002, 1.012, 1.022, 1.032
5.300, 5.422
10.111A, (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2111 (*or* 10.2211), 10.2112 (*or* 10.2212)
18.020

**Year 3**
1.0133 [11]., 1.023, 1.0333 [11]., 1.043 [11].
1 Level III unit from School of Physics offerings in Table 1
5.043, 5.122, 5.622
10.331
*1 General Studies elective* [6].

## Statistics Majors

**Year 2**
1.9222 *and* 1.9322 (recommended), *or* 1.032, *or* 2.002A
5.300, 5.422
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.1114 (*or* 10.1214), 10.2111 (*or* 10.2211), 10.2112 (*or* 10.2212), 10.311A (*or* 10.321A), 10.311B (*or* 10.321B)
18.020

**Year 3**
5.043, 5.122, 5.622
4 Level III units from Statistics offerings in Table 1
1 Level II or III unit from School of Mathematics *or* School of Physics offerings in Table 1
*1 General Studies elective* [6].

**Notes**

**1.** Students planning to take higher level Computer Science subjects should take 6.611 Computing I or 8.360 Computing instead of 5.0201 Engineering Dynamics IA in Year 1; they must then take 5.0201 prior to taking 5.300.

**2.** The following considerations pertain to the choice of optional units in Years 2 and 3:
(1) The Level III units satisfy the relevant major requirements.
(2) They should include no more than one unit from schools other than Chemistry, Electrical Engineering and Computer Science, Mathematics, Metallurgy, and Physics.
(3) They should include 1.032 Laboratory; *or* 1.9222 Electronics *plus* 1.9322 Introduction to Solids; *or* 2.002A Physical Chemistry.
(4) They should include 10.331 Statistics *or* 10.311B Basic Inference.
(5) 4.502 Mechanical Metallurgy and 4.512 Mechanical Properties of Solids are deemed to have reduced unit values of 1 and ½ respectively.

**3.** Students are recommended to take 5.421 instead of 8.171.

**4.** Materials Science majors may substitute 10.022 Engineering Mathematics II and 2 Level II units[2] from School of Metallurgy offerings in Table 1 or from Table 2 for course 3681.

**5.** If 4.402 Physical Metallury I or 4.422 Metallurgical Phases II is taken, students should take 5.4221 instead of 5.422.

**6.** Anticipated. Actual General Studies requirements correspond on whatever is required in Year 2 of the normal Mechanical and Industrial Engineering degree course.

**7.** Provided 6.647 Business Information Systems is taken as part of the 4 unit Level III requirement, students may take 14.501 Accounting and Financial Management IA instead of 6.631. 14.501 may then be counted as a Level II unit.

**8.** Excluded for students in course 3661 who should substitute a Level III unit from Table 2 offerings of School of Electrical Engineering and Computer Science.

**9.** Students may substitute any other appropriate Level II or III offering(s) from the School of Metallurgy in Table 1 or from Table 2 for course 3681.

**10.** In special circumstances and with permission of the School of Mechanical and Industrial Engineering, students may substitute 4.813 Mathematical Methods for 10.331.

**11.** Under special circumstances, and with permission of the School of Physics, a student may substitute alternative Physics Level III offerings of equivalent unit value.

**12.** Substitute one Level II or III unit from School of Mathematics or School of Physics offerings in Table 1 if 10.311B or 10.321B was taken in Year 2.

**13.** Quota restrictions apply to certain Computer Science Level III units and application must be made in writing to the Head of the School of Electrical Engineering and Computer Science before the end of Session 2 in the preceding year. Prospective Computer Science majors should aim for a creditable academic attainment (65%) over Years 1 and 2.

**14.** Students are recommended to choose 2.951 unless they wish to pursue studies requiring 2.121. The prerequisite of 2.121 for 2.002A Physical Chemistry may be waived on application to the Head of the School of Chemistry.

**Undergraduate Study**
**Board of Studies in Science and Mathematics**
**and the Faculty of Engineering**

# 3725
# Combined Science/ Electrical Engineering Course

Students in Electrical Engineering who maintain a creditable performance may qualify for the award of two degrees in five years of combined full-time study in which the requirements of the degrees have been merged. Students wishing to enrol in a combined course may do so only on the recommendation of the Head of School of Electrical Engineering and Computer Science and with the approval of the Faculty of Engineering and the Board of Studies in Science and Mathematics. Students wishing to enrol in, transfer into, or continue in a combined course shall have complied with all the requirements for prerequisite study, sequencing and academic attainment (a creditable performance, ie 65%).

Students who commence a course but subsequently do not wish to proceed with both areas of study, or who fail to maintain a creditable performance, revert to a single degree program with appropriate credit for subjects completed. Tertiary Education Assistance Scheme (TEAS) support is available for the five years of the combined degree programs.

Students may transfer into a combined course after partially completing the requirements for either degree provided suitable subjects have been studied. However, the choice of subjects and the time taken to complete the program can be seriously affected by this. Thus, students considering course **3725** should contact the Electrical Engineering School before completing their Year 2 enrolment. Application for transfer to a combined course must be made in writing to the Head of School by 6 January 1984.

Having completed Years 1 and 2 of course **3640** students in their third year complete a specific course of study consisting of four Level 3 Science units chosen from related disciplines, the appropriate General Studies electives and no less than four other Level 2 or Level 3 units, and otherwise accord with the rules of course **3970** leading to a major in Computer Science, Mathematics or Physics.

Students wishing to gain a degree at honours level in Science as part of their combined degree program shall meet all the relevant requirements of the Board of Studies in Science and Mathematics and of the School concerned. Such students may enrol for the honours year only on the recommendation of the Head of the School of Electrical Engineering and Computer Science and with the approval of the Head of the appropriate Science School, the Faculty of Engineering and the Board of Studies in Science and Mathematics.

In Years 4 and 5 the students do Year 3 and Year 4 of course **3640**. Depending on the program followed in their year of Science they may have already completed parts of the normal third and fourth year programs of the Electrical Engineering course, and they will be required to omit these from their program and to include an equivalent amount of other subjects chosen with the approval of the Head of the School.

**Year 1**
1.961
2.121
5.006
6.010
6.611
10.001
*1 General Studies elective*

**Year 2†**
1.972, 1.982
6.021A, 6.021B, 6.021C, 6.021D, 6.021E
10.111A, 10.1113, 10.1114, 10.2111, 10.2112
*1 General Studies elective*

**Year 3†***

*Either*

Computer Science

*1 General Studies elective*

Choose at least 8 Level II or Level III units including at least 4 Computer Science units at Level III, the balance to be chosen from Level III Computer Science units and other Level II or Level III units in Table 1 or Table 2 for program 0601

*or*

Mathematics

*1 General Studies elective*

Choose at least 5 Mathematics units, 4 of which are Level III Choose at least 3 Level II or Level III units from Table 1 or Table 2 for program 1001

*or*

Physics

*1 General Studies elective*

Choose 7 Level II or Level III units from Table 1 of which four must be Level III Physics units, chosen to include 1.0133, 1.0143, 1.023 and 1.0333

**Year 4**

From Electrical Engineering course, modified as required by Head of School

**Year 5**

From Electrical Engineering course

†Students intending to major in Computer Science should include 6.641 in their Year 2 enrolment. Students intending to major in Physics are required to take unit 1.992 in Year 2.

*For Year 3 refer to course **3970** and to this Handbook.

**Undergraduate Study**
**Board of Studies in Science and Mathematics**
**and the Faculty of Engineering**

# 3730 Programs in the Combined Science/ Civil Engineering Course

For details of the combined Science/Civil Engineering Course refer to the Faculty of Engineering Handbook.

## Physical Metallurgy and Chemistry

**Year 1**
1.981*
2.981**
5.0102, 5.0201, 5.0301
8.170, 8.171, 8.271, 8.360, 8.670
10.001***

**Year 2**
*2.002A, 2.042C*
*4.402, 4.512*
8.172, 8.1811, 8.1812, 8.2721, 8.2722
10.022
1 General Studies elective†

**Year 3**
*4.403, 4.703*
8.173, 8.174, 8.1821, 8.1822, 8.311, 8.312, 8.362, 8.400, 8.571
10.381
29.441, 29.491
1 General Studies elective†

**Year 4**
*2.003A, 2.003C, 2.013C*
*4.522*
8.2731, 8.2732, 8.2733, 8.572, 8.573, 8.581, 8.582, 8.671, 8.672
1 General Studies elective†

**Year 5**
1 Technical elective†
*Choose 2 units from Table 1 in the Combined Sciences Handbook at Level II or higher*
8.001, 8.191, 8.2741, 8.2742, 8.401, 8.583, 8.673, 8.674, 8.051, 8.052, 8.053, 8.054

*Note:* All material not in italics typeface refers to the BE degree component of this combined course.
*Students are advised to attempt 1.981 Physics 1CE but if timetabling difficulties arise or other exceptional circumstances prevail permission will be given to attempt 1.001 Physics I or 1.011 Higher Physics I. On successful completion of one of these latter subjects together with 2.981 Chemistry 1CE students will be exempted from one technical elective.
**Students who have not satisfied the science prerequisite for 2.981 Chemistry 1CE (ie 2 or 4 unit Science including Physics or Chemistry or 4 unit Science (multistrand) at HSC Exam in the percentile range 31-100) are advised to apply to enrol in two acceptable alternative subjects. 2.111 Introductory Chemistry and 2.121 Chemistry 1A.
***Students who have achieved a certain standard may attempt 10.011 Higher Mathematics 1.
†The combined degree program requires completion of one technical elective. and three General Studies Electives (56 hours each). Students who have completed General Studied Electives on the old basis (42 hours) will be informed of their General Studies requirements by the School. The technical electives are listed after Stage 7 in Course 3620. The choice of the technical elective must be approved by the Head of the School of Civil Engineering.

## Geography and Environmental Chemistry

**Year 1**
1.981*
2.981**
5.0102, 5.0201, 5.0301
8.170, 8.171, 8.271, 8.360, 8.670
10.001***

**Year 2**
*2.002A, 2.002D, 2.042C*
8.172, 8.1811, 8.1812, 8.2721, 8.2722
10.022
*27.111*

**Year 3**
*2.043A*
8.173, 8.174, 8.1821, 8.1822, 8.311, 8.312, 8.362, 8.400, 8.571
10.381
*27.172*
29.441, 29.491
1 General Studies elective†

**Year 4**
8.2731, 8.2732, 8.2733, 8.572, 8.573, 8.581, 8.582, 8.671, 8.672
*27.133, 27.1711, 27.1712*
*At least 2 units chosen from:*
*27.143, 27.183, 27.153, 27.862, 27.863*
2 General Studies electives†

**Year 5**
1 Technical elective†
*Choose 2 units from Table 1 in the Combined Sciences Handbook at Levell II or higher*
8.001, 8.191, 8.2741, 8.2742, 8.401, 8.583, 8.673, 8.674, 8.051, 8.052, 8.053, 8.054

Note: All material not in italic typeface refers to the BE degree component of the combined course.
* ** *** †See footnotes **Physical Metallurgy and Chemistry** above.

## Physics with Mathematics

**Year 1**
1.001 *or* 1.011
2.981**
5.0102, 5.0201, 5.0301
8.170, 8.171, 8.271, 8.360, 8.670
10.001***

**Year 2**
*1.012, 1.022, 1.032*
8.172, 8.1811, 8.1812, 8.2721, 8.2722
*10.1113*, 10.1114*, 10.2111*, 10.2112**
2 General Studies electives†

**Year 3**
*1.002, 1.023, 1.043*
8.173, 8.174, 8.1821, 8.1822, 8.311, 8.312, 8.362, 8.400, 8.571
*10.111A**, 10.381
29.441, 29.491

**Year 4**
*1.0333*
8.2731, 8.2732, 8.2733, 8.572, 8.573, 8.581, 8.582, 8.671, 8.672
1 General Studies elective†
*Choose 2 Level II or Level III Mathematics units from Table 1*
*Choose 1 unit from:*
*1.133, 1.3233, 1.0533, 1.0133, 1.0143*

**Year 5**
8.001, 8.191, 8.2741, 8.2742, 8.583, 8.673, 8.674, 8.051, 8.052, 8.053, 8.054, 8.401
1 Technical elective†
*Choose 1 or 2 units from Table 1 at Level II or higher*

Note: All material not in italic typeface refers to the BE degree component of this combined course.
** *** †See footnotes **Physical Metallurgy and Chemistry** above.
*See footnote to program 0101.

## Mathematics

**Year 1**
1.981*
2.981**
5.0102, 5.0201, 5.0301
8.170, 8.171, 8.271, 8.360, 8.670
10.001***

**Year 2**
8.172, 8.1811, 8.1812, 8.2721, 8.2722
*10.111A or 10.121A,*
*10.1113 or 10.1213,*
*10.1114 or 10.1214,*
*10.2111 or 10.2211,*
*10.2112 or 10.2212*
1 General Studies elective†
*Choose either* **1.** *or* **2.**:
**1.** *10.311A or 10.321A,*
*10.311B or 10.321B*
**2.** *Choose 3 units from:*
*10.4111 or 10.4211,*
*10.4112 or 10.4212,*
*10.331*
*10.2113 (or 10.2213), 10.2115†† (or 10.2215††)*
*(10.1111 & 10.1112)*

**Year 3**
8.173, 8.174, 8.1821, 8.1822, 8.311, 8.312, 8.362, 8.400, 8.571, 29.441, 29.491
10.381
1 General Studies elective†
*Choose 4 units from Mathematics from Table 1 of the Combined Sciences Handbook (at least one must be Level III)*

*For Year 4, Year 5 and footnotes, see overleaf*

**Year 4**
8.2731, 8.2732, 8.2733, 8.572, 8.573, 8.581, 8.582, 8.671, 8.672
1 General Studies elective†
*Choose 3 Level III (not Level II/III) Mathematics units from Table 1 in the Combined Sciences Handbook*

**Year 5**
8.001, 8.191, 8.2741, 8.2742, 8.401, 8.583, 8.673, 8.674, 8.051, 8.052, 8.053, 8.054
1 Technical elective†
*Choose 1 or 2 units from Tables 1 or 3 in the Combined Sciences Handbook at Level II or higher.*

Note: All material not in italic typeface refers to the BE degree component of this combined degree course.
* ** *** †See footnotes **Physical Metallurgy and Chemistry** above.
††If already taken, 10.2114 or 10.2214 are acceptable in place of 10.2115 or 10.2215 respectively.

## Geology with some Mathematics

**Year 1**
1.981*
2.981**
5.0102, 5.0201, 5.0301
8.170, 8.171, 8.271, 8.360, 8.670
10.001***

**Year 2**
8.172, 8.1811, 8.1812, 8.2721, 8.2722
*10.111A or 10.121A,*
*10.1113 or 10.1213,*
*10.1114 or 10.1214,*
*10.2111 or 10.2211,*
*10.2112 or 10.2212*
*25.110, 25.120*
2 General Studies electives†

**Year 3**
*2.042C*
8.173, 8.174, 8.1821, 8.1822, 8.311, 8.312, 8.362, 8.400, 8.571
10.381
*25.211, 25.221, 25.212*
29.441, 29.491
1 General Studies elective†

**Year 4**
8.2731, 8.2732, 8.2733, 8.572, 8.573, 8.581, 8.582, 8.671, 8.672
Choose four units from the following:
*25.311, 25.312, 25.314, 25.321, 25.324, 25.325, 25.3261, 25.3271*

**Year 5**
1 Technical elective†
*Choose 1 or 2 units from Table 1 in the Combined Sciences Handbook at Level II or higher*
8.001, 8.191, 8.2741, 8.2742, 8.401, 8.583, 8.673, 8.674, 8.051, 8.052, 8.053, 8.054

Note: All material not in italic typeface refers to the BE degree component of this combined degree course.
* ** *** †See footnotes **Physical Metallurgy and Chemistry** above.

## Computing with some Mathematics

**Year 1**
1.981*
2.981**
5.0102, 5.0201, 5.0301
8.170, 8.171, 8.271, 8.360, 8.670
10.001***

**Year 2**
*6.621, 6.631, 6.641*
8.172, 8.1811, 8.1812, 8.2721, 8.2722
*10.111A or 10.121A,*
*10.1113 or 10.1213,*
*10.1114 or 10.1214*
2 General Studies electives†

**Year 3**
*6.642, 6.643*
8.173, 8.174, 8.1821, 8.1822, 8.311, 8.312, 8.362, 8.400, 8.571
10.381
*10.2111 or 10.2211,*
*10.2112 or 10.2212*
29.441, 29.491
*Choose 1 Level II or Level III Mathematics unit from Table 1 in the Combined Sciences Handbook*

**Year 4**
*6.646, 6.647*
One of 6.613, 6.632, 6.633
8.2731, 8.2732, 8.2733, 8.572, 8.573, 8.581, 8.582, 8.671, 8.672
1 General Studies elective†
*Choose 1 Level II or Level III Mathematics unit from Table 1 in the Combined Sciences Handbook*

**Year 5**
1 Technical elective†
*Choose 1 or 2 units from Table 1 in the Combined Sciences Handbook at Level II or higher*
8.001, 8.191, 8.2741, 8.2742, 8.401, 8.583, 8.673, 8.674, 8.051, 8.052, 8.053, 8.054

Note: All material not in italic typeface refers to the BE degree component of this combined degree course
* ** *** †See footnotes **Physical Metallurgy and Chemistry** above.

**Undergraduate Study**
**Board of Studies in Science and Mathematics**
**and the Faculty of Medicine**

# 3820 Combined Science and Medicine Course (BSc MB BS)

A limited number of places (up to 8) are available in this course, and these are open only to students who have been accepted into the Faculty of Medicine.

For further details refer to the Faculty of Medicine Handbook. Below are programs for Years 1, 2 and 3 and the optional honours Year only; subsequent years (3, 4 and 5 of the Medical Course) are detailed in the Faculty of Medicine Handbook. Students must major in either Anatomy, Biochemistry, Physiology, Psychology, or any two of these, as well as satisfactorily completing a core course. Students majoring in Biochemistry must decide accordingly before enrolment in Year 2; other majors can be decided before enrolment in Year 3. Subjects chosen each year must be approved by the Course Controller prior to enrolment.

**Year 1**
1.001 *or* 1.011
2.121 & 2.131 *or* 2.141
10.001 *or* 10.011 *or* 10.021B & 10.021C
17.031, 17.041
*1 General Studies elective*††

**Year 2**
41.101
41.111*
70.011A, 70.011C
73.111
80.014**
*1 General Studies elective*††

Note: Students not majoring in Anatomy commonly take an additional Anatomy unit in Session 2. This may be *either* 70.012B, 70.011A, *or* 70.304 (listed in approximate order of likely usefulness).

**Year 3**
There are 10 options, as set forth immediately below. The columns represent the primary choice (major in Anatomy, Biochemistry or Physiology); the rows represent the secondary choices (single or double major). Elective units may be selected from Table 1 and/or from the Anatomy units in Table 2.

| | Anatomy Major | Biochemistry Major | Physiology Major |
|---|---|---|---|
| Core Units | General Studies elective<br>80.014**<br>4 Level III Anatomy units†<br>**together with:** | General Studies elective<br>80.014**<br>41.102A<br>41.102B<br>**together with:** | General Studies elective<br>80.014**<br>73.012<br>**together with:** |
| Single Major | 73.012F<br>3 Elective units | 2 Level III Anatomy units†<br>73.012F<br>1 Elective unit | 2 Level III Anatomy units†<br>2 Elective units |
| Double Major with Anatomy | 3 Level III Anatomy units† (makes total of 7) | 4 Level III Anatomy units† | 4 Level III Anatomy units† |
| Double Major with Biochemistry | 41.102A<br>41.102B | (double major not available) | 41.102A<br>41.102B |
| Double Major with Physiology | 73.012 | 73.012 | (double major not available) |

**Year 4**
Students may join Year 3 of the Medical Course, or apply to take Honours and proceed to the Medical Course the following year. For honours courses, see Table 3.

*Students majoring in Biochemistry should take 2.002B Organic Chemistry instead of 41.111 Biochemical Control. For students majoring in Biochemistry, 2.002B is accepted in lieu of 41.111 as a prerequisite for 73.012 Physiology II.
**80.014 Human Behaviour is offered in even numbered years only and is taken in either Years 2 or 3.
†For Anatomy units see Table 2.
††Enrolment in General Studies may be deferred until later years but two electives must be satisfactorily completed for a BSc degree, and three electives for the MB BS degrees. Students are strongly advised to complete these requirements during the first three years, before entering the Medical Course, otherwise there will be timetabling difficulties.

**Undergraduate Study**
**Board of Studies in Science and Mathematics**
**and the Faculty of Professional Studies**

# 4070 Mathematics Education Course

# 4080 Science Education Course

### 4070
### Mathematics Education Course

**Bachelor of Science Diploma in Education**
**BSc DipEd**

The Mathematics Education Course is a concurrent course leading to the award of the qualifications BSc DipEd and is designed primarily to prepare students for entry into the teaching profession as teachers of mathematics in secondary schools.

An important feature of the course is that students take education subjects along with mathematics subjects in second, third and fourth years. The Mathematics component is based on programs offered in the Science and Mathematics course. Students may proceed to honours level in either mathematics or in education.

## Objectives of the Course

The objectives of the Mathematics components broadly aim: to develop a comprehensive knowledge and interest in mathematical techniques and problem solving, to develop an ability to reason mathematically and to present mathematical reasoning clearly and persuasively, and to ensure the student's understanding of the applications of mathematics.

Objectives related to the education component seek: to develop skills in teaching mathematics, to provide an understanding of the major disciplines which contribute to educational theory, to develop a knowledge of the latest innovations in educational practice and theory and to clarify the methodologies and curriculum materials relevant to secondary mathematics teaching.

Students enrolling in this course must seek advice from the Director of Science Teachers' Courses, Room 41, Building G2, Western Campus or at the enrolment centre.

## Honours and Pass Degree Requirements

The course is offered at both pass and honours levels.

**1.** The pass course requires successful completion of a four-year program.

**2.** The honours course requires successful completion of a five-year program in which the fifth year is devoted to an approved honours program in one of the following options:

Pure Mathematics, Applied Mathematics, Mathematical Statistics, Theoretical Mechanics, or Education*.

The grades in this program shall be Honours Class I, II/1, II/2 and III.

Students who wish to proceed to the honours year should apply in writing to the Head of the School of Education. A letter of acceptance from the Head of the School in which they wish to study during the honours year should be included with this application.

*Students proceeding to the honours year in Education must have completed the Advanced Education subjects in Years 3 and 4 in addition to those Education subjects prescribed for the degree at pass level

## Components of the Course

The Mathematics Education Course consists of Mathematics, Education and General Studies components.

### 1. Mathematics Component

Two alternative programs are available. The programs consist of units ranked as Level I, Level II, Level II/III, Level III and Level IV. These units vary from 56 to 84 hours in duration. The terms Levels I, II and III do not necessarily refer to the years in which the unit must be studied. Units at the various levels may be taken in other years provided the prerequisites are met. Level II/III units have only Level I prerequisites.

Students must select one of the two following programs:

**5811 The Mathematics and Science Program**

The pass course requires at least 23 units in addition to Education and General Studies subjects

*or*

**5812 The Mathematics and Liberal Studies Program**

The pass course requires at least 24 units in addition to Education subjects.

For both programs the selection of units is subject to the requirements listed below:

(1) Not less than 8 units, nor more than 10 units selected from Level I. Except with the approval of the Head of the School of Mathematics and the Director of Science Teacher Courses, not more than 2 Level I units may be taken in any one discipline other than Mathematics.

(2) The following subjects or their higher equivalents shall be included:

10.001, 10.111A, 10.1113, 10.1114, 10.2111, 10.2112.

(3) Courses amounting to at least 2 full units chosen from:

10.1111, 10.1112, 10.1121, 10.1123, 10.1127, 10.1128, 10.1153, provided that a student may substitute for any of the above units such higher units as are deemed equivalent (for the purposes of satisfying this rule) by a professor of Pure Mathematics.

(4) Not less than 2 units from the following:

10.2113, 10.2115, 10.212L, 10.212M, 10.331, 10.311A, 10.311B, 10.312A, 10.312B, 10.312C, 10.312D, 10.312E, 10.411A, 10.411B, 10.412A, 10.1127, provided that a student may substitute for any of the above units such higher units as are deemed equivalent (for the purposes of satisfying this rule) by the Head of the School of Mathematics.

(5) Not less than 8 Level II or Level III Mathematics units from Table 1 (see below) and of these not less than four shall be Level III units of which only one may be Level II/III.

(6) For the award of honours the student must complete 10 units as specified in an individual program and must meet prerequisite requirements set out in Table 3 (see below).

(7) In order to graduate a student must pass all the units specified in the program of his/her choice.

### 2. Education Component

The Education component is one of the major sequences in the course. It consists of subjects grouped as follows:

| | | | |
|---|---|---|---|
| Theory of Education | 58.702, | 58.703, | 58.704 |
| Mathematics Curriculum and Instruction | 58.742, | 58.743, | 58.744 |
| School Experience | 58.712 | 58.713, | 58.714 |
| Honours | 58.795, | 58.793, 58.799 | 58.794 |

### 3. General Studies Component

(1) The General Studies component involves 56 hours in the pass course, which is made up of two half electives or their equivalent. The distribution of the two half electives may be varied to suit the programs of individual students.

(2) In the Mathematics and Liberal Studies Program the Liberal Studies subjects provide the General Studies component.

## Enrolment Requirements

**1.** A student in first year must be enrolled in a Mathematics program in either the Science and Mathematics Course (**3970**) or the Mathematics Education Course (**4070**). In the second, third and fourth years a student must be enrolled in one of the Mathematics programs for the Course **4070**, the Education program and, in the case of Mathematics and Science program, General Studies.

**2.** A student may with the approval of the Director of Science Teachers' Courses, and in consultation with the Head of the School of Mathematics, change from one selected Mathematics program to another. A written application to make the change must be lodged, including details of optional units selected in the new program, at the Science Education Office, Room 41, Building G2, Western Campus.

**3.** A student must take care to satisfy the requirements of sequences of units such as prerequisites and co-requisites. A prerequisite subject is one which must be completed prior to enrolment in the subject for which it is prescribed. A co-requisite subject is one which must either be completed successfully before or be studied concurrently with the subject for which it is prescribed. In exceptional circumstances, on the recommendation of the Head of the School of Mathematics, the particular prerequisite or co-requisite may be waived by the Director of Science Teachers' Courses.

## Programs

The course taken by each student has three component programs:

### 1. Education Program

This program is the same for each student though there are electives built in to some of the subjects. The program is as follows:

| Year | Subject | Hours per week* |
|---|---|---|
| 2 | 58.702 | 0.8 |
| | 58.712 | 2 |
| | 58.742 | 2 |
| 3 | 58.703 | 2.3 |
| | 58.713 | 3 |
| | 58.743 | 2½ |
| 4 | 58.704 | 2.2 |
| | 58.714 | 3 |
| | 58.744 | 2½ |
| Honours in Education | | |
| 3 | 58.793 | 1½ |
| 4 | 58.794 | 1 |
| 5 | 58.795 | 4 |
| | 58.799 | |

*Average for 28 weeks.

### 2. General Studies Program

(1) For students electing the Mathematics and Science Program:

Two half electives (or equivalent) taken during Years 2, 3 *and/or* 4 for the pass degree.

(2) For students electing the Mathematics and Liberal Studies Program:

No specific General Studies subjects are required.

### 3. Mathematics Program

## 5811
## Mathematics and Science

**Year 1**
10.001 *or* 10.011
Choose 6 units from:
Table 1 *&/or*
The BA course*† *&/or*
Table 2† for program 5811 except 14.501

**Year 2**
10.111A *or* 10.121A, 10.1113 *or* 10.1213, 10.1114 *or* 10.1214, 10.2111 *or* 10.2211, 10.2112 *or* 10.2212
Choose 4 or 5 units from:
Table 1 *&/or*
The BA course*† *&/or*
Table 2† for program 5811

**Year 3**
Choose 2 Level III Mathematics units from Table 1
Choose 2 or 3 units from:
Table 1 *&/or*
The BA course*† *&/or*
Table 2† for program 5811

**Year 4**
Choose 2 Level III Mathematics units from Table 1
Choose a further Level II or III Mathematics unit if needed to make up the required 8
Choose 1 or 2 units from:
Table 1 *&/or*
The BA course*† *&/or*
Table 2† for program 5811

**Year 5**
10.123 *or* 10.223 *or* 10.323 *or* 10.423.

*Up to 5 units of this program may be replaced by subjects offered in the BA degree course (6 credit points at level I, or 4 credit points at Upper Lever are equivalent to 1 unit). The BA degree subjects are limited to those offered by the following schools: Drama, Economics, English, French, German, History, Political Science, Russian, Sociology, Spanish and Latin American Studies. Upper Level subjects from the School of Economics are restricted to all those in Economic History plus 15.062, 15.072, 15.263 and 15.273.
†Not more than 8 units that are not in Table 1 may be taken without the approval of the Director of Science Teacher Courses.

## 5812
## Mathematics and Liberal Studies

**Year 1**
10.011 *or* 10.001
Choose 4-6 units from:
Table 1† *&/or*
The BA course*

**Year 2**
10.111A *or* 10.121A, 10.1113 *or* 10.1213, 10.1114 *or* 10.1214, 10.2111 *or* 10.2211, 10.2112 *or* 10.2212
Choose 4 or 5 units from:
Table 1† *&/or*
The BA course*

**Year 3**
Choose 2 Level III Mathematics units from Table 1
Choose 2 or 3 units from:
Table 1† *&/or*
The BA course*

**Year 4**
Choose 2 Level III Mathematics units from Table 1
Choose 2 or 3 units from:
Table 1† *&/or*
The BA course*

**Year 5**
10.123
*or*
10.223
*or*
10.323
*or*
10.423

†Units in Geography, History and Philosophy of Science, and Philosophy shall be those from the BA degree course.
*At least 6 units of this program must come from subjects offered in the BA degree course (6 credit points at Level I, or 4 credit points at Upper Level are equivalent to 1 unit). The BA degree subjects are limited to those offered by the following Schools: Drama, Economics, English, French, Geography, German, History, History and Philosophy of Science, Philosophy, Political Science, Russian, Sociology, Spanish and Latin American Studies. Upper Level subjects from the School of Economics are restricted to all those in Economic History plus 15.062, 15.072, 15.263 and 15.273.

## 4080
## Science Education Degree Course
### Bachelor of Science Diploma in Education BSc DipEd

The Science Education Course is a concurrent course leading to the award of the qualifications BSc DipEd and is designed primarily to prepare students for entry into the teaching profession as teachers of science in secondary schools.

An important feature of the course is that students take education subjects along with science subjects in second, third and fourth years. The science component is based on programs offered in the Science and Mathematics Course. Students may proceed to honours in a science or in education. One of the science units is a history and philosophy of science subject. This is included to give students an understanding of the nature of science and of its relationship to society, which is especially important to prospective teachers of science.

Students enrolling in this course must seek advice from the Director of Science Teachers' Courses, Room 41, Building G2, Western Campus or at the enrolment centre.

## Objectives of the Course

The objectives of the course are those of the Science and Mathematics Course (3970) together with others which are essential for a course which is designed to prepare science teachers.

In summary, the objectives of the Science and Mathematics course broadly aim to develop a working knowledge of scientific methods of investigation and to promote an understanding of the significance of science, technology, economics and sociological factors in modern society. The objectives seek to develop in the student the ability and disposition to think logically, to communicate clearly by written and oral means and to read critically. Students are encouraged to develop the habit of seeking and recognizing relationships between phenomena, principles, theories, conceptual frameworks and problems.

The education component of the course seeks to provide a knowledge of theories of education and the latest innovations in educational practice and theory, and the development of skills in teaching science.

## Honours and Pass Degree Requirements

There are both pass and honours programs available in the course leading to the award of the qualifications Bachelor of Science and Diploma in Education (BSc DipEd).

**1.** The pass course requires successful completion of a four-year program.

**2.** The honours course requires successful completion of a five-year program in which the fifth year is devoted to an approved honours program in one of the following disciplines:

Physics, Chemistry, Geology, Biochemistry, Biological Technology, Botany, Microbiology, Zoology, Education*, Physiology.

The grades in this program shall be Honours Class I, II/1, II/2 and III.

Students who wish to proceed to the honours year should apply in writing to the Head of School of Education. A letter of acceptance from the Head of the School in which they wish to study during the honours year should be included with this application.

*Students proceeding to the honours year in Education must have completed the Advanced Education subjects in Years 3 and 4 in addition to those Education subjects prescribed for the degree at pass level.

## Components of the Course

The Science Education Course consists of Science, Education and General Studies components.

### 1. Science Component

The Science component is based on the prescribed programs from the Science and Mathematics Course (3970) rearranged to spread over one additional year. These programs are composed of units ranked as Level I, Level II, Level II/III, Level III, and Level IV, such units varying from 56 to 84 hours. The terms Levels I, II and III do not necessarily refer to the years in which the unit must be studied. Units at the various levels may be taken in other years provided the prerequisites are met. Level II/III units have only Level I prerequisites. For the pass course the science component requires at least 23 units with the following requirements:

(1) There shall be ten units from Level I and these must come from the following subjects: 1.001 or 1.011, 2.121, 2.131, 10.001 or 10.011 or 10.021B and 10.021C, 17.031, 17.041, 25.110, 25.120.

(2) Not less than four units from Level III. For purposes of this clause Level II/III units are counted as Level III units.

(3) Not less than two units beyond Level I in science disciplines in any of the teaching areas physics, chemistry (including biochemistry), biology and geology other than that of the student's major. In special circumstances this requirement may be waived with the permission of the Director of Science Teachers' Courses or as specified in individual programs.

(4) One unit shall be a History and Philosophy of Science subject selected from a list of subjects approved by the Director of Science Teachers' Courses. In special circumstances this requirement may be waived with the permission of the Director of Science Teachers' Courses or as specified in individual programs.

(5) For the honours program with honours in a science discipline there shall be at least six Level III units and students must meet prerequisite requirements set out in Table 3.

(6) For the award of honours in a science discipline the student must complete at least ten Level IV units as specified in an individual program.

(7) In order to graduate a student must pass all the units specified in the program of his/her choice.

### 2. Education Component

The Education Component is one of the major sequences in the course. It consists of subjects grouped as follows:

| | | | |
|---|---|---|---|
| Theory of Education | 58.702, | 58.703, | 58.704 |
| Science Curriculum and Instruction | 58.732, | 58.733, | 58.734 |
| School Experience | 58.712, | 58.713 | 58.714 |
| Honours | 58.795, | 58.793, 58.799 | 58.794 |

### 3. General Studies Component

The General Studies component involves 56 hours in the pass course, which is made up of two half electives or their equivalent. The distribution of the two half electives may be varied to suit the programs of individual students.

## Enrolment Requirements

**1.** In all years of the course a student must be enrolled in one of the prescribed Science programs.

In years two, three and four a student must be also enrolled in the Education program and the General Studies program.

**2.** A student may, with approval of the Director of Science Teachers' Courses, change from one selected Science program to another. A written application to make the change must be lodged, including details of any optional units selected in the new program, at the Science Education Office, Room 41, Building G2, Western Campus.

**3.** The allowed specific programs, listed in Programs below, are made up of sequences of units. Where a choice is indicated care must be taken to satisfy the requirements such as prerequisites and co-requisites.

**4.** A prerequisite subject is one which must be completed prior to enrolment in the subject for which it is prescribed. A co-requisite subject is one which must either be completed successfully before or be studied concurrently with the subject for which it is prescribed. An excluded subject is one which cannot be counted together with the subject which excludes it towards the degree of qualification. In exceptional circumstances, on the recommendation of the head of the appropriate school, the particular prerequisite or co-requisite may be waived by the Director of Science Teachers' Courses.

**5.** Students lacking the HSC prerequisites for 1.001 Physics I *and/or* 2.121 Chemistry IA may satisfy prerequisites by completing the respective introductory subjects 1.021 Introductory Physics for Health and Life Scientists *or* 2.111 Introductory Chemistry. Students requiring 10.001 Mathematics I for Physics programs may satisfy prerequisites by completing 10.021B where appropriate. Under these circumstances these introductory subjects are not counted among the units required for the degree course.

## Programs

The Course followed by a particular student has three component programs.

### 1. Education Program

This program is the same for each student though there are electives built in to some of the subjects. The program is as follows:

| Year | Subject | Hours per week* |
|---|---|---|
| 2 | 58.702 | 1 |
| | 58.712 | 2 |
| | 58.732 | 2 |
| 3 | 58.703 | 2.3 |
| | 58.713 | 3 |
| | 58.733 | 4½ |
| 4 | 58.704 | 2.2 |
| | 58.714 | 3 |
| | 58.734 | 4 |
| Honours in Education | | |
| 3 | 58.793 | 1½ |
| 4 | 58.794 | 1 |
| 5 | 58.795 | 4 |
| | 58.799 | |

*Average for 28 weeks.

### 2. General Studies Program

Two half electives (or equivalent) taken during second, third *and/or* fourth years for the pass degree.

### 3. Science Program

Each Science program is based on a program in the Science and Mathematics Course. Each one has an identifying number. The Science Education programs have 58 as the first two digits of the identifying number.

## 5801 Physics

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011*
17.031, 17.041
*or*
25.110, 25.120

**Year 2**
1.012, 1.022, 1.032
10.2111*, 10.2112*
10.1113*, 10.1114*
17.031, 17.041
*or*
25.110, 25.120

**Year 3**
Choose 1 HPS unit
1.002
Choose 2 units from:
1.0133, 1.023, 1.0333, 1.043, 10.111A*†

**Year 4**
Choose 4 units from:††
Level III Physics units in Table 1, 10.111A*, 10.212A*, 10.412D*

**Year 5**
1.104

*†See footnote to program 0101.
††Students are advised that units 1.0133, 1.0143, 1.023, 1.0333, 1.0343 and 1.043 are compulsory and must be completed by the end of Year 4.

## 5802 Physics
### Single Major†

**Year 1**
1.001 *or* 1.011
10.001 *or* 10.011
2.121 & 2.131, *or* 2.141
17.031, 17.041
*or*
25.110, 25.120

**Year 2**
1.012, 1.022, 1.032
10.2111, 10.2112
17.031, 17.041
*or*
25.110, 25.120
Choose 1 unit from Table 1**

**Year 3**
Choose 1 HPS unit
1.002
Choose from 1 unit from:
1.0133, 1.023, 1.0333, 1.043
Choose 1 unit from Table 1**

**Year 4**
Choose 3 units from:
Level III Physics units in Table 1††
Choose 1 unit from Table 1**

†See footnote to program 0102.
††See footnote to program 5801.
**Units available for choice from Table 1 in this program are those from Schools other than Mechanical and Industrial Engineering, Electrical Engineering (except Level II), Mathematics, Psychology, Geography, Philosophy.

## 5803
## Applied Physics

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011*
17.031, 17.041
*or*
25.110, 25.120

**Year 2**
1.012, 1.022, 1.032
10.2111*, 10.2112*
10.1113*, 10.1114*
17.031, 17.041
*or*
25.110, 25.120

**Year 3**
Choose 1 HPS unit
1.002
Choose 2 units from:
1.0133, 1.023, 1.0333, 1.043

**Year 4**
Choose 4 units from:††
1.0133, 1.0143, 1.023, 1.0333, 1.0343, 1.043, 1.133, 1.3033, 1.3133, 1.3233, 1.3333, 1.3533, 1.713, 1.763, 1.773

**Year 5**
1.304

*See footnote to program 0101.
††See footnote to program 5801.

## 5805
## Theoretical Physics

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011*
17.031, 17.041
*or*
25.110, 25.120

**Year 2**
10.111A*, 10.2111*, 10.2112*, 10.1113*, 10.1114*
17.031, 17.041
*or*
25.110, 25.120
1.012, 1.022

**Year 3**
Choose 1 HPS unit
1.002, 1.032
Choose 1 unit from:
1.0133, 1.1133, 1.023, 1.0333

**Year 4**
Choose 2½ units from:
1.0133, 1.1133, 1.023, 1.0333, 1.043
Choose 1½ units from:
1.5133, 1.5233, 1.5333, 1.5433, 1.5533, 10.412D*

**Year 5**
1.504

*See footnote to program 0101.

## 5821
## Chemistry Major

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011 *or* 10.021B & 10.021C
17.031, 17.041
*or*
25.110, 25.120

**Year 2**
2.002A, 2.002B, 2.042C, 2.002D
17.031, 17.041
*or*
25.110, 25.120
Choose 1 unit from:
Table 1**

**Year 3**
Choose 1 HPS unit
Choose 2 Level III Chemistry units
Choose 1 unit from:
Table 1**

**Year 4**
Choose 2 Level III Chemistry units
Choose 2 units from Table 1**

**Year 5**
2.004

**See footnote to program 5802.

## 5831
## Geology
Double Major

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
25.110, 25.120

**Year 2**
17.031, 17.041
25.211, 25.221, 25.212, 25.223, 25.2261
Choose 1 HPS unit

**Year 3**
Choose 4 out of the following:
25.311, 25.321, 25.312, 25.314, 25.324, 25.325, 25.333, 25.3162, 25.3261, 25.3271

**Year 4**
Take the remaining 4½ units of Level III Geology II not taken in Year 3

**Year 5**
Program as in 2501 Year 4

## 5832
## Geology
Single Major

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
25.110, 25.120

**Year 2**
17.031, 17.041
25.211, 25.221, 25.212, 25.223
Choose 1 unit from Table 1**

**Year 3**
Choose 2 units from the following:
25.311, 25.312, 25.314, 25.3162, 25.321, 25.333, 25.324, 25.325, 25.3261, 25.3271
Choose 1 HPS unitj
Choose 1 unit from Table 1**

**Year 4**
Choose 2 units of Level III Geology
Choose 2 units from Table 1**

**Year 5**
25.434

**See this footnote to program 5802.

## 5841
## Biochemistry

**Year 1**
1.001 *or* 1.011
2.121 & 2.131 *or* 2.141
10.001 *or* 10.011 *or* 10.021B & 10.021C
17.031, 17.041

**Year 2**
2.002B
25.110, 25.120
41.101, 41.111
Choose 1 unit from Table 1**

**Year 3**
41.102A
Choose 1 HPS unit
Choose 1 unit from Table 1**

**Year 4**
Choose *either*
41.102B *or* 41.102C & 41.102E
Choose 2 units from Table 1**

**Year 5**
41.103

**See this footnote to program 5802.

## 5842
## Microbiology and Biochemistry

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011 *or* 10.021B & 10.021C
17.031, 17.041

**Year 2***
2.002B
25.110, 25.120
41.101
44.101, 44.121

**Year 3**
41.102A, 41.102B, *or* 41.102C & 41.102E

**Year 4**
44.102, 44.112

**Year 5**
41.103 *or* 44.103

*Students are advised to include, where possible, the subject 41.111 in addition to those listed.

## 5854
## Botany

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011 *or* 10.021B & 10.021C
17.031, 17.041

**Year 2**
17.012
25.110, 25.120
43.101, 43.111
Choose 2 units from Table 1**

**Year 3**
43.131
Choose 2 Level III Botany units
Choose 1 HPS unit

**Year 4**
Choose 2 Level III Botany units
Choose 2 units from Table 1**

**Year 5**
43.103

**See this footnote to program 5802.

## 5855
## Botany with Zoology

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011 *or* 10.021B & 10.021C
17.031, 17.041

**Year 2**
25.110, 25.120
Choose 3 units from 17.012, 43.101, 43.111, 43.131
Choose 2 units from 45.101, 45.201, 45.301

**Year 3**
Choose 2 Level III Botany units
Choose 1 Level III Zoology unit
Choose 1 HPS unit

**Year 4**
Choose 2 Level III Botany units
Choose 2 Level III Zoology units

**Year 5**
43.103

## 5861
## Microbiology

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011 *or* 10.021B & 10.021C
17.031, 17.041

**Year 2**
2.002B
25.110, 25.120
41.101
44.101, 44.121

**Year 3**
41.102A
44.102

**Year 4**
44.112, 44.132
Choose 1 HPS unit

**Year 5**
44.103

## 5862
## Microbiology (General)

**Year 1**
1.001 *or* 1.011
2.121 & 2.131 *or* 2.141
10.001 *or* 10.011 *or* 10.021B & 10.021C
17.031, 17.041

**Year 2**
25.110, 25.120
41.101
44.101, 44.121
Choose 1 unit from Table 1**

**Year 3**
44.102, 44.112

**Year 4**
Choose 1 HPS unit
Choose 3 units from Table 1**

**Year 5**
44.103

**See this footnote to program 5802.

## 5866
## Zoology (General)

**Year 1**
1.001 *or* 1.011
2.121 & 2.131 *or* 2.141
10.001 *or* 10.011 *or* 10.021B & 10.021C
17.031, 17.041

**Year 2**
25.110, 25.120
45.101, 45.201, 45.301
Choose 2 Level II units of Biochemistry, Chemistry, Physics, Geology or Mathematics

**Year 3**
43.101
Choose 1 HPS unit
Choose 2 Level III Zoology units from Table 1

**Year 4**
Choose 2 Level III Zoology units from Table 1
Choose 2 units from Table 1**

**Year 5**
45.103

**See this footnote to program 5802.

## 5867
## Zoology with Botany

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011 *or* 10.021B & 10.021C
17.031, 17.041

**Year 2**
17.012
25.110, 25.120
43.101, 43.111
45.201, 45.301

**Year 3**
45.101
Choose 1 HPS unit
Choose 2 Level III Zoology units

**Year 4**
Choose 2 Level III Zoology units
Choose 2 Level III Botany units

**Year 5**
45.103

## 5871
## Physiology
Single Major

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011 *or* 10.021B & 10.021C
17.031, 17.041

**Year 2**
25.110, 25.120
41.101, 41.111
73.111

**Year 3**
73.012

**Year 4**
Choose 1 HPS unit
Choose 3 units from Table 1**

**Year 5**
73.013

**See this footnote to program 5802.

**Undergraduate Study**
**Board of Studies in Science and Mathematics**
**and the Faculty of Law**

# 4770 Programs in the Combined Science/Law Course

For details of the combined Science/Law Course refer to the Faculty of Law Handbook.

Below are approved programs for Years 1, 2 and 3 only. Years 4 and 5 are detailed in the Faculty of Law Handbook.

Note that where the levels of elective units are not specified they must be chosen so that the maximum number of Level I units, viz 8, is not exceeded.

## Physics

**Year 1**
1.001 *or* 1.011
10.001 *or* 10.011
90.112, 90.711
Choose 2 Level I units from Table 1

**Year 2**
1.002, 1.012, 1.022, 1.032
10.2111, 10.2112
90.141, 90.161
Choose 1 Level I or Level II unit from Table 1

**Year 3**
1.0133, 1.0143, 1.023, 1.0333, 1.0343, 1.043
90.216, 90.301, 90.621
Choose 2 units of appropriate levels from Table 1

## Chemistry

**Year 1**
1.001 *or* 1.011
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011 *or* 10.021B & 10.021C
90.112, 90.711

**Year 2**
2.002A, 2.002B, 2.042C, 2.002D
90.141, 90.161
Choose 2 Level I or Level II units from Table 1

**Year 3**
90.216, 90.301, 90.621
Choose 4 Level III Chemistry units from Table 1
Choose 2 other units of appropriate levels from Table 1

## Computer Science*

**Year 1**
6.611
10.001 *or* 10.011
90.112, 90.711
Choose 3 Level I units from Table 1

**Year 2**
6.621, 6.631, 6.641
90.141, 90.161
Choose 1 Level II unit from Table 1
Choose 2 Level I or Level II units from Table 1

**Year 3**
90.216, 90.301, 90.621
Choose 4 Level III Computing Science units
Choose 2 other units of appropriate levels from Table 1

*Progress into Year 2 of this program is by competitive entry at the end of Year 1. See entry under Course 3970 Computer Science.

## Mathematics

**Year 1**
10.001 *or* 10.011
90.112, 90.711
Choose 4 Level I units from Table 1

**Year 2**
10.111A *or* 10.121A,
10.1113 & 10.1114
*or*
10.1213 & 10.1214,
10.2111 & 10.2112
*or*
10.2211 & 10.2212
90.141, 90.161
Choose 1 Level II unit from Table 1
Choose 2 Level I or Levell II units from Table 1

**Year 3**
90.216, 90.301, 90.621
Choose 4 Level III Mathematics units from Table 1
Choose 2 other units of appropriate levels from Table 1

## Psychology

**Year 1**
10.001 *or* 10.011
*or*
10.021B & 10.021C
12.100
90.112, 90.711
Choose 2 Level I units from Table 1

**Year 2**
12.200
Choose 2 units from:
12.201, 12.202, 12.204, 12.205
90.141, 90.161
Choose 1 Level II unit from Table 1
Choose 2 Level I *or* Level II units from Table 1

**Year 3**
90.216, 90.301, 90.621
Choose 4 Level III Psychology units from Table 1
Choose 2 other units of appropriate levels from Table 1

## Geology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
25.110, 25.120
90.112, 90.711

**Year 2**
1.001 *or* 1.011
25.211, 25.221, 25.212, 25.223
90.141, 90.161

**Year 3**
Choose four units from the following:
25.311, 25.312, 25.314, 25.321, 25.333, 25.324, 25.325, 25.3261, 25.3271
90.216, 90.301, 90.621
Choose 2 Level II *or* Level III units from Table 1

## Geography

**Year 1**
10.001 *or* 10.011
*or*
10.021B & 10.021C
27.111*
*or*
27.301* & 27.302
90.112, 90.711
Choose 2 Level I units from Table 1

**Year 2**
27.311*, 27.312*, 27.2813, 27.2814
90.141, 90.161
Choose 1 Level II unit from Table 1
Choose 2 Level I *or* Levell II units from Table 1

**Year 3**
90.216, 90.301, 90.621
Choose 4 units from:
27.133, 27.143, 27.153, 27.183, 27.862, 27.363
Choose 2 units of appropriate levels from Table 1

*Students who choose 27.111 instead of 27.301 & 27.302 in Year 1 should omit 27.301 & 27.311 from their program and complete 27.302 & 27.312 in Years 2 and 3 respectively.

## Biochemistry

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
90.112, 90.711

**Year 2**
2.002B
41.101
90.141, 90.161
Choose 1 Level II unit from Table 1 (preferably 41.111)
Choose 2 Level I *or* Level II units from Table 1

**Year 3**
41.102A
41.102B
*or* 41.102C & 41.102E
90.216, 90.301, 90.621
Choose 2 units of appropriate levels from Table 1

## Botany

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
90.112, 90.711

**Year 2**
43.101, 43.111
90.141, 90.161
Choose 2 Level II units from Table 1
Choose 2 Level I *or* Level II units from Table 1

**Year 3**
90.216, 90.301, 90.621
Choose 4 Level III Botany units from Table 1
Choose 2 other units of appropriate levels from Table 1

## Microbiology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021c
17.031, 17.041
90.112, 90.711

**Year 2**
41.101
44.101, 44.121
90.141, 90.161
Choose 2 Level I *or* Level II units from Table 1

**Year 3**
44.102, 44.112
90.216, 90.301, 90.621
Choose 2 units of appropriate levels from Table 1

## Biotechnology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.031B & 10.021C
17.021, 17.041
90.112, 90.711

**Year 2**
41.101
42.101
90.141, 90.161
Choose group **1.** *or* **2.** *or* **3.**
**1.** 44.101, 44.121
1 Level I *or* Level II unit from Table 1
**2.** 2.002B
41.111
1 Level I *or* Level II unit from Table 1
**3.** 2.002A, 2.002B
2.042C *or* 2.002D

**Year 3**
42.102A, 42.102B
90.216, 90.301, 90.621
Choose group **1.** *or* **2.** *or* **3. as appropriate.**
**1.** 44.102
Choose 2 other units of appropriate levels from Table 1
**2.** 41.102A
Choose 2 other units of appropriate levels from Table 1
**3.** Choose 2 Level III Chemistry units
Choose 2 other units of appropriate levels from Table 1

## Zoology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
90.112, 90.711

**Year 2**
45.101, 45.201, 45.301
90.141, 90.161
Choose 41.101 *or* 2 Level II Chemistry units *or* 2 Level II Mathematics units
Choose 1 other Level I *or* Level II unit from Table 1

**Year 3**
90.216, 90.301, 90.621
Choose 4 Level III Zoology units from Table 1
Choose 2 other units of appropriate levels from Table 1

## Ecology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
90.112, 90.711

**Year 2**
17.012
43.111
44.101
45.101, 45.201, 45.301
90.141, 90.161

**Year 3**
90.216, 90.301, 90.621
Choose 4 units from:
43.152, 43.172
45.112, 45.122, 45.302
Choose 2 other units of appropriate levels from Table 1

## Marine Science

**Year 1**
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
90.112, 90.711
Choose one of the following:
1.01 *or* 1.011
2.121 & 2.131 *or* 2.141
25.110, 25.120

**Year 2**
43.111
44.101
45.201 *or* 41.101
68.302
90.141, 90.161
Choose: *one* or *two* of the following as appropriate:
2.002A
10.031,
10.331 *or* 10.301
17.012
25.622
44.121

**Year 3**
43.172
45.112
90.216, 90.301, 90.621
Choose one of the following groups:
**1.** 2.043A
1 other Level III and 2 other units of appropriate levels from Table 1
**2.** 10.032, 10.412A
2 other units of appropriate levels from Table 1
**3.** 2 other Level III units and 2 other units of appropriate levels from Table 1

## Anatomy

**Year 1**
10.001 *or* 10.011
*or*
10.021B & 10.021C
17.031, 17.041
90.112, 90.711
Choose 2 Level I units from Table 1

**Year 2**
70.011A, 70.011C
90.141, 90.611
Choose 2 Level II units from Table 1*
Choose 2 Level I *or* Level II units from Table 1

**Year 3**
90.216, 90.301, 90.621
Choose 4 Level III Anatomy units from Table 2
Choose 2 other units of appropriate levels from Table 1*

*Anatomy units from Table 2 may be taken in lieu.

## Physiology and Pharmacology

**Year 1**
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011 *or* 10.021B & 10.021C
17.031, 17.041
90.112, 90.711

**Year 2**
41.101
41.111
73.111
90.141, 90.161
Choose 1 Level I or Level II unit from Table 1

**Year 3**
73.012
90.216, 90.301, 90.621
Choose 2 units of appropriate levels from Table 1

**Units offered by the**
**Board of Studies in Science and Mathematics**

# Table 1

Information Key
The following is the key to the information supplied about each subject in the table below: F (Full year, ie both sessions); S1 (Session 1); S2 (Session 2); SS (single session, ie *one* only); I, II, III (Levels, I, II, III); Hpw (Hours per week); C (Credit).

## Physics

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| **Physics Level I** | | | | | | | | |
| 1.001 | Physics I | I | 2 | F | 6 | See Subject Descriptions later in this Handbook | 10.021C, *or* 10.001, *or* 10.011 | |
| 1.011 | Higher Physics I | I | 2 | F | 6 | See Subject Descriptions later in this Handbook | 10.001 *or* 10.011 | |
| 1.021 | Introductory Physics I* (For Health and Life Scientists) | I | 2 | F | 6 | | 10.021B *and* 10.021C *or* 10.001 *or* 10.011 | |

*For students who enrol in and successfully complete the subjects 1.021 Introductory Physics (2 units) and 1.001 Physics (2 units) the total unit value of the combined subjects be counted as 3 units.

## Physics (continued)

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 1.041 | Laboratory Computers in Physical Science | I | 1 | S1 *or* S2 | 6 | As for 1.001 | 10.001 *and* 1.021 *or* 1.001 *or* 1.011 | Programs 0601, 0610, 0611, 6806 |
| 1.061 | Computer Applications in Experimental Science I | I | 1 | S2 | 6 | 6.611 | 1.001 10.001 *or* 10.011 | 1.041 1.042 |
| **Physics Level II*** | | | | | | | | |
| 1.002 | Mechanics, Waves and Optics | II | 1 | S1 | 4 | 1.001, 10.001 | 10.2111 | 10.4111, 10.4211, 1.992 |
| 1.012 | Electormagnetism and Thermal Physics | II | 1 | S2 | 4 | 1.001, 10.001 | 10.2111 | |
| 1.022 | Modern Physics | II | 1 | F | 2 | 1.001, 10.001 | 10.2112 | 1.9322 |
| 1.032 | Laboratory | II | 1 | F | 3 | 1.001, 10.001 | | 1.9222 |
| 1.042 | Measurement and Measurement Control Systems | II | 1 | S2 | 5 | 1.001, 10.001 | | 1.9422, 1.962 |
| 1.052 | Methods in Mathematical Physics | II | 1 | S2 | 4 | 1.001, 10.001 | 10.2111, 10.2112, 10.1113 | |
| 1.9222 | Electronics | II | ½ | S1 | 3 | 1.021 | | 1.032 |
| 1.9322 | Introduction to Solids | II | ½ | S2 | 3 | 1.021 | | 1.022 4.402 4.412 |
| 1.9422 | Introduction to Physics of Measurement | II | ½ | S1 | 3 | 1.001 | | 1.042 |
| **Physics Level III*** | | | | | | | | |
| 1.0133 | Quantum Mechanics | III | ½ | S1 | 2 | 1.022, 10.2112 | | 1.013 2.023A, 10.222F |
| 1.0143 | Nuclear Physics | III | ½ | S2 | 2 | | 1.0133 | 1.013 |
| 1.023 | Statistical Mechanics and Solid State Physics | III | 1 | S1 | 4 | 1.012, 1.022, 10.2112 | | |
| 1.0333 | Electromagnetism | III | ½ | S1 | 2 | 1.012, 10.2111, 10.2112 | | 10.222C, 1.033 |
| 1.0343 | Advanced Optics | III | ½ | S2 | 2 | | 1.002 | 1.033 |
| 1.043 | Experimental Physics A | III | 1 | F | 4 | 1.032 | | |
| 1.0533 | Experimental Physics B1 | III | ½ | S1 | 4 | 1.032 | | 1.053 |
| 1.0543 | Experimental Physics B2 | III | ½ | S2 | 4 | 1.032 | | 1.053 |
| 1.1133 | Advanced Quantum Mechanics | III | ½ | S2 | 2 | | 1.0133 | 2.023A 10.222F |
| 1.133 | Electronics | III | 1 | S1 | 6 | 1.032 *or* 1.9222 | | |
| 1.1433 | Biophysics | III | ½ | S1 | 3 | 1.012, 1.022 | | |
| 1.1533 | Biophysical Techniques | III | ½ | S2 | 3 | 1.012, 1.022, 1.032 | | |
| 1.1633 | Astrophysics | III | ½ | S2 | 2 | 1.022 | | |
| 1.1733 | Conceptual Framework of Physics | III | ½ | S2 | 3 | 1.012, 1.022 | 1.0133, 1.023 | |

## Physics (continued)

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 1.3033 | Mechanical Properties of Materials | III | ½ | S1 | 2 | | 1.023 | 4.403 |
| 1.3133 | Electrical, Optical and Thermal Properties of Materials | III | ½ | S2 | 2 | | 1.023 | |
| 1.3233 | Measurement and Non-destructive Testing | III | ½ | S1 | 2 | 1.032 | | |
| 1.3333 | Applications of Radiation | III | ½ | S2 | 2 | | 1.0333<br>1.0343 | 1.343<br>1.033 |
| 1.3533 | Marine Acoustics | III | ½ | S1 | 2 | | | |
| 1.5133 | Classical Mechanics and Field Theory | III | ½ | S1 | 2 | 1.002 (*or* 10.4111)<br>10.1113<br>10.2111<br>10.2112 | | |
| 1.5233 | Electrodynamics | III | ½ | S2 | 2 | 1.022<br>10.1113<br>10.2111<br>10.2112 | 1.0333 | 10.222C |
| 1.5333 | Radiation and Matter | III | ½ | S2 | 2 | 1.012, 1.022<br>10.2111, 10.2112 | 1.0133 *or*<br>10.222F *or*<br>2.023A<br>1.0333 (*or*<br>10.222C) | |
| 1.5433 | Plasmas and Laser Fusion | III | ½ | S2 | 2 | 1.012, 1.022 | | 1.513 |
| 1.5533 | General Relativity | III | ½ | S1 | 2 | 1.012, 1.022<br>10.1113, 10.2111<br>10.2112 | | 1.523 |
| 1.713 | Advanced Laser and Optical Applications | III | 1 | F | 2 | | 1.002 | |
| 1.763 | Laser and Optical Technology Laboratory I | III | 1 | F | 4 | 1.032 | | |
| 1.773 | Laser and Optical Technology Laboratory II | III | 1 | F | 4 | | 1.763 | |

*Where mathematics units are specified as prerequisites or as co-requisites, the higher levels of such units are acceptable and preferable. Similarly Physics 1.011 is acceptable in place of 1.001 and either of these units in place of 1.021. Students are also advised that other units may be acceptable equivalent prerequisites or co-requisites to those listed, eg Unit 1.982 of course 3640 may be acceptable in place of 1.022. Enquiry should be made to the School of Physics.

## Chemistry

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 2.121 | Chemistry IA | I | 1 | S1 *or* S2 | 6 | See **Subject Descriptions** later in this Handbook | | 2.141 |
| 2.131 | Chemistry IB | I | 1 | S1 *or* S2 | 6 | 2.111 *or* 2.121 | | 2.141 |
| 2.141 | Chemistry IM‡ | I | 2 | F | 6 | See **Subject Descriptions** later in this Handbook | | |

## Chemistry (continued)

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 2.002A | Physical Chemistry | II | 1 | S1 *or* S2 | 6 | 2.121 *or* 2.141, 10.001 *or* 10.011 *or* 10.021B & 10.021C | | |
| 2.002B | Organic Chemistry | II | 1 | F *or* S1 *or* S2 | 6 | 2.131 *or* 2.141 | | |
| 2.002D | Analytical Chemistry | II | 1 | SS | 6 | 2.121 & 2.131, *or* 2.141 10.001 *or* 10.011 *or* 10.021B & 10.021C | | |
| 2.042C | Inorganic Chemistry | II | 1 | SS | 6 | 2.121 & 2.131 *or* 2.141 | | |
| 2.003E | Nuclear and Radiation Chemistry | II/III | 1 | S1 *or* S2 *or* F | 6 | 2.121 & 2.131 *or* 2.141 10.001 *or* 10.011 *or* 10.021B & 10.021C | | |
| 2.003H | Molecular Spectroscopy and Structure | II/III | 1 | S2 | 6 | 2.121 & 2.131 *or* 2.141 | | |
| 2.003J | Fundamentals of Biological and Agricultural Chemistry | II/III | 1 | SS | 6 | 2.121 & 2.131 *or* 2.141 | | 2.013L, 41.101 |
| 2.003K | Solid State Chemistry | II/III | 1 | SS | 6 | 2.121 & 2.131 *or* 2.141 *and* 10.001 *or* 10.011 | | |
| 2.013A | Introductory Quantum Chemistry | II/III | 1 | S1 | 6 | 1.001 *or* 1.011 2.121 & 2.131 *or* 2.141 10.011 *or* 10.011 *or* 10.021B & 10.021C | | |
| 2.003A | Physical Chemistry | III | 1 | SS | 6 | 2.002A | | |
| 2.003B | Organic Chemistry | III | 1 | S1 *or* S2 | 6 | 2.002B | | |
| 2.003C | Inorganic Chemistry | III | 1 | S1 *or* S2 | 6 | 2.042C | | |
| 2.003D | Instrumental Analysis | III | 1 | SS | 6 | 2.002D, 2.002A | | |
| 2.003L | Applied Organic Chemistry | III | 1 | S1 | 6 | 2.002B | | 2.033L |
| 2.003M | Organometallic Chemistry | III | 1 | SS | 6 | 2.002B | | |
| 2.013B | Synthetic Organic Chemistry | III | 1 | S2 | 6 | 2.003B | | |
| 2.013C | Advanced Inorganic Chemistry | III | 1 | SS | 6 | 2.042C | 2.003C | |
| 2.013D | Advanced Analytical Chemistry | III | 1 | F *or* S2 | 6 | 2.002D | 2.003D | |
| 2.013L | Chemistry and Enzymology of Foods | III | 1 | F | 3 | 2.002B | | 2.003J, 2.023L, 2.043L, 2.053L |
| 2.023A | Quantum Theory of Atoms and Molecules | III | 1 | F | 3 | 2.002A, 10.2111 & 10.2112 | | |
| 2.023B | Natural Product Chemistry | III | 1 | S2 | 6 | 2.003B | | |
| 2.023L | Biological and Agricultural Chemistry | III | 1 | SS | 6 | 2.002B | | 2.013L, 2.043L, 2.053L |
| 2.033A | Physical Chemistry of Macromolecules | III | 1 | S2 | 6 | 2.003J *or* 2.002B, 1.012 *or* 2.002A | | |
| 2.043A | Environmental Chemistry | III | 1 | S2 | 6 | 2.002A, 2.002D | | |

*For footnotes, see overleaf*

## Chemistry (continued)

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 2.043L | Chemistry and Enzymology of Foods† | III | 2 | F | 6 | 2.002B | | 2.013L, 2.023L, 2.053L |
| 2.053A | Chemical Kinetics and Reaction Mechanisms | III | 1 | SS | 6 | 2.002A | | |
| 2.053L | Biological and Agricultural Chemistry† | III | 2 | F | 6 | 2.002B | | 2.013L, 2.023L, 2.043L |
| 2.063A | Advanced Molecular Spectroscopy | III | 1 | S2 | 6 | 2.013A | | |

‡Students majoring in Chemistry may take 2.141 in lieu of 2.121 and 2.131.

†Only one of these double units may be chosen.

## Metallurgy

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 4.302 | Chemical and Extraction Metallurgy I | II | 1 | F | 3 | | 2.002A* | |
| 4.402 | Physical Metallurgy I | II | 2 | F | 6 | | 2.002A*, 4.502 | 1.9322, 4.412, 4.422 |
| 4.412 | Metallurgical Phases — Structure and Equilibrium Part I | II | 1 | S1 | 6 | | 2.002A, 4.302 | 1.9322, 4.402 |
| 4.422 | Metallurgical Phases — Structure and Equilibrium Part II | II | 1 | S2 | 6 | 4.412 | 4.303 | 4.402 |
| 4.502 | Mechanical Metallurgy | II | 1½ | F | 4S1 3S2 | | 4.402 | 4.512, 4.522 |
| 4.512 | Mechanical Properties of Solids | II | 1 | S1 | 4 | | 4.402 | 4.502 |
| 4.522 | Mechanical Metallurgy | II/III | ½ | S2 | 3 | 4.512 | | 4.502 |
| 4.602 | Metallurgical Engineering I | II | 1 | S2 | 5 | | 4.302 | |
| 4.303 | Chemical and Extraction Metallurgy II | III | 2 | F | 5 | 4.302, 4.602 *and* 4.402 *or* 4.412 | 4.422 | |
| 4.403 | Physical Metallurgy II | III | 3 | F | 9 | 4.402 | | 1.3033 |
| 4.613 | Metallurgical Engineering IIA | III | ½ | S1 | 3 | 4.602 | | |
| 4.703 | Materials Science | III | ½ | S2 | 3 | | 4.403 | |

*This unit must be taken in Session 1.

## Mechanical and Industrial Engineering

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 5.006 | Engineering E* | I | 1 | S1 | 6 | See **Subject Descriptions** later in this Handbook | | |
| 5.010 | Engineering A† | I | 1 | S1 *or* S2 | 6 | | | |
| 5.030 | Engineering C**†‡ | I | 1 | S1 *or* S2 | 6 | | | |
| 5.020 | Engineering B† | I | 1 | S2 | 6 | 5.010 | | |

*Note, for this subject, *Excluded: 5.010, 5.020, 5.030.*

**Students who wish to enrol in this subject can make up for the lack of the prerequisite by work taken in Physics in the first half of first year.

†Note, for this subject, *Excluded: 5.006.*

‡Also offered over the full year at 3 hours per week, for the 'Production Technology' option only.

## Electrical Engineering and Computer Science

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 6.611 | Computing I | I | 1 | S1 | 6 | HSC Mathematics as for 10.001 | 10.001 *or* 10.011 | 1.041* 6.600 6.620 6.021D |
| 6.621 | Computing IIA | II | 1 | S1 *or* S2 | 5 | 6.611** 10.001 *or* 10.011 | | 6.620 6.021D |
| 6.631 | Computing IIB | II | 1 | S1 *or* S2 | 5 | 6.621** *or* 6.620‡** *or* 6.021D** | | 6.021E |
| 6.641 | Computing IIC | II | 1 | S1 *or* S2 | 5 | 6.621** *or* 6.620‡** *or* 6.021D** | | |
| 6.646 | Computer Applications | III | 1 | S1 | 5 | 6.620‡** *or* 6.621** *or* 6.021D** One of 10.311A, 10.321A, 10.301, 10.331 *or* 45.101 *or* equivalent. | | 6.622 |

*Excluded for students in programs 6806, 0601, 0611.

**Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.

‡Students who have completed 6.600 at a grade of credit or better, may be enabled to undertake this subject with permission.

## Mathematics

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites†† | Co-requisites†† | Excluded* |
|---|---|---|---|---|---|---|---|---|
| 10.001 | Mathematics I | I | 2 | F | 6 | See Subject Descriptions later in this Handbook | | 10.011<br>10.021B<br>10.021C |
| 10.011 | Higher Mathematics I | I | 2 | F | 6 | See Subject Descriptions later in this Handbook | | 10.001<br>10.021B<br>10.021C |
| 10.021B | General Mathematics IB | I | 1 | S1 | 6 | See Subject Descriptions later in this Handbook | | 10.001<br>10.011 |
| 10.021C | General Mathematics IC | I | 1 | S2 | 6 | 10.021B | | 10.001<br>10.011 |
| 10.081 | Mathematics IX | I | 1 | S2 | 6 | As for 10.001 | 10.001 *or* 10.011 *and* 6.611 *or* 1.041 | |
| 10.031‡ | Mathematics | II | 1 | F | 2 | 10.001 *or* 10.021C (CR) | | ‡ |
| 10.032§ | Mathematics | III | 1 | F | 2 | 10.031 | | § |
| 10.612 | Mathematical Software | III | 1 | F | 2 | 6.621, 10.111A 10.2112 (or equivalent) | | |

††For any listed unit an appropriate higher unit may be substituted.
*If a unit in this column is counted the corresponding unit in the first column may not be counted.
‡Mathematics 10.031 is included for students desiring to attempt only one Level II Mathematics unit. If other Level II units in Pure Mathematics, Applied Mathematics are taken, 10.031 Mathematics will not be counted.
§Mathematics 10.032 is included for students desiring to attempt only one Level III Mathematics unit. If other Level III units in Pure Mathematics, Applied Mathematics or Theoretical Mechanics are taken, 10.032 Mathematics will not be counted except that 10.412A may be taken with 10.032.

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites†† | Co-requisites†† | Excluded* |
|---|---|---|---|---|---|---|---|---|
| **Pure Mathematics** | | | | | | | | |
| **Pure Mathematics Level II** | | | | | | | | |
| 10.111A | Linear Algebra | II | 1 | F | 2½ | 10.001 | | 10.121A |
| 10.1113 | Multivariable Calculus | II | ½ | S1 *or* S2 | 2½ | 10.001 | | 10.1213 |
| 10.1114 | Complex Analysis | II | ½ | S1 *or* S2 | 2½ | 10.001 | | 10.1214 |
| 10.1115 | Finite Mathematics A | II | ½ | S1 | 2 | 10.001 | | |
| 10.1116 | Finite Mathematics B | II | ½ | S2 | 2 | 10.1115 (or any other level II Mathematics half unit) | | |
| **Higher Pure Mathematics Level II†** | | | | | | | | |
| 10.121A | Algebra | II | 1 | F | 2½ | 10.011 *or* 10.001 DN | | 10.111A<br>10.1111 |
| 10.1213 | Multivariable Calculus | II | ½ | S1 | 2½ | 10.011 *or* 10.001 DN | | 10.1113 |
| 10.1214 | Complex Analysis | II | ½ | S2 | 2½ | 10.1213 | | 10.1114 |
| **Pure Mathematics Level III*** ** | | | | | | | | |
| 10.1111 | Group Theory | III | ½ | S1 | 2 | *** | | 10.121A |
| 10.1112 | Geometry | III | ½ | S2 | 2 | *** | | 10.121C |
| 10.1121 | Number Theory | III | ½ | SS | 2 | *** | | 10.1421 |

*For footnotes, see overleaf*

## Mathematics (continued)

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites†† | Co-requisites†† | Excluded* |
|---|---|---|---|---|---|---|---|---|
| 10.1123 | Logic and Computability | III | ½ | SS | 2 | *** | | |
| 10.1124 | Combinatorial Topology | III | ½ | SS | 2 | *** | | 10.122C |
| 10.1125 | Ordinary Differential Equations | III | ½ | S1 | 2 | 10.111A | *** | 10.122E, 10.1425 |
| 10.1126 | Partial Differential Equations | III | ½ | S2 | 2 | 10.1113, 10.1114 | 10.1125 | 10.1426 |
| 10.1127 | History of Mathematics | III | ½ | S2 | 2 | 10.111A, 10.1113, 10.1114, 10.2111, 10.2112 | | |
| 10.1128 | Foundations of Calculus | III | ½ | S1 | 2 | *** | | 10.122B |
| 10.1521 | Combinatorics and its Applications | III | ½ | SS | 2 | *** | | |
| 10.1522 | Differential Geometry | III | ½ | SS | 2 | 10.1113 | *** | 10.112C, 10.1325, 10.122C |
| 10.1523 | Functional Analysis and Applications | III | ½ | SS | 2 | 10.111A 10.2112 | *** | 10.122B |
| **Higher Pure Mathematics Level III**** | | | | | | | | |
| 10.122B | Real Analysis and Functional Analysis | III | 1 | F | 2 | 10.121A *or* 10.111A DN 10.1213 *or* 10.1113 DN | | 10.112B |
| 10.1321 | Rings and fields | III | ½ | S1‡ | 2 | 10.121A *or* 10.111A DN | | |
| 10.1322 | Galois Theory | III | ½ | S2‡ | 2 | | 10.1321 | |
| 10.1323 | Complex Analysis | III | ½ | S1‡ | 2 | 10.1214 *or* 10.1114 DN | ††† | |
| 10.1324 | Integration and Fourier Analysis | III | ½ | S2‡ | 2 | | 10.122B | |
| 10.1325 | Differential Geometry | III | ½ | S1‡ | 2 | 10.121A *or* 10.111A DN 10.1213 *or* 10.1113 DN | | 10.1522 |
| 10.1326 | Calculus on Manifolds | III | ½ | S2‡ | 2 | | 10.1325 | |
| 10.1421 | Number theory | III | ½ | S1‡‡ | 2 | | | 10.1121 |
| 10.1422 | Groups and Representations | III | ½ | S2‡‡ | 2 | 10.121A *or* 10.111A DN and 10.1111 DN | | |
| 10.1423 | Topology | III | ½ | S1‡‡ | 2 | 10.1213 *or* 10.1113 DN | | |
| 10.1424 | Geometry | III | ½ | S2‡‡ | 2 | 10.121A *or* 10.111A and 10.1111 DN | | 10.1112 |
| 10.1425 | Ordinary Differential Equations | III | ½ | S1‡‡ | 2 | 10.121A *or* 10.111A DN 10.1213 *or* 10.1113 DN | ††† | 10.1125 |
| 10.1426 | Partial Differential Equations | III | ½ | S2‡‡ | 2 | | 10.1425 | 10.1126 |

††For any listed unit an appropriate higher unit may be substituted.

*If a unit in this column is counted the corresponding unit in the first column may not be counted.

†1. Admission to Higher Pure Mathematics II normally requires completion of 10.011 Higher Mathematics I; students who gain a superior pass in 10.001 Mathematics I may, subject to the approval of the Head of the School of Mathematics, be permitted to proceed to Higher Pure Mathematics II units.

2. Students majoring in Physics who wish to take Higher Pure Mathematics II should attempt 10.121A, 10.1213, 10.1214, either 10.2211 or 10.2111 and either 10.2212 or 10.2112.

3. Students aiming at Honours in Pure Mathematics must take 10.121A, 10.121C, 10.1213, 10.1214, either 10.2211 or 10.2111 and either 10.2212 or 10.2112.

**Students wishing to attempt Level III Higher Pure Mathematics units should consult the School of Mathematics prior to enrolment. Students will not normally be permitted to attempt a Level III Higher Pure Mathematics unit unless they have completed at least 2 Level II units from 10.121A, 10.1213, 10.1214, 10.2211 and 10.2212, or obtained sufficiently good gradings in the corresponding ordinary Level II units.
Pre- and co-requisites may be varied in special circumstances with the permission of the Head of the School of Mathematics.

***Students will not normally be permitted to attempt a Level III Pure Mathematics unit unless they have completed at least two Level II units from 10.111A, 10.1113, 10.1114, 10.2111 and 10.2112.

‡These subjects are to be offered in odd numbered years.

‡‡These subjects are to be offered in even numbered years.

†††The unit 10.122B is strongly recommended.

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites†† | Co-requisites†† | Excluded* |
|---|---|---|---|---|---|---|---|---|
| **Applied Mathematics** | | | | | | | | |
| **Applied Mathematics Level II** | | | | | | | | |
| 10.2111 | Vector Calculus | II | ½ | S1 *or* S2 | 2½ | 10.001 | | 10.2211<br>4.813 |
| 10.2112 | Mathematical Methods for Differential Equations | II | ½ | S1 *or* S2 | 2½ | 10.001 | | 10.2212<br>4.813 |
| 10.2113 | Introduction to Linear Programming | II | ½ | S1 *or* S2 | 2 | 10.001 | | 10.2213 |
| 10.2115 | Discrete-Time Systems | II | ½ | S2 | 2 | 10.001 | | 10.2215 |
| 10.211E | Numerical Methods | II | 1 | F | 2 | 10.001 | | |
| **Higher Applied Mathematics Level II** | | | | | | | | |
| 10.2211 | Vector Analysis | II | ½ | S1 | 2½ | 10.001 *or* 10.001 DN** | | 10.2111 |
| 10.2212 | Mathematical Methods for Differential Equations | II | ½ | S2 | 2½ | 10.2211 | | 10.2112 |
| 10.2213 | Introduction to Linear Programming | II | ½ | S1 | 2 | 10.011 *or* 10.001 DN** | | 10.2113 |
| 10.2215 | Discrete-Time Systems | II | ½ | S2 | 2 | 10.011 *or* 10.001 DN | | 10.2115 |
| **Applied Mathematics Level III** | | | | | | | | |
| 10.212A | Numerical Analysis | III | 1 | F | 2 | 10.2112, 10.111A | | 10.222A |
| 10.212L | Optimization Methods | III | 1 | F | 2 | 10.1113*** | | 10.222L |
| 10.212M | Optimal Control Theory | III | 1 | F | 2 | 10.1113 *and* 10.1114<br>10.111A | | 10.222M |
| **Higher Applied Mathematics Level III** | | | | | | | | |
| 10.222A | Numerical Analysis | III | 1 | F | 2 | 10.2212 *or* 10.2112 DN**,<br>10.121A *or* 10.111A DN** | | 10.212A |
| 10.222C | Maxwell's Equations and Special Relativity | III | 1 | F | 2 | 10.2211 *or* 10.2111 DN**,<br>10.2212 *or* 10.2112 DN**,<br>10.1214 *or* 10.1114 DN**,<br>1.001 | | 1.033 |
| 10.222F | Quantum Mechanics | III | 1 | F | 2 | 10.2211 *or* 10.2111 DN**,<br>10.2212 *or* 10.2112 DN**,<br>10.121A *or* 10.111A DN**,<br>10.1213 *or* 10.1113 DN**,<br>10.1214 *or* 10.1114 DN** | | 1.013 |
| 10.222L | Optimization Methods | III | 1 | F | 2 | 10.1213 *or* 10.1113 DN** **** | | 10.212L |
| 10.222M | Optimal Control Theory | III | 1 | F | 2 | 10.1213 *or* 10.1113 DN**,<br>10.1214 *or* 10.1114 DN**,<br>10.121A *or* 10.111A DN** | | 10.212M |

††For any listed unit an appropriate higher unit may be substituted.
*If a unit in this column is counted the corresponding unit in the first column may not be counted.
**With the permission of the Head of the Department a sufficiently good grading may be substituted.
***At least one further unit chosen from the following: 10.111A, 10.1114, 10.2111, 10.2112, 10.2113.
****At least 1½ further units chosen from the following: 10.121A *or* 10. 111A DN, 10.1214 *or* 10.1114 DN, 10.2211 *or* 10.2111 DN, 10.2212 *or* 10.2112 DN, 10.2213 *or* 10.2113 DN, 10.2215 *or* 10.2113 DN.

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites†† | Co-requisites†† | Excluded* |
|---|---|---|---|---|---|---|---|---|
| **Statistics** | | | | | | | | |
| **Theory of Statistics Level II** | | | | | | | | |
| 10.311A‡ | Probability and Random Variables | II | 1½ | S1‡ | 7 | 10.001 *or* 10.021C CR | | 10.321A<br>10.331<br>10.301<br>45.101 |
| 10.311B | Basic Inference | II/III | 1½ | S2 | 7 | 10.311A | | 10.321B<br>10.331<br>10.301<br>45.101 |
| 10.331 | Statistics SS | II | 1 | F | 2 | 10.001 *or* 10.021C CR | | 10.311A<br>10.311B<br>10.321A<br>10.321 B<br>10.301<br>45.101 |
| **Higher Theory of Statistics Level II** | | | | | | | | |
| 10.321A | Probability and Random Variables | II | 1½ | S1 | 8 | 10.001 | | 10.311A<br>10.331<br>10.301<br>45.101 |
| 10.321B | Basic Inference | II/III | 1½ | S2 | 8 | 10.321A | | 10.311B<br>10.331<br>10.301<br>45.101 |
| **Theory of Statistics Level III**** | | | | | | | | |
| 10.312A | Probability and Stochastic Processes | III | 1 | S1 | 4 | 10.311A, 10.111A, 10.1113 | | 10.322A |
| 10.312B | Experimental Design (Applications) and Sampling | III | 1 | S2 | 4 | 10.311B *or* 10.331 | | 10.322B |
| 10.312C | Experimental Design (Theory) | III | 1 | S1 | 4 | 10.311B, 10.111A, 10.1113 | 10.312B† | 10.322C |
| 10.312D | Probability Theory | III | 1 | S2 | 4 | 10.311A, 10.111A, 10.1113, 10.2112 | | 10.322D |
| 10.312E | Statistical Inference | III | 1 | S2 | 4 | 10.311B, 10.111A, 10.1113 | † | 10.322E |
| 10.312F | Statistical Computation | III | 1 | SS | 4 | 10.311B (*or* 10.312B *or* 10.3321)<br>6.621<br>6.641 | | |
| 10.3321 | Regression Analysis and Experimental Design | III | ½ | S1 | 2 | 10.331 *or* 10.311B *or* 10.321B | | 10.312B<br>10.322B |
| 10.3322 | Applied Stochastic Processes | III | ½ | S2 | 2 | 10.331 *or* 10.311A *or* 10.321A | | 10.312A<br>10.322A |
| **Higher Theory of Statistics Level III** | | | | | | | | |
| 10.322A | Probability and Stochastic Processes | III | 1 | S1 | 4½ | 10.312A, 10.111A, 10.1113 | | 10.312A |
| 10.322B | Experimental Design (Applications) and Sampling | III | 1 | S2 | 4½ | 10.321B, 10.111A, 10.1113 | | 10.312B |

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites†† | Co-requisites†† | Excluded* |
|---|---|---|---|---|---|---|---|---|
| 10.322C | Experimental Design (Theory) | III | 1 | S1 | 4½ | 10.321B, 10.111A, 10.1113 | 10.322B† | 10.312C |
| 10.322D | Probability Theory | III | 1 | S2 | 4½ | 10.321A, 10.111A, 10.1113 | | 10.312D |
| 10.322E | Statistical Inference | III | 1 | S2 | 4½ | 10.321B, 10.111A 10.1113 | † | 10.312E |

††For any listed unit an appropriate higher unit may be substituted.
*If a unit in this column is counted, the corresponding unit in the first column may not be counted.
† Plus any two Level III Pure Mathematics, Applied Mathematics, Theoretical Mechanics or Computer Science units. It is sufficient to take 10.312B (10.322B) in the same year.
**For a student taking four of the units 10.312A, 10.312B, 10.312C, 10.312D, 10.312E (or the corresponding higher units) a project is required as part of either 10.312C (10.322C) or 10.312E (10.322E).
‡The evening course 10.311A will, subject to a sufficient enrolment, run at 3½ hours per week throughout the year.

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites†† | Co-requisites†† | Excluded* |
|---|---|---|---|---|---|---|---|---|
| **Theoretical and Applied Mechanics** | | | | | | | | |
| **Theoretical Mechanics Level II** | | | | | | | | |
| 10.4111 | Introduction to Theoretical Mechanics | II | ½ | S1 | 2 | 10.001, 1.001 *or* 5.006 | 10.2111, 10.2112, 10.1113 | 10.411B, 10.421B, 10.4211, 1.002, 1.992 |
| 10.4112 | Introduction to Hydrodynamics | II/III | ½ | S2 | 2 | 10.001 | 10.4111 *or* 1.002 | 10.411A, 10.421A, 10.4212 |
| **Higher Theoretical Mechanics Level II** | | | | | | | | |
| 10.4211 | Introduction to Theoretical Mechanics | II | ½ | S1 | 2 | 10.011 *or* 10.001 DN** 1.001 *or* 5.006 | 10.2211, 10.2212, 10.1113 | 10.411B, 10.421B, 10.4111, 1.002, 1.992 |
| 10.4212 | Introduction to Hydrodynamics | II/III | ½ | S2 | 2 | 10.011 *or* 10.001 DN** | 10.4211 | 10.421A, 10.411A, 10.4112 |
| **Theoretical Mechanics Level III** | | | | | | | | |
| 10.412A | Dynamical and Physical Oceanography | III | 1 | F | 2 | 1.001, 10.2111 *and* 10.2112 *or* 10.031 | ‡ | |
| 10.412B | Continuum Mechanics | III | 1 | F | 2 | 10.2111, 10.2112, 10.1113, 10.1114, 10.111A | 10.4112 *or* 1.012 *or* 1.913 | 10.422B |
| 10.412D | Mathematical Methods | III | 1 | F | 2 | 10.2112, 10.1113, 10.1114, 10.111A | | 10.422D, 10.4331 |
| 10.4129 | Applied Time Series Analysis | III | ½ | S2 | 2 | 10.2112 *or* 10.031 *or* 10.022 | 10.331 *or equivalent* 10.4331 *or* 10.412D *or equivalent* | |
| 10.4331 | Transform Methods | III | ½ | S1 | 2 | 10.1113, 10.1114, 10.2112 *or equivalent* | | 10.412D, 10.422D |

## Mathematics (continued)

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites†† | Co-requisites†† | Excluded* |
|---|---|---|---|---|---|---|---|---|
| **Higher Theoretical Mechanics Level III** | | | | | | | | |
| 10.422A | Fluid Dynamics | III | 1 | S2 | 4 | 10.421A *or* 10.411A DN** | 10.422B | |
| 10.422B | Mechanics of Solids | III | 1 | S1 | 4 | 10.2111, 10.2112, 10.1113, 10.1114, 10.111A, 10.421B *or* 10.411B DN** *or* 1.012 | | 10.412B |
| 10.422D | Mathematical Methods | III | 1 | F | 2 | 10.2211 *or* 10.2111 DN**, 10.2212 *or* 10.2112 DN**, 10.1213 *or* 10.1113 DN**, 10.1214 *or* 10.1114 DN** | | 10.412D, 10.4331 |

**With the permission of the Head of the Department a sufficiently good grading may be substituted.
‡It is recommended that one of the following be taken concurrently: 10.4112 *or* 1.3533.
*If a unit in this column is counted the corresponding unit in the first column may not be counted.
††For any listed unit an appropriate higher unit may be substituted.

## Psychology

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| **Psychology Level I** | | | | | | | | |
| 12.100 | Psychology I | I | 2 | F | 5 | | | 12.001 |
| **Psychology Level II** See Notes | | | | | | | | |
| 12.200 | Research Methods II | II | 1 | F | 3 | 12.100* | | 12.152 |
| 12.201 | Basic Psychological Processes II | II | 1 | S2 | 4 | 12.100* | | 12.052 |
| 12.202 | Complex Psychological Processes II | II | 1 | S1 | 4 | 12.100* | | 12.062 |
| 12.204 | Human Relations II | II | 1 | S1 | 4 | 12.100* | | 12.072 |
| 12.205 | Individual Differences II | II | 1 | S2 | 4 | 12.100* | | 12.082 |
| **Psychology Level III: Group A** See Notes | | | | | | | | |
| 12.300 | Research Methods IIIA | III | 1 | S1 | 4 | 12.200 | | 12.153 |
| 12.304 | Personality and Individual Differences III | III | 1 | S1 | 4 | 2 Psychology Level II subjects | | 12.303 |
| 12.305 | Learning and Behaviour III | III | 1 | S1 *or* S2 | 4 | 12.200 *and* 12.201 | | 12.253 |
| 12.322 | Abnormal Psychology III | III | 1 | S1 | 4 | 12.200 *and* 12.201 | | 12.603 |

## Psychology (continued)

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites†† | Co-requisites†† | Excluded* |
|---|---|---|---|---|---|---|---|---|
| **Psychology Level III: Group B** **See Notes** | | | | | | | | |
| 12.301 | Research Methods IIIB | III | 1 | S2 | 4 | 12.200 *and* 12.300 | | 12.163 |
| 12.310 | Physiological Psychology III | III | 1 | S2 | 4 | 12.200 *and* 12.201 | | 12.413 |
| 12.311 | Perception III | III | 1 | S1 | 4 | 12.200 *and* 12.201 | | 12.473 |
| 12.312 | Language and Cognition III | III | 1 | S2 | 4 | 12.200 *and* 12.202 | | 12.453 |
| 12.314 | Motivation and Emotion III | III | 1 | S2 | 4 | 12.200 *and* 12.201 | | 12.323 |
| 12.320 | Social Psychology III | III | 1 | S1 | 4 | 12.200 *and* 12.202 | | 12.503 |
| 12.321 | Developmental Psychology III | III | 1 | S2 | 4 | 12.200 *and* 12.202 | | 12.553 |
| 12.324 | Experimental Psychopathology III | III | 1 | S2 | 4 | 12.322 | | |
| 12.325 | Social Behaviour III | III | 1 | S2 | 4 | 12.200 *and* 12.202 | | |
| 12.330 | Psychological Assessment III | III | 1 | Not offered 1984 | 4 | 12.200, *and* 1 other Psychology Level II subject | | 12.042, 12.203 *and* 12.373 |
| 12.331 | Counselling Psychology III | III | 1 | S2 | 4 | 2 Psychology Level II subjects | | 12.623 |
| 12.332 | Behavioural Change III | III | 1 | Not offered 1984 | 4 | 12.200 *and* 12.201 | | 12.713 |
| 12.333 | Ergonomics III | III | 1 | S1 | 4 | 12.200 | | 12.663 |
| 12.334 | Behaviour in Organizations III | III | 1 | S2 | 4 | 2 Psychology Level II subjects | | 12.653 |
| 12.335 | Behavioural Evaluation and Assessment III | III | 1 | S2 | 4 | 12.322 | | |
| 12.340 | Special Topic III | III | 1 | Not offered 1984 | 4 | 12.300, 12.304 *and* 12.305 | | |

*Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.

**Notes:**

**1.** A student may not enrol in more than four Level II Psychology units.

**2.** A student may not enrol in more than three Level III Psychology units unless 12.200 Research Methods II has been passed.

**3.** A student may not enrol in more than six Level III Psychology units unless 12.300 Research Methods IIIA has been passed.

**4.** A major in Psychology is 12.100, two Psychology Level II units, including 12.200 and four Psychology Level III units.

**5.** A student may not enrol in more than three Psychology Level III subjects selected from 12.304 Personality and Individual Differences III, 12.322 Abnormal Psychology III, 12.324 Experimental Psychopathology III, 12.331 Counselling Psychology III, and 12.335 Behavioural Evaluation and Assessment III.

**6.** A student may not enrol in more than eight Level III Psychology units in course **3970.**

## Biological Sciences

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 17.031 | Biology A | I | 1 | S1 | 6 | See **Subject Descriptions** later in this Handbook | | |
| 17.041 | Biology B | I | 1 | S2 | 6 | 17.031 | | 17.021 |
| 17.012 | General Ecology | II | 1 | S2 | 6 | 17.031 *and* 17.041 | | |

*Students with percentile range 61-100 in HSC Examination 4 unit Science with Biology, or 2 unit Biology may apply to enrol in 43.101, 45.201 or 45.301 in lieu of 17.041 after completion of 17.031. Students are selected by the Head of School for enrolment in these units. If successful, students will have met the prerequisite requirement of 17.041 Biology B for all units.

## Applied Geology

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 25.110 | Earth Materials and Processes** | I | I | S1 | 6 | See **Subject Descriptions** later in this Handbook | | |
| 25.120 | Earth Environments and Dynamics**** | I | I | S2 | 6 | 25.110 | | |
| 25.211 | Earth Materials I* | II | 1 | S1 | 6 | 25.120 | | |
| 25.221 | Earth Materials II‡‡ | II | 1 | S2 | 6 | 25.211 | | |
| 25.212 | Earth Environments I‡ | II | 1 | S1 | 6 | 25.120 | | |
| 25.223 | Earth Physics** | II | 1 | S2 | 6 | 25.110 | | |
| 25.2261 | Mathematical Geology I | II | ½ | S2 | 3 | 25.120 | | |
| 25.621 | Marine Geology I** | II | 1 | F | 3 | 25.601 *or* 25.110 *and* 25.120 | | †† |
| 25.662 | Hydrological and Coastal Surveying‡ | II/III | 1 | F | 3 | | | †† |
| 25.311 | Earth Materials III | III | 1 | S1 | 6 | 25.221 | | |
| 25.321 | Earth Materials IV† | III | 1 | S2 | 6 | 25.221 | | |
| 25.312 | Earth Environments II‡‡ | III | 1 | S1 | 6 | 25.212††† | | |
| 25.314 | Mineral and Energy Resources I**** | III | 1 | S1 | 6 | 25.221 | | |
| 25.3162 | Mathematical Geology II | III | ½ | S1 | 3 | 25.2261 | | |
| 25.324 | Mineral and Energy Resources II* | III | 1 | S2 | 6 | 25.212 *or* 25.5212 | | |
| 25.325 | Engineering and Environmental Geology*** | III | 1 | S2 | 6 | | | |
| 25.3261 | Geochemical Analytical Techniques | III | ½ | S1 | 2 | 25.311 | | |
| 25.3271 | Advanced Structural Geology*** | III | ½ | S2 | 2 | 25.221 | | |
| 25.333 | Exploration Geophysics*** | III | 1 | F | 3S1 2S2 | 25.120 | | |
| 25.6342 | Exploration and Seismic Methods | III | ½ | S2 | 3 | | | 25.634, 25.9321 |
| 25.9311 | Gravity and Magnetic Methods* | III | ½ | S1 | 3 | 1.001 10.001 | | |
| 25.9312 | Seismic Methods* | III | ½ | S1 | 3 | 1.001 10.001 | | |
| 25.9313 | Electrical Methods* | III | ½ | S1 | 3 | 1.001 10.001 | | |

*Field work of up to 1 day.
**Field work of up to 2 days.
***Field work of up to 3 days.
****Field work of up to 4 days.
‡Field work of up to 5 days.
†Field work of up to 6 days.
‡‡Field work of up to 8 days.

Field tutorials are an essential part of the subject, and are held during weekends and/or recesses. Dates and costs are available during the first week of the subject. Attendance is compulsory.

††*Not* available for programs 2501, 2502, 2703, 2725, *nor* in Geology program of Course 4770, *nor* in Geology with some Mathematics program of Course 3730.

†††It is desirable that students taking 25.312 should also have taken 25.223.

## Geography

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites†† | Co-requisites†† | Excluded* |
|---|---|---|---|---|---|---|---|---|
| 27.111 | Applied Physical Geography I | I | 2 | F | 5 | See **Subject Descriptions** later in this Handbook | | 27.301, 27.311, 27.801, 27.811 |
| 27.301 | Introduction to Physical Geography* | I | 1 | S1 | 4½ | | | 27.111 |
| 27.302 | Introduction to Human Geography* | I | 1 | S2 | 4½ | | | |
| 27.311 | Physical Geographyϕ | II | 1 | S2 | 4½ | 27.801 *or* 27.301, 27.2813† | | 27.111, 27.301 |
| 27.312 | Human Geographyϕ | II | 1 | S1 | 4½ | 27.802 *or* 27.302, 27.2813† | | 27.302 |
| 27.2813 | Geographic Methods | II | ½ | S1 | 3 | 27.111 (*or* 27.301‡) *and* 27.302 | | |
| 27.2814 | Geographic Field Methods** | II | ½ | S2 | 2 | 27.111 (*or* 27.301) *and* 27.302, 27.2813 | | |
| 27.153 | Climatology** | II/III | 1 | S1 | 5 | 1.001 (*or* 27.311) (*or* 25.110 & 25.120) (*or* 17.031 *and* 17.041†) *or* 27.111 | | |
| 27.143 | Biogeography** | II/III | 1 | S2 | 5 | 27.311 *or* 27.111 (*or* 17.031 & 17.041) | | |
| 27.183 | Geomorphology** | II/III | 1 | S1 | 5 | 25.110 & 25.120 *or* 27.311 *or* 27.111 | | 27.860 |
| 27.133 | Pedology** | II/III | 1 | S2 | 5 | 27.111 *or* any 2 units from: 2.111, 2.121, 2.131, 2.141, 27.811 *or* 27.311 (*or* 25.012 *or* 25.022) | | |
| 27.860 | Landform Studies* | II/III | 1 | S1 | 4½ | 27.301 *or* 27.111 | 27.311 | 27.183 27.870 |
| 27.862 | Australian Environment and Natural Resources**% | II/III | 1 | S2 | 4½ | 27.111 *or* 27.311 *or* 27.312 *or* 25.110 *and* 25.120 | | 27.872 |
| 27.363 | Ecosystems and Man** | II/III | 1 | S2 | 4½ | 27.111 *or* 27.311 *or* 27.312 | | 27.873 |
| 27.324 | Spatial Population Analysis** | II/III | 1 | S2 | 4 | 27.312 | | 27.834 |
| 27.325 | Urban Activity Systems** | II/III | 1 | S1 | 4 | 27.312 | | 27.835 |
| 27.326 | Urban and Regional Development** | II/III | 1 | S1 | 4 | 27.312 | | 27.836 |
| 27.327 | Environment and Behaviour** | II/III | 1 | S1 | 4 | 27.312 | | |
| 27.834 | Spatial Population Analysis (Advanced)** | III | 1 | S2 | 5 | 27.312 CR, 27.2813 CR | | 27.324 |
| 27.835 | Urban Activity Systems (Advanced)** | III | 1 | S1 | 5 | 27.312 CR, 27.2813 CR | | 27.325 |
| 27.836 | Urban and Regional Development (Advanced)** | III | 1 | S2 | 5 | 27.312 CR, 27.2813 CR | | 27.326 |
| 27.837 | Environment and Behaviour (Advanced)** | III | 1 | S1 | 5 | 27.312 CR, 27.2813 CR | | 27.327 |

## Geography (continued)

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites†† | Co-requisites†† | Excluded* |
|---|---|---|---|---|---|---|---|---|
| 27.870 | Landform Studies (Advanced)** | III | 1 | S1 | 6 | 27.111 CR *or* 27.311 CR, 27.2813 CR | | 27.860 |
| 27.872 | Australian Environment and Natural Resources (Advanced)**% | III | 1 | ϕϕ | 6 | 27.111 CR *or* 27.311 CR *or* 27.312 CR | | 27.862 |
| 27.873 | Ecosystems and Man (Advanced) | III | 1 | S2 | 5 | 27.111 CR *or* 27.311 CR *or* 27.2813 CR | | 27.863, 27.363 |
| 27.880 | Advanced Geographic Methods | III | 1 | F | 3 | 27.2813 CR *and* 27.311 CR *or* 27.312 CR *or* 27.111 CR | | |
| 27.604 | Geography 4 (Honours) | | | F | | 27.880 | | |

*Field work of up to 2 days is a compulsory part of the subject.

‡In special circumstances a student may apply to the Head of School for permission to take 27.301 as a co-requisite.

†This prerequisite unit may be waived for students not proceeding into a major Geography sequence.

**Field work of up to 5 days is a compulsory part of the subject.

ϕ3 days field work equivalent to 24 tutorial hours is a compulsory part of the subject.

ϕϕNot offered in 1984.

## Surveying

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 29.001 | Surveying I* | I | 1½ | S1 | 4½ | | | |
| 29.002 | Surveying II* | I | 1½ | S2 | 5 | 29.001 | | |

*These two subjects must be taken together in the one year.

## Biochemistry‡

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites* | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 41.101 | Biochemistry | II | 2 | S1 | 12 | 17.041†, 2.121† & 2.131†, *or* 2.141† | | 2.003J |
| 41.111 | Biochemical Control | II | 1 | S2 | 6 | 41.101 | | |
| 41.102A | Biochemistry of Macromolecules | III | 2 | S1 | 12 | 41.101** *or* 41.111**, 2.002B | | |
| 41.102B | Physiological Biochemistry | III | 2 | S2 | 12 | 41.101** *or* 41.111**, 2.002B | | |
| 41.102C | Plant Biochemistry | III | 1 | S2 | 6 | 41.101** *or* 41.111**, 2.002B | | |
| 41.102E | Molecular Biology of Higher Organisms | III | 1 | S2 | 6 | 41.102A | | |

‡Level III units available only during the daytime.

*In exceptional circumstances a student may apply to the Head of School for variation of the prerequisite.

†Terminating pass not acceptable.

**Students must obtain a clear pass (PS) in *either* 41.101 *or* 41.111.

## Biotechnology

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites* | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 42.101 | Introduction to Biotechnology | II | 1 | S2 | 6 | 2.121 & 2.131, *or* 2.141, 17.041, 10.001 *or* 10.011 *or* 10.021B *and* 10.021C | | |
| 42.102A | Biotechnology A | III | 1 | S1 | 6 | 41.101† 42.101† *or* 44.101† | | |
| 42.102B | Biotechnology B | III | 1 | S2 | 6 | 42.102A† | | |

*In exceptional circumstances a student may apply to the Head of School for variation of the prerequisite.
†Pass Conceded (PC) or Terminating Pass (TP) awarded prior to Session 2, 1983 is not acceptable.

## Botany

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 17.012 | General Ecology | | | | | See under Biological Sciences | | |
| 43.101 | Introductory Genetics | II | 1 | S2 | 6 | 17.031 *and* 17.041* | | |
| 43.111 | Flowering Plants | II | 1 | S1 | 6 | 17.031 *and* 17.041 | | |
| 43.131 | Fungi and Man | II | 1 | S1 | 6 | 17.031 *and* 17.041 | | |
| 43.102 | Microbial Genetics | III | 1 | S1 | 6 | 43.101 | | |
| 43.112 | Taxonomy and Systematics | III | 1 | S2§ | 6 | 43.111 | 43.101 | |
| 43.122 | Plant Physiology† | III | 1 | S2 | 6 | 17.031 *and* 17.041, 2.121 *and* 2.131, *or* 2.141 | | 43.121 |
| 43.132 | Mycology-Plant Pathology | III | 1 | S2 | 6 | 43.131*** | | |
| 43.142 | Environmental Botany | III | 1 | S1 | 6 | 17.031 *and* 17.041 | | |
| 43.152 | Plant Community Ecology | III | 1 | S2 | 6 | 43.111 & 17.012 *or* 27.111 | | |
| 43.162 | The Plant Kingdom | III | 1 | S1§ | 6 | 43.111 | | |
| 43.172 | Phycology and Marine Botany | III | 1 | S2 | 6 | 43.111 | | |
| 43.192 | Ultrastructure | III | 1 | S2 | 6 | 17.031 *and* 17.041 | | 43.182 |

*Students with percentile range 61-100 in HSC Examination 4 unit Science with Biology, or 2 unit Biology may apply to enrol in 43.101, 45.201 or 45.301 in lieu of 17.041 after completion of 17.031. Students are selected by the Head of School for enrolment in these units. If successful, students will have met the prerequisite requirement of 17.041 Biology B for all units.

†Students intending to undertake honours work in the field of Plant Physiology should have obtained a pass in 41.101 (Biochemistry) or 45.101 (Biometry) or 2.002A (Physical Chemistry) depending on their proposed field of specialization.

***A student may apply to the School for variation of the prerequisite.

§These units will alternate each year. 43.112 Taxonomy and Systematics is offered in 1984. If both units 43.112 and 43.162 are to be included in a three-year pass degree program, one should be completed in Year 2.

## Microbiology†

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites* | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 44.101 | Introductory Microbiology | II | 1 | S1 | 6 | 17.031 *and* 17.041 | | |
| 44.121 | Microbiology I | II | 1 | S2 | 6 | 44.101<br>41.101 *or* 2.003J | | |
| 44.102 | General Microbiology | III | 2 | S1 | 12 | 44.101; 44.121‡, 41.101 | | |
| 44.112 | Applied Microbiology | III | 2 | S2 | 12 | 44.102 | | |
| 44.122 | Immunology | III | 1 | S2 | 6 | 17.031 *and* 17.041,<br>41.101 | | |
| 44.132 | Virology | III | 1 | S2 | 6 | 44.102 | | |

†All units available only during the daytime.
*In exceptional circumstances a student may apply to the Head of School for variation of the prerequisite.
‡Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.

## Zoology†

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 17.012 | General Ecology | | | | | See under **Biological Sciences** | | |
| 45.101 | Biometry | II | 1 | S2 | 6 | 17.031 *and* 17.041 | | 10.311A,<br>10.321A,<br>10.331 |
| 45.201 | Invertebrate Zoology | II | 1 | S2 | 6 | 17.031 *and* 17.041 | | |
| 45.301 | Vertebrate Zoology | II | 1 | S1 | 6 | 17.031 *and* 17.041 | | |
| 45.112 | Marine Ecology§ | III | 1 | S1 | 6 | 17.031 *and* 17.041,<br>45.201<br>*or* 25.621 *or* 2.002D | | |
| 45.121 | Evolutionary Theory | III | 1 | S1 | 6 | 17.031 *and* 17.041 | | |
| 45.122 | Animal Behaviour | III | 1 | S2 | 6 | 45.101‡ *and* (45.201<br>*or* 45.301) | | |
| 45.132 | Ecological Physiology | III | 1 | S2 | 6 | 45.201 *or* 45.301 | | |
| 45.142 | Comparative Physiology | III | 1 | S2 | 6 | 45.201 *or* 45.301 | | |
| 45.152 | Population and Community Ecology | III | 1 | S1 | 6 | 17.041<br>*and* 10.001<br>*or* 10.011 | | |
| 45.302 | Vertebrate Zoogeography and Evolution | III | 1 | S2 | 6 | 45.301 | | |
| 45.402 | Insects§ | III | 1 | S1 | 6 | 17.031 *and* 17.041 | | |
| 45.422 | Economic Zoology | III | 1 | S1 | 6 | 45.201 *or* 45.402 | | |
| 45.432 | Project‡‡ | III | 1 | ‡‡ | 6 | 45.402 *or* 45.201 | | |

**Note:** A student will not be admitted to Level III Zoology units without special permission of the Head of School, unless Chemistry 2.001 or 2.121 and 2.131, *or* 2.141, has been completed.

Students who wish to complete a major in the School of Zoology must take Biometry 45.101 and at least two Level II units from one of the following Schools: Biochemistry, or Chemistry, or Physics, or Mathematics, except as detailed in an approved program.

†Level III courses conducted by the School of Zoology are available only during the daytime to part-time students enrolling for the first time in 1973 or later.

§Students intending to enrol in this unit should register with the School of Zoology for the February field trip by 14 January.

‡One of: 10.311A; 10.321A; 10.331 may be substituted for 45.101 with special permission of the Head of School.

‡‡Not offered in 1984

## Philosophy

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 52.103 | Introductory Philosophy A | I | 1 | S1 | 4 | | | |
| 52.104 | Introductory Philosophy B | I | 1 | S2 | 4 | | | |
| 52.2010 | Reasoning Skills | II | ½ | S1 or S2 | 2 | Any Level I Subject | | 52.233 |
| 52.2020 | Descartes | II | ½ | S1 | 2 | Level II Status in Philosophy** | | 52.163 |
| 52.2021 | Spinoza and Leibniz | II | ½ | S2 | 2 | 52.2020 *or* 52.163 | | 52.303 |
| 52.2030 | Predicate Logic A | II | ½ | S1 | 2 | Any Level I Subject | | 52.153, 52.162, 52.1531 |
| 52.2031 | Predicate Logic B | II | ½ | S2 | 2 | 52.2030 *or* 52.1531 | | 52.153, 52.162, 52.1532 |
| 52.2040 | Greek Philosophy: Thales to Plato | II | ½ | S1 | 2 | Level II Status in Philosophy** | | 52.183 |
| 52.2050 | Classical Political Philosophy | II | ½ | S1 | 2 | Level II Status in Philosophy** | 52.182, 52.203 | |
| 52.2060 | Sartre | II | ½ | S1 | 2 | Level II Status in Philosophy** | | 52.213 |
| 52.2130 | British Empiricism | II | ½ | S2 | 2 | Level II Status in Philosophy** | | 52.173 |
| 52.2140 | Scientific Method | II | ½ | S1 | 2 | Level II Status in Philosophy** | | 52.193 |
| 52.2150 | Philosophy of Law | II | ½ | S2 | 2 | Level II Status in Philosophy** | | 52.105 |
| 52.219 | Philosophical Foundations of Marx's Thought | II | 1 | S1 | 3 | Level II Status in Philosophy** | | 52.373 |
| 52.2170 | Hume | II | ½ | S1 | 2 | Level II Status in Philosophy** | | 52.563, 52.152 |
| 52.2220 | Classical Greek Ethics | II | ½ | S1 | 2 | Level II Status in Philosophy** | | 52.5231 |
| 52.2230 | Theories in Moral Philosophy | II | ½ | S2 | 2 | Level II Status in Philosophy** | | 52.5232 |
| 52.2240 | Philosophical Study of Woman | II | ½ | S2 | 2 | Level II Status in Philosophy** | | 52.283 |
| 52.2250 | Plato's Theory of Forms | II | ½ | S2 | 2 | Level II Status in Philosophy** | | 52.483 |
| 52.2260 | Aesthetics | II | ½ | S2 | 2 | Level II Status in Philosophy** | | 52.273 |
| 52.2270 | Social and Political Philosophy | II | ½ | S2 | 2 | Level II Status in Philosophy** | | Not offered in 1984 52.513 |
| 52.2330 | Psychoanalysis — Freud and Lacan | II | ½ | S2 | 2 | Level II Status in Philosophy** | | 52.573 |
| 52.2360 | Theories, Values and Education | II | ½ | S1 | 2 | Level II Status in Philosophy** | | 52.583 |
| 52.2371 | Plato's Later Dialogues | II | ½ | S2 | 2 | 52.2250 *or* 52.483* | | 52.293 |
| 52.2411 | History of Logic | II | ½ | S1 | 2 | 52.2030 *or* 52.1531 | | 52.353, 52.393, 52.593 |

## Philosophy (continued)

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 52.2980 | Seminar A | II | ½ | S2 | 2 | Level II Status in Philosophy** | | 52.423 |
| 52.2990 | Reading Option A | II | ½ | S1 *or* S2 | 2 | Level II Status in Philosophy** | | 52.413 |
| 52.3010 | Seminar B | II | ½ | S1 | 2 | Level II Status in Philosophy** | | 52.433 |
| 52.3020 | Seminar C | II | ½ | S2 | 2 | Level II Status in Philosophy** | | 52.443 |
| 52.3030 | Reading Option B | II | ½ | S1 *or* S2 | 2 | Level II Status in Philosophy** | | 52.453 |

*In exceptional circumstances a student may apply to the School for variation of the prerequisite or co-requisite.

**Level II status in Philosophy consists in **1.** being in second or later year of university study, and **2.** having taken and passed at least one Level I Philosophy unit. If the unit is composed of two half-units, these must have been passed in the same session. The prerequisite may be waived in certain cases by the School.

## History and Philosophy of Science

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 62.012 | The Origins of Modern Science | II/III | 1 | S1 | 3 | | | |
| 62.022 | Materials Machines and Men | II/III | 1 | S2 | 3 | | | 26.564, 26.251 |
| 62.032 | The Scientific Theory* | II/III | 1 | S2 | 3 | | | |
| 62.033 | The Development of Theories of Matter* | II/III | 1 | S1 | 3 | | | |
| 62.052 | Scientific Knowledge and Political Power | II/III | 1 | S1 | 3 | A pass in *two* of 1.001 *or* 1.011<br>2.121 & 2.131, *or* 2.141<br>10.001 *or* 10.011 *or* 10.021B *and* 10.021C<br>12.100<br>17.031 *and* 17.041<br>25.110 *and* 25.120<br>27.801 *and* 27.802 (*or* 27.301 and 27.302) | | |
| 62.062 | The Social System of Science | II/III | 1 | S2 | 3 | | | |
| 62.072 | Historical Origins of the American Scientific Estate | II/III | 1 | S1 | 3 | | | |
| 62.082 | Science, Technology and Developing Countries | II/III | 1 | S1 | 3 | | | |
| 62.103 | The Discovery of Time | II/III | 1 | S1 | 3 | | | |
| 62.104 | The Darwinian Revolution | II/III | 1 | S2 | 2 | | | |
| 62.106 | Mind, Mechanism and Life | II/III | 1 | S1 | 3 | | | 62.043 |
| 62.109 | The History of Medical Theory and Practice | II/III | 1 | S1 | 3 | | | 62.043<br>26.568, 26.2506 |
| 62.551 | The Arch of Knowledge: History of the Philosophy and Methodology of Science to 1800 | II/III | 1 | S1 | 2 | | | 62.013 |

*For footnotes, see overleaf*

## History and Philosophy of Science (continued)

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites†† | Co-requisites†† | Excluded* |
|---|---|---|---|---|---|---|---|---|
| 62.552 | Modern History of the Philosophy and Methodology of Science | II/III | 1 | S2 | 2 | 62.551 *or* by permission of Head of School | | 62.013 |
| 62.553 | The Social Construction of Scientific Knowledge | II/III | 1 | S2 | 3 | As for 62.012 | | 62.083 |
| 62.554 | Computers, Brains and Minds: Foundations of the Cognitive Sciences | II/III | 1 | S2 | 3 | As for 62.012 | | |
| 62.105 | Research Methods in History and Philosophy of Science | III | 1 | F | 1½ | Completion of 3 HPS units with an average of Credit or better, or by permission of Head of School | | |

*Not offered in 1984.

## Board of Studies in Science and Mathematics

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 68.313 | Physical Oceanography | III | 1 | S2 | 4 | 10.001 *or* 10.011 *and* 1.001 *or* 1.011 | | |
| 68.601 | Genetics of Behaviour I | II | 1 | S1 | 5 | 17.031 | | 79.402 |
| 68.602 | Genetics of Behaviour II | III | 1 | S2 | 5 | 79.402 *or* 68.601 | | 79.403 |
| 68.451 | Biological Laboratory Computing | I | 1 | S2 | 6 | As for 10.021B | | 1.041 *and* Programs 0601, 0610, 0611, 6806 |

## Pathology

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 72.301 | Basic and Applied Pathology | III | 1 | F | 3 | 70.011A<br>70.011C<br>73.111<br>*or equivalent* | | |

## Physiology and Pharmacology

| No | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 73.111 | Physiology IA | II | 2 | F | 6 | 2.121 *and* 2.131, *or* 2.141, 10.001 *or* 10.011 *or* 10.021B *and* 10.021C, 17.041 | 41.101 | 73.121 |
| 73.121 | Physiology IB | II | 2 | F | 6 | 2.121 *or* 2.141, 10.001 *or* 10.011 *or* 10.021B *and* 10.021C, 17.041 | 2.131* | 73.111 |
| 73.012 | Physiology II | III | 4 | F | 12 | 73.111, 41.101, 41.111 | | |
| 73.012A | Membrane Biology | III | 1 | S1 | 6 | Normally as for 73.012, but may be studied only with permission of Head of School | | |
| 73.012B | Neurophysiology | III | 1 | S1 | 6 | | | |
| 73.012C | Organ Physiology | III | 2 | S2 | 12 | | | |
| 73.022 | Pharmacology | III | 2 | F | 6 | 73.111 *or* 73.121 | 73.012 *or* 41.102A *and* 41.102B *or* 2.003J *and* 2.033A | |

**Note**: The above represent the normal prerequisites for the courses in Physiology, but the Head of School may recommend that students with a good academic record be granted exemption from them.

*Not if 2.141 has been completed.

## Community Medicine

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|---|---|---|
| 79.201 | Population Genetics | III | 1 | S1 | 5 | 45.101 *or* 10.331 *or* 10.311A *and* 10.311B *or* 10.321A *and* 10.321B | | |
| 79.202 | Quantitative Methods in Human Genetics | III | 1 | S2 | 5 | See * below | | |
| 79.302 | Biochemical Genetics of Man | III | 1 | S1 | 6 | 43.101, 41.101 | | |

*A unit of genetics and a unit of statistical methods, or theory, as approved by the Head of School.

**Course 3970**
**Units available in specific programs**

# Table 2

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded | Specific Programs |
|---|---|---|---|---|---|---|---|---|---|
| 2.111 | Introductory Chemistry* | I | 1 | S1 | 6 | | | | 0101, 0103, 0105, 1201, 2743 |
| 2.013E | Advanced Nuclear and Radiation Chemistry | III | 1 | S2 | 6 | 2.003E | | | Any appropriate program *except* 0201, 0202, 0203, 0204, 0241, 0242, 0261, 0262 *and* Course 3910 |
| 2.951 | Chemistry I ME | I | 1 | S2 | 6 | | | 2.121, 2.131, 2.141 | Course 3681 |
| 4.802 | Metallurgical Physics††† | II | ½ | S2 | 2 | 1.001 *or* 1.011 | | | 0401, 0402, 0403, Course 3681 |
| 4.813 | Mathematical Methods†††† | III | 1 | F | 3 | 10.001 *or* 10.011 | | 10.2111, 10.2112 | 0401, 0402, 0403, Course 3681 |
| 5.0201 | Engineering Dynamics 1A | I | ½ | S1 *or* S2 | 3 | 5.010 | | 5.020 | Course 3681 |
| 5.300 | Engineering Dynamics 1B | II | ½ | S2 | 2 | 1.001, 5.020 or 5.0201, 10.001 | | | Course 3681 |
| 5.421 | Mechanics of Solids I | I | ½ | S2 | 4 | 5.010 | | 5.020, 8.171 | Course 3681 |
| 5.422 | Mechanics of Solids II/ Materials | II | 1½ | F | 4½ | 5.020 *or* 5.421 *or* 8.171, 10.001 | | 4.402, 4.442, 5.4221 | Course 3681 |

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded | Specific Programs |
|---|---|---|---|---|---|---|---|---|---|
| 5.4221 | Mechanics of Solids II/ Materials | II | 1½ | F | 3½ | 5.020 *or* 5.421 *or* 8.171, 10.001 | 4.402 *or* 4.422 | 5.422 | Course 3681 |
| 5.622 | Fluid Mechanics/ Thermodynamics | II | 1½ | F | 4 | 1.001, 5.010, 10.001 | 5.020 *or* 5.0201 | | Course 3681 |
| 6.010 | Electrical Engineering | I | 1 | S2 | 6 | Electrical *and* magnetism section of 1.001 *or* 1.011 | | | 0102, 0105, 0162, 0601, 6806 |
| 6.021A | Basic Circuit Theory | II | ½ | S1 *or* S2 | 4 | 6.010, 1.001, 10.001 | | | 0102, 0601 |
| 6.021C | Electronics | II | ½ | S1 *or* S2 | 4 | 6.021A, 1.982 *or equiv.* | | | 0102, 0601 |
| 6.613 | Computer Organization and Design** | III | 1 | S2 | 5 | 6.631*** *or* 6.021E***, 6.021D*** *or* 6.620*** *or* 6.621*** | | 6.0318 | 0601, 0610, 0611, Courses 3611, 3661, 3681, 3701, 4770 |
| 6.632 | Operating Systems** | III | 1 | S1 | 5 | 6.631*** *or* 6.021E***, 6.641*** | | 6.672 | 0601, 0610, 0611, Courses 3611, 3661, 3681, 3701, 4770 |
| 6.633 | Data Bases and Networks** | III | 1 | S2 | 5 | 6.641*** | | 6.622, 6.652, 14.607, 14.608 | 0601, 0610, 0611, Courses 3611, 3661, 3681, 3701, 4770 |
| 6.642 | Design and Analysis of Algorithms** | III | 1 | S1 | 5 | 6.641*** | | | 0601, 0610 0611, Courses 3611, 3661, 3681, 3701, 4770 |
| 6.643 | Compiling Techniques and Programming Languages** | III | 1 | S2 | 5 | 6.641*** | | 6.672 | 0601, 0610 0611, Courses 3611, 3661, 3681, 3701, 4770 |
| 6.647 | Business Information Systems** | III | 1 | S1 | 5 | 6.641*** 14.501 | | 14.603 14.604, 14.605 | 0601, 0610, 0611, Courses 3611, 3661, 3681, 3701 |
| 6.649 | Computing Practice**†***** | III | 1 | | 5 | 6.641*** | 6.633 *or* 6.643 *or* 6.647 | | 0601, 0610, 0611, Courses 3611, 3661, 3681, 3701, 4770 |
| 7.023 | Mineral Process Engineering | III | ½ | S1 | 2 | | | | 0402, 0403 |
| 8.171 | Mechanics of Solids I | I | ½ | SS | 3 | 5.010 | | 5.020, 5.421 | Course 3681 |
| 8.360 | Computing | I | ½ | SS | 3 | | | 6.611 | Course 3681 |

*For footnotes, see overleaf*

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded | Specific Programs |
|---|---|---|---|---|---|---|---|---|---|
| 9.801 | Genetics I | II | 1 | F | 2S1<br>3S2 | | | | 6840 |
| 9.811 | Biostatistics I | III | 1 | S1 | 4 | 45.101 | | | 6840 |
| 9.802 | Genetics II | III | 1 | F | 4 | 9.801 | | | 6840 |
| 10.022 | Engineering Mathematics II | II | 1 | F | 4 | 10.001 | | | Courses 3681, 3730 |
| 10.301 | Statistics SA | II | 1 | F | 2 | 10.001 *or* 10.021CR | | | 6832, 6833 |
| 14.501 | Accounting and Financial Management IA****†††† | I | 1 | S1 | 4½ | | | | 0601, 1001, 1020, 1021, 1022, 1023, 5811, 1401, Course 3681 |
| 14.511 | Accounting and Financial Management IB | I | 1 | S2 | 4½ | 14.501 | | | 0601, 1001, 1020, 1021, 1022, 1023, 5811, 1401 |
| 14.522 | Accounting and Financial Management IIA | II | 1 | S1 | 4½ | 14.511 | | | 0601, 1001, 1022, 5811, 1401 |
| 14.542 | Accounting and Financial Management IIB | II | 1 | S2 | 4½ | 14.511 | | | 0601, 1001, 1022, 5811 |
| 14.563 | Accounting and Financial Management IIIA | III | 1 | S1 | 4½ | 14.542 | | | 1022 |
| 14.573 | Accounting and Financial Management IIIA (Honours) | III | 1 | S1 | 6 | 14.542 | | | 1023 |
| 14.583 | Accounting and Financial Management IIIB | III | 1 | S2 | 4½ | 14.522 | | | 1022, 1401 |
| 14.593 | Accounting and Financial Management IIIB (Honours) | III | 1 | S2 | 6 | 14.522 | | | 1023 |
| 14.601 | Law and Society I | I | 1 | S2 | 3 | | | | 1020, 1021, 1022, 1023 |
| 14.602 | Computer Information Systems I | II | 1 | S1 | 3 | | | | 0601, 1001, 1020, 1021, 1022, 1023, 5811, 1401 |
| 14.603 | Computer Information Systems II | II | 1 | S2 | 3 | 14.602 | | 6.647 | 0601, 1001, 1020, 1021, 1022, 1023, 5811, 1401 |
| 14.605 | Information Systems Implementation | III | 1 | S2 | 3 | 14.603 | | 6.647 | 0601, 1401 |
| 14.607 | Distributed Computer Systems | III | 1 | S2 | 3 | 14.603 | | 6.633 | 0601, 1022 1023, 1401 |
| 14.608 | Database Systems | III | 1 | S1 | 3 | 14.603 | | 6.633 | 0601, 1022, 1023, 1401 |
| 14.611 | Information Systems Development | III | 1 | S1 | 3 | 14.603 and approval from Head of Department of Information Systems | | | 0601, 1022, 1023 |
| 14.613 | Business Finance II | II | 1 | S2 | 3 | | | | 0601, 1001, 1022, 1023, 5811, 1401 |

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded | Specific Programs |
|---|---|---|---|---|---|---|---|---|---|
| 14.614 | Business Finance IIIA | III | 1 | S1 | 3 | 14.613 | | | 0601, 1022, 1023 |
| 14.615 | Business Finance IIIB | III | 1 | S2 | 3 | 14.614 | | | 0601, 1022, 1023 |
| 14.851 | Current Developments in Accounting Thought — Financial | IV | 1 | S1 | 3 | Admission to BCom degree course at honours level | | | 1023 |
| 14.852 | Current Developments in Accounting Thought — Managerial | IV | 1 | S1 | 3 | Admission to BCom degree course at honours level | | | 1023 |
| | | | | | | | | *HSC Exam Percentile Range Required* | |
| 15.001 | Microeconomics I | I | 1 | S1 *or* S2 | 3½ | 2 unit A English<br>*or* 2 unit English<br>*or* 3 unit English | | 31-100<br>21-100<br>11-100 | 0601, 1001, 1020, 1021, 1022, 1023, 1401 |
| 15.002 | Microeconomics II | II | 1 | S1 | 4 | 15.011 plus<br>2 unit Mathematics<br>*or* 3 unit Mathematics<br>*or* 4 unit Mathematics | | <br>51-100<br>21-100<br>1-100 | 0601, 1001, 1020, 1023, 5811 |
| 15.003 | Macroeconomics III | III | 1 | S1 | 4 | 15.042 | | | 0601, 1020 |
| 15.011 | Macroeconomics I | I | 1 | S1 *or* S2 | 3½ | 15.001 | | | 0601, 1001, 1020, 1021, 1022, 1023, 1401 |
| 15.012 | Microeconomics II (Honours) | II | 1 | S1 | 4 | 15.011<br>plus<br>2 unit Mathematics<br>*or* 3 unit Mathematics<br>*or* 4 unit Mathematics | | <br>51-100<br>21-100<br>1-100 | 1021 |
| 15.013 | Macroeconomics III (Honours) | III | 1 | S1 | 4 | 15.052 | | | 1021 |
| 15.024 | Advanced Macroeconomics | IV | 1 | S1 | 4 | 15.473, 15.013 *and* 15.153 | | | 1021 |
| 15.034 | International Trade | IV | 1 | S2 | 2 | 15.024 | | | 1021 |
| 15.042 | Macroeconomics II | II | 1 | S2 | 4 | 15.011 | | | 0601, 1001, 1020, 1022, 1023, 5811 |
| 15.052 | Macroeconomics II (Honours) | II | 1 | S2 | 4 | 15.012 | | | 1021 |
| 15.062 | Applied Macroeconomics | II | 1 | S1 *or* S2 | 4 | 15.011 | | | 1023 |
| 15.063 | Money Banking and the Financial System | III | 1 | S2 | 3 | 15.013 *or* 15.003 *or* 15.062 at CR level or better | | | 1020, 1021 |
| 15.072 | Applied Microeconomics | II | 1 | S1 | 4 | 15.011 | | | 1023 |
| 15.073 | Natural and Environmental Resources Economics | III | 1 | S2 | 3 | 15.002 *or* 15.072 *or* 15.012 | | | 1020, 1021 |
| 15.103 | International Economics | II | 1 | S2 | 3 | 15.002 *or* 15.012 | | | 1020 |
| 15.113 | International Economics (Honours) | II | 1 | S2 | 4 | 15.002 *or* 15.012 | | | 1020 |

*For footnotes, see overleaf*

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded | Specific Programs |
|---|---|---|---|---|---|---|---|---|---|
| 15.143 | Microeconomics III | III | 1 | S2 | 4 | 15.002 *or* 15.012 | | | 0601, 1001, 1020 |
| 15.153 | Microeconomics III (Honours) | III | 1 | S2 | 4 | 15.002 *or* 15.012 | | | 1021 |
| 15.183 | The Less Developed Countries in the World Economy† | III | 1 | S2 | 3 | 15.103 *or* 15.113 *or* 15.062 *and* 15.072 | | | 1020, 1021 |
| 15.413 | Econometrics A | III | 1 | S1 | 3½ | 10.311B†† | | | 1020, 1021 |
| 15.423 | Econometrics B | III | 1 | S2 | 3½ | 15.413 *or*†† 10.312C | | | 1020, 1021 |
| 15.440 | Operations Research in Economics | III | 1 | S2 | 3½ | 15.442 or equivalent, *or* 10.311B | | | 1020, 1021 |
| 15.434 | Mathematical Economics A | III | 1 | S1 | 3 | †† | | | 1020, 1021 |
| 15.444 | Mathematical Economics B | III | 1 | S2 | 3 | †† | | | 1020, 1021 |
| 15.416 | Applied Business Statistics | III | 1 | S1 | 3 | 15.421 or equivalent, *or* 10.311B | | | 1020, 1021 |
| 15.666 | Australia in the International Economy in the Twentieth Century | I | 1 | S1 *or* S2 | 3½ | | | | 1020, 1021, 1022, 1023 |
| 15.777 | Management Strategy and Business Development | I | 1 | S2 | 3½ | 15.601 *or* 15.666 | | | 1020, 1021, 1022, 1023 |
| 25.5212 | Sedimentology | II | ½ | S1 | 2 | 25.120 | | 25.212 | 0125, 1025, 2503 |
| 25.5313 | Stratigraphy | III | ½ | S1 | 2 | 25.5212 | | 25.312 | 0125, 1025, 2503 |
| 25.523 | Mineralogy | II | ½ | F | 2 | | | | 0401, 0402, 0403 |
| 25.631 | Marine Geology II | III | 1 | F | 3 | 25.621 | | | 6833, 6870 |
| 25.632 | Estuarine Geology‡ | III | 1 | S1 | 3 | | | | 6832, 6833, 6870 |
| 25.6341 | Marine Mineral Deposits | III | ½ | S1 | 3 | 25.621 | 25.631 | | 6833, 6870 |
| 25.635 | Marine Resources | III | 1 | F | 3 | 25.621 | 25.631 | | 6833, 6870 |
| 25.9314 | Geological Applications | III | ½ | S1 | 4 | 25.120 | | | 2503 |
| 25.9321 | Geophysical and Geological Applications | III | ½ | S2 | 3 | 25.120 | | 25.6342 | 2503 |
| 27.1711 | Introduction to Remote Sensing | III | ½ | S1 | 3 | ϕ | | | 2701, 2703, 2743, Course 3730 |
| 27.1712 | Remote Sensing Applications | III | ½ | S2 | 3 | 27.1711 | | | 2701, 2703, 2743, Course 3730 |
| 27.172 | Environmental Measurements | II | 2 | F | 6 | 27.111 | | | 2701, 2703, 2743, Course 3730 |
| 29.191 | Survey Camp | I | ½ | | | | 29.001 *and* 29.002 | | 6870 |
| 48.023 | Chemical Engineering Science I | II | 2 | F | 6S1 5S2 | 1.001, 10.001 | | | 0204 |
| 48.024 | Chemical Engineering Principles I | II | 1 | F | 3S1 2S2 | 1.001, 10.001 | | | 1001, 5811 |
| 48.037 | Chemical Engineering Science II | III | 2 | F | 7S1 6S2 | 2.002A, 48.023 | | | 0204 |

1984 -

| No. | Name | Level | Unit Value | When Offered | Hpw | Prerequisites | Co-requisites | Excluded | Specific Programs |
|---|---|---|---|---|---|---|---|---|---|
| 48.038 | Chemical Engineering Principles II | III | 1 | F | 4S1 252 | | | | 1001, 5811 |
| 68.302 | Introductory Marine Science | II | 1 | S1 | 4 | | | 25.601 | 6831, 6832, 6833, 6834, 6870 |
| 68.503 | Science of Interfaces | III | 1 | † | 5 | 1.012, 1.022, 2.002A | | | 6851, 6852, 6853 |
| 70.011A | Histology I | II | 1 | S1 | 6 | 17.041, 17.031*** | | | |
| 70.011B | Mammalian Embryology | III | 1 | S2 | 6 | 70.011A*** | | | 1270, 4170 4402‡‡ |
| 70.011C | Introductory Anatomy | II | 1 | S1 | 6 | 17.041, 17.031*** | | | 4570, 6270, 6840‡‡ |
| 70.021B | Visceral Anatomy | III | 1 | S2 | 6 | 70.011A,*** 70.011C*** | | | 7001, 7002 |
| 70.012C | Neuroanatomy I | III | 1 | S1 | 6 | 70.011A,*** 70.011C*** | | | 7003, 7073§§ |
| 70.304 | Histology II | III | 1 | S2 | 6 | 70.011A*** | §§ | 70.3041§, 70.304§ | Courses 4770 (Antomy) |
| 70.305 | Neuroanatomy II | III | 1 | S2 | 3 | 70.012C (CR) | | | 3820 |
| 70.306 | Functional Anatomy I | III | 1 | S1 | 6 | 70.011A,*** 70.011C*** | | | |
| 70.307 | Functional Anatomy II | III | 1 | S2 | 6 | 70.012C,*** 70.306*** | | | |
| 70.3041 | Histological and Histochemical Techniques‡‡‡ | III | ½ | S2 | 3 | 17.031***, 17.041*** *and* any 1 of 41.101, 45.301 *or* 70.011A*** | | | |
| 73.012F | Clinical Physiology | III | 1 | F | 3 | 73.111, 41.101, 41.111 *or* 2.002B, 70.011A, 70.011C, 80.014 | | | 3820 |
| 80.014 | Human Behaviour | II | 1 | F | 3 | | | | 3820 |

*Students who have passed 2.121 may not subsequently enrol in 2.111. A student meeting the 2.121 prerequisite is not permitted to enrol in 2.111 without the permission of the Head of the School of Chemistry. Once a student enrols in 2.111 he must pass 2.111 before he can proceed to 2.121 or 2.131. A student may not count more than *two* Level I Chemistry units towards BSc degree requirements.

**In exceptional circumstances the Head of School may give permission for students outside the specified programs to undertake one of these subjects.

***Pass Conceded (PC) awarded prior to Session 2, 1983, is not acceptable.

****Not available in Year 1 of programs 0601, 1001, 1020, 1021, 5811, 1401.

*****Can only be counted with at least 3 other Level III Computer Science units.

†Not offered in 1984.

††Consult with Head of Department.

†††May be counted as Level III for Courses 3611, 3661, 3681 and 3701.

††††May be counted as a Level II unit for Courses 3611, 3661, 3681 and 3701 in special circumstances only.

‡Excluded by 25.211.

‡‡70.011A, 70.304 and 70.3041 only.

‡‡‡May not be offered in 1984 if insufficient enrolments.

§70.304 and 70.3041 are mutually exclusive (see **Subject Descriptions** later in this handbook).

§§Anatomy units may be counted as Table 1 units in any program on obtaining special permission of the Head of the School of Anatomy.

ϕ See subject description for prerequisite requirements.

**Course 3970**
**Level IV units offered by the Board of Studies in Science and Mathematics**

# Table 3

A student planning to complete a program involving any unit/units from this table must seek the approval of the Head of the School in which the unit is taught.

| No. | Name | Level | Unit Value | When Offered | Prerequisites in Years 1, 2, 3 or 4 | Number of Level III Units Required |
|---|---|---|---|---|---|---|
| 1.104 | Physics IV (Honours) | IV | 10 | F | Program 0101, 0103, 0105, 0125, 0161 | 7 |
| | | | | | Program 5801 | 6 |
| | | | | | Program 6201 | 5 |
| 1.304 | Applied Physics IV (Honours) | IV | 10 | F | Program 0101, 0103, 0105, 0125, 0161 | 7 |
| | | | | | Program 5803 | 6 |
| 1.504 | Theoretical Physics IV (Honours) | IV | 10 | F | Program 0101§, 0105, 0161 | 7 |
| | | | | | Program 5805 | 6 |
| 1.604 | Biophysics IV (Honours) | IV | 10 | F | Program 0106 | 6 |
| 2.004 | Chemistry IV | IV | 10 | F | 4 Level III Chemistry units | 8 |
| | | | | | Program 5821 | 7 |
| 4.004 | Metallurgy IV | IV | 10 | F | Program 0401, *or* 0402 | 7-8 |
| 6.606 | Computer Science IV | IV | 10 | F | 6.613, 6.632, 6.642, 6.643 | 8 |
| 10.123 | Pure Mathematics Honours | IV | | F | Program 1003, 1013 *or* 1025 | * |
| | | | | | *Program 5811 *or* 5812 | * |
| 10.223 | Applied Mathematics Honours | IV | | F | Program 1005, 1015 *or* 1025 | * |
| | | | | | Program 5811 *or* 5812 | 7 |
| 10.233 | Applied Mathematics Honours (Short Course) | IV | 6 | F | Program 1021 *or* 1023 | * |
| 10.323 | Theory of Statistics Honours | IV | | F | Program 1007 *or* 1017 *or* 0611 | * |
| | | | | | *Program 5811 *or* 5812 | 7 |
| 10.423 | Theoretical Mechanics Honours | IV | | F | Program 1009, 1019 *or* 10.423 | * |
| | | | | | *Program 5811 *or* 5812 | 7 |
| 12.403 | Psychology IV (Research) | IV | 10 | F | Program 1201, 1270 *or* 7312 | 8 |
| 12.404 | Psychology IV (Course Work) | IV | 10 | F | Program 1201 *or* 1270 | 8 |

| No. | Name | Level | Unit Value | When Offered | Prerequisites in Years 1, 2, 3 or 4 | Number of Level III Units Required |
|---|---|---|---|---|---|---|
| 14.851 | Current Developments in Accounting Thought — Financial | IV | 2 | S1 | See program 1023 | |
| 14.852 | Current Developments in Accounting Thought — Managerial | IV | 2 | S1 | See program 1023 | |
| 15.024 | Advanced Macroeconomics | IV | 2 | S1 | See program 1021 | |
| 15.034 | International Trade | IV | 2 | S2 | See program 1021 | |
| 25.410 | Resource Geology† | IV | 2 | S1 | | |
| 25.4101 | Topics in Advanced Geology† | IV | 1 | S1 | | |
| 25.420 | Field Project† | IV | 5 | S2 | | |
| 25.412 | Sedimentary Basin Resources† | IV | 2 | | Programs 2501 and 5831 | 8 |
| 25.414 | Mineral Resources† | IV | 2 | | | |
| 25.415 | Engineering and Environmental Geology† | IV | 2 | | | |
| 25.931 | Geophysics† | IV | 2 | | | |
| 25.434 | Geology IV Honours (Single Major) | IV | 10 | F | Programs 2502, 2503 0125, 0225 1025, 2543, 2725 | 8 |
| | | | | | Program 5832 | 7 |
| 27.604 | Geography IV | IV | 10 | F | Program 2701, 2703, 2725 *or* 2743 | 8 |
| 41.103 | Biochemistry IV | IV | 10 | F | 4 Level III Biochemistry units | 8 |
| | | | | | Program 5841 *or* 5842 | 7 |
| 42.103 | Biotechnology IV | IV | 10 | F | 4 Level III units in a discipline, or disciplines, related to Biotechnology | 8 |
| 43.103 | Botany | IV | 10 | F | 4 Level III Botany units or a closely related discipline | 8 |
| | | | | | Program 5854 *or* 5855 | 7 |
| 44.103 | Microbiology Honours | IV | 10 | F | 44.102, 44.112 | 8 |
| | | | | | Program 5861, 5862 *and* 5842 | 7 |
| 45.103 | Zoology IV | IV | 10 | F | 4 Level III Zoology units | 8 |
| | | | | | Program 5866 *or* 5867 | 7 |
| 62.014 | History and Philosophy of Science Honours | IV | 10 | F | Program 6200,6201, 6225, 6243, 6245, 6270 | 8 |
| 62.024 | Science Studies Honours | IV | 10 | F | Program 0162, 0262 *or* 4162 | 8 |
| 68.304 | Marine Science IV | IV | 10 | F | Program 6831, 6832, 6833 *or* 6834 | 8 |
| 68.404 | Genetics IV | IV | 10 | F | Program 6840 | 7 |
| 68.430 | Combined Geology Physics Honours | IV | 10 | F | Program 0125 | 8 |
| 70.013 | Anatomy IV | IV | 10 | F | 4 Level III Anatomy units | 6 |
| 72.402G | Principles of Disease Processes | IV | 1 | F | 73.111 *or* equivalent 70.011C *or* equivalent | |
| 73.013 | Physiology IV | IV | 10 | F | 4 Level III Physiology units | 7-8 |
| | | | | | Program 5871 | 7 |
| 73.023 | Pharmacology | IV | 10 | F | Program 7303 | 7-8 |
| 79.014 | Human Genetics | IV | 10 | F | At least 3 of the following: 41.102A, 43.102, 44.122, 45.121, 79.201, 79.202, 79.302, 68.403 | 8 |

*Higher level units of Mathematics must be included at Levels I, II and III in order to comply with the prerequisites for admission to Level IV Mathematics. Since entry to Level IV is only with approval of the Head of School, students should discuss their Year 3 program with a Professor of the Department concerned. In special circumstances additional prerequisites may be required, or some of those listed may be waived.

§Students entering 1 504 from the 0101 program should have demonstrated adequate mathematical ability

ϕField work of up to 7 days duration is a compulsory part of the subject.

†Students undertaking Geology IV Honours in program 2501 or 5831 must enrol in 25.410, 25 4101, 25 420 and *one* of the subjects 25 412, 25.414, 25.415, *or* 25.931.

# Faculty of Biological Sciences

**Faculty of Biological Sciences**

# Introduction

The Schools of the Faculty of Biological Sciences contribute programs to the Science and Mathematics Course (**3970**) and the Faculty supervises the undergraduate course in Psychology (**3430**). The Schools of the Faculty also offer facilities for students to proceed to the award of a Graduate Diploma in Biochemical Engineering (**5320**); Graduate Diploma in Biotechnology (**5340**); to masters degrees in Biological Technology (**8260**) and in Psychology (**8250** and **8255**); and to the award of masters degrees by research and the award of the degree of Doctor of Philosophy.

Students requiring advice about the undergraduate course should contact
School of Psychology ..... Dr K. R. Llewellyn
Mr T. J. Clulow

Students requiring advice about graduate studies should check details later in this handbook and also enquire from the Head of the appropriate School.

Faculty of Biological Sciences

# Course Outline 3430

## 3430
## Psychology Degree Course — Full-time Course

### Bachelor of Science
### BSc

The four year course in Psychology, which leads to the award of the degree of Bachelor of Science, is designed to meet the requirements of students who intend to become professional psychologists, as either practitioners or research workers. It provides extensive study of psychological theory and practice, supported by an appropriate selection of other subjects.

The course is available on a full-time basis only. Entry into the course is subject to a quota which is determined from time to time.

In the fourth year, students undertake a program of study which includes courses in the major areas of general psychology and in a number of applied fields. In addition, each student must complete either a research thesis or a group research project.

Details of the qualifications required for admission to the Psychology Course leading to the award of BSc, the course requirements for Pass and Honours at graduation and rules governing admission with advanced standing are given below.

## Rules governing the Psychology Course

**1.** Applicants for admission to the Course must be matriculated to this University; and also have satisfied either the entrance requirements for 10.001 Mathematics I *or* 10.021B General Mathematics IB and 10.021C General Mathematics IC *or* for 17.031 Biology A and 17.041 Biology B.

**2.** (1) In order to qualify for admission to the award of degree of BSc in Psychology under these regulations a candidate must attend classes and satisfy the examiners in the following subjects:

(a) *Each of:*
12.100 Psychology I
12.200 Research Methods II
12.201 Basic Psychological Processes II
12.202 Complex Psychological Processes II
12.203 Psychology IIA

A total of 8 Level III units of Psychology including 12.300, 12.305 and *either* 12.304 *or* 12.322 from Group A (see Table 1). Additionally, students intending to take the research alternative in Psychology Level IV Honours are required to include 12.301 Research Methods IIIB from Group B (see Table 1).

(In special cases, the Head of the School of Psychology or his representative may approve of the substitution of some other appropriate course or equivalent units.)

*and either*
12.400 Psychology IV (Research — Course **3430**) *or* 12.401 Psychology IV (Course Work — Course **3430**) leading to the award of the degree of Bachelor of Science in Psychology.

(b) Five other subjects (or their equivalent in units) selected to meet the following requirements:

(i) that they shall include *at least* one of:
10.011 Higher Mathematics I *or*
10.001 Mathematics I *or*
10.021B General Mathematics IB *and* 10.021C General Mathematics IC
*or*
17.031 Biology A *and*
17.041 Biology B.
(They may include both the above alternatives.)

(ii) that they shall include *at least* one of:

53.001 Introduction to Sociology *or*
15.001 Microeconomics I *and* 15.011 Macroeconomics I *or* Political Science I (select two of 54.1002 Power and Democracy in Australia, 54.1003 Australian Political Institutions, 54.1004 Government in the Modern World and 54.1005 A History of Political Thought) *or*
52.103 Introductory Philosophy A *and* 52.104 Introductory Philosophy B.

*or*
with the approval of the Head of the School of Psychology, one other Arts I subject.

(iii) that they shall include at least one subject (two Science and Mathematics Level II units or twelve Arts Upper Level credit points are equivalent to one Level II subject and three Science and Mathematics Level III units are equivalent to one Level III subject) which together with the subject meeting the requirements of (i) or (ii) immediately above constitutes a recognized sequence of two courses.

Examples of recognized sequences are:

- 10.001 Mathematics I, followed by two Mathematics Level II units (chosen from 10.111A, 10.1113, 10.1114, 10.2111 and 10.2112) or by both of 10.311A Probability and Random Variables and 10.311B Statistical Inference;

- 17.031 Biology A and 17.041 Biology B followed by two Level II units chosen from the following units according to the regulations of the Board of Studies in Science and Mathematics:

  41.101 Biochemistry (equivalent to 2 units)
  41.111 Biochemical Control
  43.101 Introductory Genetics
  45.101 Biometry
  45.301 Vertebrate Zoology
  73.121 Physiology IB (equivalent to 2 units)
  68.601 Genetics of Behaviour I
  68.602 Genetics of Behaviour II

- 53.001 Introduction to Sociology followed by twelve credit points value of Sociology Upper Level subjects

  15.001 Microeconomics I and 15.011 Macroeconomics I followed by twelve credit points value of Economics Upper Level subjects

  Political Science I followed by twelve credit points value of Political Science Upper Level subjects

  52.103 Introductory Philosophy A and 52.104 Introductory Philosophy B followed by twelve credit points value of Philosophy Upper Level subjects

(2) The proposed course must be approved by the Head of the School of Psychology or his representative prior to or during enrolment. The courses must be chosen in such a way as to fit in with the timetable.

(3) Progression in the Course shall be by subjects, and the subjects in the Course may be completed in any order consistent with the requirements concerning prerequisites and corequisites for the subjects chosen.

**3.** *Prerequisites and Co-requisites*
Before enrolling in any course (or equivalent units of a subject) the student shall have attended the classes and shall have satisfied the examiners in all relevant prerequisite subjects.

The student should refer to the appropriate Faculty Handbook for a statement of subject prerequisities and/or co-requisites.

**4.** The degree of BSc in Psychology will be awarded at either Pass level or with Honours, after a minimum of four years of full-time study.

## Rules governing admission to the Psychology Course with advanced standing

**1.** Graduates of the University of New South Wales may be admitted to the Psychology Course leading to the award of the degree of BSc with exemption from no more than five subjects or their unit equivalents that they have completed. No more than two Psychology subjects may be included in these exemptions.

**2.** Undergraduates of the University of New South Wales who transfer from another course to the Psychology Course may be admitted to the Psychology Course with exemption in no more than seven Psychology Course subjects or their unit equivalents.

**3.** Graduates or undergraduates of other universities may be admitted to the Psychology Course with advanced standing.

**4.** Students admitted under Rule 3 who have satisfied the examiners in subjects of the same title or subject matter as those permissible in the Psychology Course may, subject to the approval of the appropriate Heads of School, be granted exemption in no more than five subjects, of which no more than two may be Psychology subjects.

## Recommended Psychology Course patterns

The course requirements have been so designed that they allow for:

**1.** a solid core of psychology to equip the psychologist-in-training with psychological theory, skill in experimentation and psychological techniques;

**2.** supporting studies in mathematics and/or biology (a minimum of one such course is compulsory);

**3.** supporting studies in the social sciences (a minimum of one such course is compulsory); and

**4.** the special needs, interests and academic or vocational background of individual students.

For these reasons, no course patterns are prescribed. The patterns to be completed by students who are admitted with advanced standing will take into account the subjects credited.

Students commencing university studies for the first time will arrange their pattern of supporting subjects in consultation with the Head of the School or his representative before completing enrolment.

In *Year 1*, students must take four subjects which include 12.100, either Biology I or a first-year Mathematics, one of Economics I, Sociology I, Philosophy I or Political Science I or one other Arts I subject, and a fourth subject. (It should be noted that the University has arranged these subjects so that there is no clash of timetables. If other subjects are taken, care must be taken to check that there is no timetable clash in the program that is chosen.)

In *Year 2* students take 12.200, 12.201, 12.202, 12.203, a second-year follow on subject from one of the non-Psychology subjects completed in Year 1, and one other Level I, II or III non-Psychology subject. Eight Level III units of Psychology are taken in *Year 3*, while *Year 4* consists of either 12.400 or 12.401 only.

Some examples of patterns, based on different supporting subjects are suggested below:

## Compulsory Psychology Subjects

**Year 1**
12.100

**Year 2**
12.200, 12.201, 12.202, 12.203

**Year 3**
8 Psychology Level III units including 12.300, 12.305 and either 12.304 or 12.322 from Group A. Additionally, if intending to take the research alternative in Psychology IV 12.301 must be taken from Group B.

**Year 4**
*Either* 12.400 *or* 12.401

## With Pure Mathematics or Statistics as the main supporting subject

**Year 1**
10.001 Mathematics I
A Level I Social Science subject, *and*
One other Level I subject

**Year 2**
*Either* two units of Level II Pure and Applied Mathematics, *or*
10.311A and 10.311B Theory of Statistics Level II, *and*
One other Level I or II subject

## With Biochemistry or Physiology as the main supporting subject

**Year 1**
2.121 Chemistry IA and 2.131 Chemistry IB
*Either* 10.001 Mathematics I, *or* 10.021B General Mathematics IB and 10.021C General Mathematics IC, *and*
17.031 Biology A and 17.041 Biology B

**Year 2**
A Level I Social Science subject, and
*Either* 41.101 Biochemistry,
*or* 73.121 Physiology IB

## With Zoology or Genetics as the main supporting subject

**Year 1**
10.001 Mathematics I, *or* 10.021B General Mathematics IB and 10.021 General Mathematics IC
17.031 Biology A and 17.041 Biology B, *and*
A Level I Social Science subject

**Year 2**
*Either* 45.101 Biometry, 45.201 Invertebrate Zoology, 45.301 Vertebrate Zoology and one other unit for Zoology, *or*
43.101 Introductory Genetics, 68.601 Genetics of Behaviour I 68.602 Genetics of Behaviour II and one other unit for Genetics

## With Social Sciences as the main supporting subject

**Year 1**
10.001 Mathematics I, *or* 10.021B General Mathematics IB and 10.021C General Mathematics IC, *or*
17.031 Biology A and 17.041 Biology B
A Level I Social Science subject, *and*
One other Level I subject

**Year 2**
An Upper Level Social subject, *and*
One other Level I or II subject

Notes: **1.** For details of Psychology units, and Science and Mathematics units, including pre- and co-requisites, refer to Table 1 of the Science and Mathematics Course details set out earlier in this handbook
**2.** For details of Social Science (Arts) subjects, including pre- and co-requisites, refer to the Faculty of Arts Handbook

# Faculty of Science

# Introduction

The Schools of the Faculty of Science contribute programs to the Science and Mathematics Course (**3970**) and the Faculty supervises the undergraduate courses in Pure and Applied Chemistry (**3910**) and Optometry (**3950**) and the graduate diploma course Food and Drug Analysis (**5510**). The Schools of the Faculty also offer facilities for students to proceed to Masters Degrees in Chemistry (**8770**), Mathematics (**8740**), Optometry (**8760**), Physics (**8730**), Statistics (**8750**) and Master of Science and Society (**8780**), to the award of masters degrees by research and to the award of the degree of Doctor of Philosophy.

Students requiring information about the undergraduate course should contact the representative of the appropriate School:
School of Chemistry ..... Mr W. J. Dunstan
School of Optometry ..... Dr J. Alexander

Students requiring information about the graduate studies which are available should seek advice from:
Graduate Diploma in Food and Drug Analysis..... Associate Professor G. Crank
*or*
in the case of masters and doctors degrees from:
School of Chemistry ..... Associate Professor B. J. Orr
School of Mathematics ..... Associate Professor M. N. Barber
School of Optometry..... Professor H. B. Collin
School of Physics ..... Associate Professor H. G. L. Coster

# Course Outlines

## 3910
## Pure and Applied Chemistry Course
### Specialization in Chemistry

While some students will wish to include a small number of chemistry units in courses leading to major studies in other disciplines, there will be others who wish to specialize in chemistry to varying degrees.

**1.** *Major in Chemistry in the Science and Mathematics Course.* For purposes of graduation Science and Mathematics course regulations require students to study a minimum of four Level III units in related disciplines, such a combination being regarded as major study in that discipline or group of disciplines.

When studies in chemistry are required to be regarded as being major studies at least seven units of chemistry *must* be included after completing Level I Chemistry and these *must* include at least three of the four Level II units.

Students wishing to take 8 or more Level III Chemistry units are required to transfer to the Pure and Applied Chemistry Course (**3910**) before the commencement of Year 2. If Year 2 studied in the Science and Mathematics course is similar to Year 2 of Course (**3910**), the transfer may still be made before the commencement of Year 3.

**2.** *Pure and Applied Chemistry Course.* This course which allows intensive specialization in chemistry according to a prescribed pattern, leads to the award of the Bachelor of Science degree, and is administered by the Faculty of Science. It may be taken at pass or honours standard. The pass course requires full-time attendance at the University for three years.

An additional year is required for the honours degree. The program may also be extended over a longer period (previously referred to as part-time).

A total of 23 units is required for graduation at the pass level. First years is similar to the Science and Mathematics Course and covers 8 units. Of the remaining 15 units *at least 12* must be chemistry units and must include the following:

2.002A, 2.002B, 2.002D, 2.003B, 2.003C, 2.003D, 2.0003H, 2.013A, 2.042C and 4 other Chemistry units.

The remaining 2 units may be chosen from any of the Science and Mathematics course topics listed in Table 1.

In all cases prerequisites, co-requisites and exclusions are similar to those prescribed for the units in the Science and Mathematics course.

## Electives offered by the School of Chemistry

| Level | No. | Title | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|
| II/III | 2.003E | Nuclear and Radiation Chemistry | 2.121 & 2.131, *or* 2.141 10.001 *or* 10.011 *or* 10.021B *and* 10.021C | | |
| II/III | 2.003H | Molecular Spectroscopy and Structure | 2.121 & 2.131, *or* 2.141 | | |
| II/III | 2.003J | Fundamentals of Biological and Agricultural Chemistry | 2.121 & 2.131, *or* 2.141 | | 2.013L, 41.101 |

| Level | No. | Title | Prerequisites | Co-requisites | Excluded |
|---|---|---|---|---|---|
| II/III | 2.003K | Solid State Chemistry | 2.121 & 2.131, *or* 2.141 *and* 10.001 *or* 10.011 | | |
| II/III | 2.013A | Introductory Quantum Chemistry | 1.001 *or* 1.011 *and* 2.121 & 2.131, *or* 2.141 *and* 10.001 *or* 10.011 *or* 10.021B *and* 10.021C | | |
| III | 2.003A | Physical Chemistry | 2.002A | | |
| III | 2.003B | Organic Chemistry | 2.002B | | |
| III | 2.003C | Inorganic Chemistry | 2.042C | | |
| III | 2.003D | Instrumental Analysis | 2.002D *and* 2.002A | | |
| III | 2.003L | Applied Organic Chemistry | 2.002B | | 2.033L |
| III | 2.003M | Organo-metallic Chemistry | 2.002B | | |
| III | 2.013B | Synethetic Organic Chemistry | 2.003B | | |
| III | 2.013C | Advanced Inorganic Chemistry | 2.042C | 2.003C | |
| III | 2.013D | Advanced Analytical Chemistry | 2.002D | 2.003D | |
| III | 2.013E | Advanced Nuclear and Radiation Chemistry | 2.003E | | Not available in Course **3910** |
| III | 2.013L | Chemistry and Enzymology of Foods | 2.002B | | 2.003J, 2.043L, 2.023L, 2.053L |
| III | 2.023A | Quantum Theory of Atoms and Molecules | 2.002A *and* 10.2111 *and* 10.2112 | | |
| III | 2.023B | Natural Product Chemistry | 2.003B | | |
| III | 2.023L | Biological and Agricultural Chemistry 2.043L | 2.002B | | 2.053L, 2.013L |
| III | 2.033A | Physical Chemistry of Macro-molecules | 2.003J *or* 2.002B *and* 1.012 *or* 2.002A | | |
| III | 2.043A | Environmental Chemistry | 2.002A, 2.002D | | |
| III | 2.043L | Chemistry and Enzymology of Foods† (double unit) | 2.002B | | 2.013L, 2.023L, 2.053L |
| III | 2.053A | Chemical Kinetics and Reaction Mechanisms | 2.002A | | |
| III | 2.053L | Biological and Agricultural Chemistry† (double unit) | 2.002B | | 2.013L, 2.023L, 2.043L |
| III | 2.063A | Advanced Molecular Spectroscopy | 2.013A | | |

†Only *one* of these double units may be chosen.

## 3910
## Pure and Applied Chemistry — Full-time Course

### Bachelor of Science
### BSc

| **Year 1** | | **Hours per week** |
|---|---|---|
| 1.011 *or* 1.001 | Higher Physics I *or* Physics I | 6 |
| 2.121 2.131 2.141 | Chemistry IA & Chemistry IB *or* Chemistry IM | 6 |
| 10.011 *or* 10.001 10.021B & 10.021C | Higher Mathematics I *or* Mathematics I *or* General Mathematics IB & General Mathematics IC | 6 |
| *Plus one of* | | |
| 5.010 5.020 5.030 | Engineering A *and* Engineering B *or* Engineering C | 6 |
| 17.031 17.041 | Biology A *and* Biology B | 6 |
| *or* | | |
| 25.110* 25.120** | Earth Materials and Processes *and* Earth Environment and Dynamics | 6 |
| 27.301 27.302 | Introduction to Physical Geography *and* Introduction to Human Geography | |

*Field work of up to 1½ days is a compulsory part of the subject.
**Field work of up to 3½ days is a compulsory part of the subject.

**Year 2**

| | | Hpw |
|---|---|---|
| 2.002A | Physical Chemistry | 3 |
| 2.002B | Organic Chemistry | 3 |
| 2.002D | Analytical Chemistry | 3 |
| 2.003H | Molecular Spectroscopy and Structure | 3 |
| 2.042C | Inorganic Chemistry | 3 |
| | Science Electives* (2 units) | 6 |
| | One General Studies Elective | 1½ |
| | | 22½ |

*To be chosen from units in the Science and Mathematics course in accordance with Science course requirements. The following are recommended.

Chemistry

Any non-compulsory units for which prerequisites are held.

Mathematics

| | | |
|---|---|---|
| 10.031 | Mathematics | 2 |
| 10.331 | Statistics SS | 2 |
| 10.111A<br>10.1113<br>*and*<br>10.1114<br>10.2111<br>*and*<br>10.2112 | Mathematics II | 6 |

Physics

Choose 2 of

| | | |
|---|---|---|
| 1.9222 | Electronics | 3 |
| 1.9322 | Introduction to Solids | |
| 1.9422 | Introduction to Physics of Measurement | |

Biological Science

| | | |
|---|---|---|
| 17.031<br>17.041 | Biology A *and*<br>Biology B | 6 |
| 41.101 | Biochemistry | 12 |
| 44.101 | Introductory Microbiology | 6 |

Geology

| | | |
|---|---|---|
| 25.110<br>25.120 | Earth Materials and Processes *and*<br>Earth Environment and Dynamics | 6 |
| 25.211 | Earth Materials I | 3 |
| 25.221 | Earth Materials II | 3 |
| 25.212 | Earth Environment I | 3 |
| 25.223 | Earth Physics | 3 |

**Year 3**

| | | |
|---|---|---|
| 2.003B | Organic Chemistry | 3 |
| 2.003C | Inorganic Chemistry | 3 |
| 2.003D | Instrumental Analysis | 3 |
| 2.013A | Introductory Quantum Chemistry | 3 |
| | Advanced Electives* (4 units) | 12 |
| | One General Studies Elective | 1½ |
| | | 25½ |

*Chosen from Level II/III or Level III units offered by the School of Chemistry in the Science and Mathematics course and in accordance with Science and Mathematics course regulations.

**Year 4 Honours**

| | | |
|---|---|---|
| 2.004 | Chemistry Honours | 24 |

## Extended Time Program

The course in Pure and Applied Chemistry may be extended over a longer period of time (previously referred to as part-time); however, evening instruction is not necessarily offered in all subjects.

This provision has been designed for students employed in the chemical industry, but employment in this industry is not obligatory for extending the time for the program of study.

A possible way in which this extended time program may be done over six years is set out below:

**Stages 1 and 2**

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

| | | Hpw |
|---|---|---|
| 1.011<br>1.001 | Higher Physics I *or*<br>Physics I | 6 |
| 2.121<br>2.131<br>2.141 | Chemistry IA *and*<br>Chemistry IB *or*<br>Chemistry IM | 6 |
| 10.001<br>10.021B<br>10.021C | Mathematics I *or*<br>General Mathematics IB *and*<br>General Mathematics IC | 6 |
| *Plus one of* | | |
| 5.010<br>5.020<br>5.030 | Engineering A *and*<br>Engineering B *or*<br>Engineering C | 6 |
| | *or* | |
| 17.031<br>17.041 | Biology A<br>*and*<br>Biology B | 6 |
| | *or* | |
| 25.110*<br>25.120** | Earth Materials & Processes<br>*and*<br>Earth Environment & Dynamics | 6 |
| | *or* | |
| 27.301<br>27.302 | Introduction to Physical Geography*** *and*<br>Introduction to Human Geography*** | 4½ |

*Field work of up to 1½ days is a compulsory part of the subject.
**Field work of up to 3½ days is a compulsory part of the subject.
***Field work (to be arranged by the School of Geography) is a compulsory component of each unit.

**Stage 3**

| | | Hpw |
|---|---|---|
| 2.002A | Physical Chemistry | 3 |
| 2.042C | Inorganic Chemistry | 3 |
| | Science Electives* (two units) | 6 |
| | | 12 |

*See footnote * under Year 2 full-time course.

**Stage 4**

| | | |
|---|---|---|
| 2.002B | Organic Chemistry | 3 |
| 2.002D | Analytical Chemistry | 3 |
| 2.003H | Molecular Spectroscopy and Structure | 3 |
| | General Studies Elective | 1½ |
| | | 10½ |

**Stage 5**

| | | |
|---|---|---|
| 2.003B | Organic Chemistry | 3 |
| 2.003C | Inorganic Chemistry | 3 |
| 2.003D | Instrumental Analysis | 3 |
| 2.013A | Introductory Quantum Chemistry | 3 |
| | General Studies Elective | 1½ |
| | | 13½ |

**Stage 6**

| | | |
|---|---|---|
| | Advanced Electives* (4 units) | 12 |

*See footnote under Year 3 full-time course.

### Honours

The requirements for admission to the honours course and the program of study are the same as for Year IV of the full-time course. A student wishing to do honours over a longer period should consult the Head of the School of Chemistry. Students are, however, advised to make every effort to do the honours year full time.

## 3950 Optometry Course

The School of Optometry provides a four year full-time course in Optometry leading to the award of the degree of Bachelor of Optometry, at either the pass or honours level. The first year of the course involves a study in the fundamental sciences of physics, chemistry, mathematics and biology. Students who have completed the first year of a science course including physics, chemistry, mathematics and general and human biology or zoology at any Australian university are eligible for selection for admission to the second year of the course. Second, third and fourth years are devoted to professional training in optometry including clinical optometry in the final year.

## 3950 Optometry — Full-time Course

### Bachelor of Optometry BOptom

**Year 1**

| | | Hours per week |
|---|---|---|
| 1.001 | Physics I | 6 |
| 2.121 | Chemistry IA *and* | |
| 2.131 | Chemistry IB *or* | 6 |
| 2.141 | Chemistry IM | |
| 10.001 | Mathematics I *or* | |
| 10.011 | Higher Mathematics I *or* | |
| 10.021B | General Mathematics IB *and* | 6 |
| 10.021C | General Mathematics IC | |
| 17.031 | Biology A *and* | 6 |
| 17.041 | Biology B | |
| | | 24 |

In special cases, students who do not meet the prerequisites for admission to 2.121 Chemistry IA may be enrolled in 2.111 Introductory Chemistry in Session 1, 2.121 Chemistry IA in Session 2 and be permitted to carry 2.131 Chemistry IB into Session 1 of Year 2.

**Year 2**

| | | |
|---|---|---|
| 31.811 | Optometry I | 10 |
| 31.821 | Anatomy and Physiology of the Eye and Visual System | 6 |
| 73.011A | Principles of Physiology | 6 |
| | General Studies Elective | 2 |
| | | 24 |

**Year 3**

| | | |
|---|---|---|
| 12.100 | Psychology I | 5 |
| 31.812 | Optometry II | 15 |
| 31.831 | Diseases of the Eye | 3 |
| | Two General Studies Electives | 4 |
| | | 27 |

**Year 4**

| *Full Year* | | S1 | S2 |
|---|---|---|---|
| 12.741 | Psychology (Optometry) | 2 | 2 |
| 31.813 | Optometry III | 6 | 6 |
| 31.841 | Clinical Optometry | 15 | 15 |
| *Session 2* | | | |
| 74.001 | Indication for Medical Referral | 0 | 1 |
| | | 23 | 24 |

# Conditions for the combined course leading to the award of the degrees of BSc BOptom in the Faculty of Science

**1.** Undergraduates* of the University of New South Wales who have satisfied the examiners in at least the first two years of the Optometry degree course may be admitted to the Science degree course with advanced standing for the purpose of qualifying for the award of the two degrees of BSc BOptom. Such undergraduates' performance shall have been of a high standard and their admission shall be subject to the approval of the Dean of the Faculty of Science.

**2.** In order to qualify for the award of the degree of BSc, students so admitted shall be required to complete the appropriate general studies subjects and no less than four units of either Level II or Level III and four other Level III units, in accordance with the Science and Mathematics Course regulations.

The units submitted for the award of the Bachelor's degree under these regulations must include at least four Level III units chosen from related disciplines in accordance with the Science Course regulations.

**3.** In order to qualify for the award of the degree of BOptom, students so admitted shall complete the requirements of the Optometry degree course.

*In Rule 1, the word 'undergraduates' includes graduands, ie a person may be admitted under these rules if he has met all requirements for a first degree which has not yet been conferred on him and his admission under these rules shall be no bar to the subsequent award of the first degree.

Graduate Study
Conditions of the Award of Higher Degrees
Subject Descriptions

# Sciences

**Faculty of Biological Sciences and Faculty of Science**

# Graduate Study

## Faculty of Biological Sciences and Faculty of Science Enrolment Procedures

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

## Faculty of Biological Sciences

Facilities are available in each of the Schools for research leading to the degrees of Master of Science and Doctor of Philosophy. The School of Biotechnology offers a graduate diploma course in Biochemical Engineering, a graduate diploma in Biotechnology *and* a Master's course in Biotechnology by formal study, and the School of Psychology offers Master of Psychology and Master of Science (Psychology) degree courses.

### Higher Degree Qualifying Program

Students without a BSc Honours degree wishing to register as higher degree candidates must usually complete a qualifying program, admission to which is subject to the approval of the Faculty Higher Degree Committee.

Applicants must normally have a degree or diploma in an appropriate field of study from an approved university or institution, and in the case of a diploma, appropriate professional experience.

Undergraduates of this University may be admitted to the full-time or part-time Honours undergraduate course. Other applicants may be admitted to a full-time, part-time or external qualifying program. The duration of the qualifying program is a minimum of one year for full-time and two years for part-time or external students.

*Content of Qualifying Program*
The qualifying program consists of the whole of the usual program for the final Honours year of the undergraduate course, the following being the prescribed Level IV subjects:

41.103 Biochemistry Honours
42.103 Biotechnology Honours
43.103 Botany Honours
44.103 Microbiology Honours
12.403 Psychology IV (Research)
45.103 Zoology Honours

The qualifying program is graded in the usual way, and in appropriate cases the results are expressed as a grading equivalent to Honours.

*Alternative Qualifying Program*
Applicants who cannot attend the University regularly for the above programs may be admitted as external qualifying students to a program similar to a standard Honours year. The following are the alternative qualifying subjects:

41.999G Biochemistry
42.999G Biotechnology
43.999G Botany
44.999G Microbiology
12.999G Psychology
45.999G Zoology

The results in alternative qualifying subjects are graded Pass or Fail only.

*Fees*
Candidates enrolled in the Alternative Qualifying Program are exempt from student service fees.

## Biotechnology

### 5320
### Biochemical Engineering Graduate Diploma Course

**Graduate Diploma**
**GradDip**

The School of Biotechnology, conjointly with the School of Chemical Engineering and Chemical Technology, offers a course in biochemical engineering which leads to the award of a graduate diploma (GradDip). The course is open to graduates in the biological sciences, chemistry, chemical engineering or agriculture, and can be completed in one year of full-time or over a longer period by part-time study. It contains a component of graduate level 'bridging' subjects, designed to facilitate the introduction of graduates with a variety of backgrounds to the current practice of biochemical engineering.

The normal entrance requirement is an appropriate degree or equivalent qualification in biological sciences, chemistry, chemical engineering or agriculture. Intending students are referred to the conditions for the award of Graduate Diplomas set out later in this handbook.

| | | Hours per week S1 | S2 |
|---|---|---|---|
| *Session 1* | | | |
| 42.211G | Principles of Biology | 3 | 0 |
| 42.212G | Principles of Biochemistry | 3 | 0 |
| 44.101 | Introductory Microbiology | 6 | 0 |
| 48.282G | Thermodynamics | 4 | 0 |
| 48.284G | Mass Heat and Momentum Transfer | 4 | 0 |
| *Session 2* | | | |
| 42.213G | Biochemical Methods | 0 | 3 |
| 42.214G | Biotechnology | 0 | 3 |
| 48.283G | Process Dynamics and Biochemical Engineering Design | 0 | 8 |

### 5340
### Biotechnology Graduate Diploma Course

**Graduate Diploma**
**GradDip**

The graduate diploma course provides the opportunity for graduates with no previous tuition in biotechnology to undertake training in this discipline.

A degree in a science-based course is required for admission. If the degree course has not included a biology component, the candidate is required to undertake some basic biology training as a prerequisite or co-requisite.

Under normal circumstances, students whose previous training has included a substantial component of biotechnology will not be admitted to the course.

The course comprises study of undergraduate and graduate formal subjects, plus extensive laboratory training in biotechnology.

The diploma is awarded after one year's full-time study, consisting of an average of 19 hours per week, or two years part-time study, consisting of an average of 9½ hours per week. The program includes the listed obligatory subjects plus sufficient of the listed elective subjects to meet the hours of study required. The electives include subjects necessary for students without previous tuition in biochemistry and/or microbiology, as well as alternatives for those with previous tuition in these disciplines. The choice of electives in each individual case is subject to approval by the Head of School.

| | | Hours per week S1 | S2 |
|---|---|---|---|
| **Obligatory Subjects** | | | |
| *Full Year* | | | |
| 42.215G | Practical Biotechnology | 7 | 7 |
| *Session 1* | | | |
| 42.102A | Biotechnology A | 6 | |
| **Elective Subjects** | | | |
| *Full Year* | | | |
| 42.104G | Graduate Seminars | 2 | 2 |
| 42.111G | Reading List in Biotechnology (Microbiology) | 3 | 3 |
| 42.112G | Reading List in Biotechnology (Biochemistry) | 3 | 3 |
| 42.305G | Case Studies | 0 | 2 |
| *Session 1* | | | |
| 44.101 | Introductory Microbiology | 6 | |
| 42.212G | Principles of Biochemistry | 3 | |
| *Session 2* | | | |
| 42.101 | Introduction to Biotechnology | | 6 |
| 42.102B | Biotechnology B | | 6 |
| 44.121 | Microbiology I | | 6 |

### Master of Science (Biotechnology)

The School also offers a formal graduate course at the masters' level (Master of Science (Biotechnology)). The course includes advanced treatments of all areas of biotechnology. It is open to graduates with a four-year degree in biotechnology or a related discipline, or who have, in the opinion of the Higher Degree Committee, acquired equivalent qualifications or experience. Intending students are referred to **Conditions for the Award of Graduate Degrees** set out later in this handbook.

The course consists of lectures, tutorials, practical sessions, case history studies and a supervised project. The minimum period of registration before the award of the degree is two sessions for full-time students and four sessions for part-time students.

To qualify for the degree students must satisfy the examiners in the prescribed examinations, which include the submission and assessment of a report on the specified project.

## 8260
## Master of Science (Biotechnology) Graduate Course

### Master of Science (Biotechnology)
### MSc(Biotech)

| | | Hours per week S1 | S2 |
|---|---|---|---|
| *Full Year* | | | |
| 42.306G | Project | 7 | 7 |
| *Session 1* | | | |
| 42.303G | Biochemical Process Control | 5 | 0 |
| 42.304G | Biodeterioration and Biodegradation | 5 | 0 |
| *Session 2* | | | |
| 42.301G | Microorganism Productivity | 0 | 5 |
| 42.302G | Enzyme Technology | 0 | 5 |
| 42.305G | Case Studies | 0 | 2 |
| | | 17 | 19 |

# Psychology

Head of School
Vacant
Administrative Officer
Mr T. J. Clulow

The School of Psychology offers courses leading to the award of the degrees of Master of Psychology and Master of Science (Psychology).

### Master of Psychology

This course is designed to provide professional training at an advanced level for honours graduates in psychology.

The normal entrance requirements are:

**1.** a degree of Bachelor, with Honours Class I or Class II in Psychology;

*and*

**2.** completion of approved courses in learning, perception and cognition, physiological psychology, psychological statistics, psychometrics and abnormal psychology, or in such other fields as may be prescribed by the Head of the School.

A student who does not satisfy the above requirements may be permitted to undertake a qualifying course prescribed by the Head of School, satisfactory completion of which will be accepted as meeting entrance requirements.

Selection of students is based on academic qualifications and suitability for the course. It may be necessary to limit the number of new enrolments in any year. An application to register for the degree of Master of Psychology must be made on the prescribed form which shall be lodged with the Registrar at least two months before the commencement of the academic year.

The minimum period of registration before the award of the degree is four sessions for full-time students and six sessions for part-time students.

To qualify for the degree, students must satisfy the examiners in respect of their academic attainments, and their skill and competence in relevant aspects of practical professional work.

The course consists of lectures, seminars, demonstrations and practical work, supervised clinical and community work, and a research thesis.

The major aims of the course are: **1.** to acquaint students with the issues, findings and problems of contemporary clinical and community psychology; and **2.** to equip them with basic clinical skills and techniques. A total of 250 hours of supervised clinical practice must be completed in the first year, and a further 430 hours in the second year.

Assessment of student performance is by sessional examinations, class tests, seminar papers and a research thesis.

It should be noted that the course extends over two calendar years and not just four academic sessions with vacation breaks.

## 8250
## Master of Psychology Graduate Course—Full-time

### Master of Psychology
### MPsychol

| Year 1 | | Hours per week S1 | S2 |
|---|---|---|---|
| *Full Year* | | | |
| 12.231G | Professional Practice: 250 hours | | |
| 12.235G | Community Psychology | 5 | 5 |
| 12.237G | Biological Aspects of Behavioural Disturbance | 2 | 2 |
| 12.239G | Research and Evaluation Methods in Clinical and Community Psychology | 2 | 2 |
| 12.240G | Graduate and Clinical Seminars | 2 | 2 |
| 12.241G | Graduate Colloquium | 1 | 1 |
| 12.242G | Research Thesis* | | |
| 12.243G | Experimental Clinical Psychology | 5 | 5 |
| 12.244G | Psychological and Behavioural Assessment | 1 | 1 |
| 12.245G | Behavioural Health Management | 2 | 2 |

| Year 2 | | Hpw S1 | S2 |
|---|---|---|---|
| *Full Year* | | | |
| 12.230G | Psychological Problems of Children | 3 | |
| 12.231G | Professional Practice: 180 hours in Session 1 250 hours in Session 2 | | |
| 12.235G | Community Psychology | 3 | |
| 12.241G | Graduate Colloquium | 1 | 1 |
| 12.242G | Research Thesis* | | |
| 12.243G | Experimental Clinical Psychology | 3 | |

*Contributes approximately 40 per cent to the overall grading for the degree.
Note: Part-time students normally are expected to take half the full-time program in any one session.

## Master of Science (Psychology)

The degree is available only to students who hold the degree of Doctor of Philosophy in an approved area of psychology. In combination with the PhD, the degree is designed to train candidates for academic positions in clinical psychology and to provide the background necessary for advancement to senior posts in applied fields.

The minimum period of full-time registration for the degree is three sessions, and the minimum period of part-time registration is six sessions. Students with advanced standing may have the minimum period reduced by up to one-third of the program.

Assessment of student performance is by sessional examinations, class tests and seminar papers.

### 8255
### Master of Science (Psychology) Graduate Course—
### Full-time

**Master of Science (Psychology)**
**MSc (Psychol)**

| Year 1 | | Hours per week S1 | S2 |
|---|---|---|---|
| 12.231G | Professional Practice: 250 hours | | |
| 12.237G | Biological Aspects of Behavioural Disturbance | 2 | 2 |
| 12.239G | Research and Evaluation Methods in Clinical and Community Psychology | 2 | 2 |
| 12.241G | Graduate Colloquium | 1 | 1 |
| 12.243G | Experimental Clinical Psychology | 5 | 5 |
| 12.244G | Psychological and Behavioural Assessment | 1 | 1 |
| 12.245G | Behavioural Health Management | 2 | 2 |
| 12.246G | Behavioural Management in Institutions | 2 | 2 |
| 12.247G | Graduate Seminars in Clinical Psychology | 2 | 2 |

| Year 1 | | Hpw S1 | S2 |
|---|---|---|---|
| 12.230G | Psychological Problems of Children | 3 | |
| 12.231G | Professional Practice: 200 hours | | |
| 12.241G | Graduate Colloquium | 1 | |
| 12.243G | Experimental Clinical Psychology | 3 | |
| 12.248G | Community Psychology | 3 | |

Note: Part-time students take half the full-time program in any one session.

# Faculty of Science

Facilities are available in each of the schools for research leading to the award of the higher degrees of Master of Science and Doctor of Philosophy.

The following formal courses leading to graduate awards are also offered:

| | |
|---|---|
| Faculty of Science | Graduate Diploma in Physical Oceanography |
| School of History and Philosophy of Science | Master of Science and Society |
| School of Optometry | Master of Optometry |
| School of Chemistry | Master of Chemistry<br>Graduate Diploma in Food and Drug Analysis |
| School of Mathematics | Master of Mathematics<br>Master of Statistics |
| School of Physics | Master of Physics |

For admission to registration for all degrees of Master (except Master of Statistics), candidates must have completed one of the following:

**1.** An approved degree of Bachelor with Honours.

**2.** An approved three year course leading to the degree of Bachelor plus an approved qualifying program. Suitable professional and/or research experience may be accepted in lieu of the qualifying program.

**3.** An approved four year course leading to the degree of Bachelor.

Applicants for registration for the degree of Master of Statistics shall have been admitted to the degree of Bachelor with major studies in the field of statistics in the University of New South Wales or other approved university.

The manner of presentation and examination of reports of projects undertaken as part of formal courses shall be determined by the Head of the School.

The conditions governing these awards are set out later in this handbook.

## 5530
## Physical Oceanography Graduate Diploma Course

### Graduate Diploma in Physical Oceanography
### GradDip

This graduate diploma is intended to train graduates in the physical sciences or engineering in the basic techniques of physical oceanography.

It is intended to develop student skills in planning and execution of oceanographic experiments, in the theory of oceanographic fluid mechanics, the applications and limitations of oceanographic equipment and of commonly used data analysis techniques.

Recent rapid developments in marine science coupled with the relative scarcity of persons able to take up support positions demonstrate the need for skilled persons who will be able to assist oceanographic research with minimum training. This program is aimed at providing such skilled graduates.

Intending students are referred to the conditions for the award of graduate diplomas set out elsewhere in this handbook. Basic entry qualifications for this program are a degree in Engineering or in Science with major studies in mathematics or physics.

The program, requiring 28 credits for completion, consists of a major project (67.001G) worth 50% of the total accreditation for the program, the remaining 50% being comprised as indicated below.

**1. Compulsory Subjects**

| | | |
|---|---|---|
| 67.001G | Experimental Project | 14 credits |
| 67.002G | Geophysical Fluid Dynamics | 4 credits |
| 67.003G | Instrumentation | 1 credit |
| 67.004G | Applied Data Analysis | 2 credits |

**2. Elective Subjects**

| | | |
|---|---|---|
| 67.005G | Theoretical Project | 7 credits |
| 6.380G | Data aquisition and analysis in Remote Sensing | 1 credit |
| 6.387G | Programming and software in Remote Sensing | 1 credit |
| | Appropriate existing subjects within mathematics, physics or engineering chosen on the basis of individual background | |

Here 1 credit is defined as being 1 hour per week for one session. The course may be taken over one year (full-time) or two years (part-time).

## Chemistry

**Head of School**
Professor J. S. Shannon
**Executive Assistant to Head of School**
Mr W. J. Dunstan

## 8770
## Master of Chemistry Graduate Course

### Master of Chemistry
### MChem

Three programs are available, emphasising different areas of chemistry. Each program consists of a number of lecture courses (each separately examinable), laboratory instruction and visits to laboratories. In addition each student undertakes a short research project, with a research report assessed by two examiners. The student may also be required to undergo an oral examination.

Program 2.581G Advanced Analytical Chemistry and 2.583G Analytical Science (Chemistry) are available only on a full-time basis; however, the qualifying program may be taken part-time.

Program 2.582G Food and Drug Chemistry may be taken either full-time or part-time.

Details of the programs are:

**2.581G Advanced Analytical Chemistry**

This program should be of interest to chemistry graduates who are involved in the practice or teaching of analytical chemistry.

**1.** *2.581G Advanced Analytical Chemistry Lecture Courses*

Students are required to take *all* of the following nine core courses of lectures:

(1) Analytical flame spectroscopy;
(2) Advanced electrochemical analysis;
(3) Chromatography;
(4) Analytical chemistry of pollutants;
(5) Emission, IR, Mass and XRF spectroscopy;
(6) Calculations and statistics in analytical chemistry;
(7) Chemical analysis of organic and biological materials;
(8) Operations and applications of minicomputers in chemistry;
(9) Chemical microscopy.

The lecture time for the whole course is a minimum of 140 hours.

**2.** *Laboratory Instruction and Visits to Laboratories*

An additional minimum of 150 hours is spent by students in selected areas of laboratory practice, instruction and visits to laboratories.

**3.** *Research Project*

A short research project (with report) of approximately 4 months' duration full-time (400 hours laboratory work) is selected in relation to the combined interests of the student and the supervisor.

**2.582G Food and Drug Chemistry**

This program involves an advanced study of the chemistry, stability, mode of action (where applicable) and analysis of food constituents, food additives and selected drugs. Entry to this program is excluded in the case of applicants who have completed the Graduate Diploma in Food and Drug Analysis (course 5510).

**1.** *Food and Drug Chemistry Lecture/Laboratory Courses*

(1) Food and Drugs I
(2) Treatment of Analytical Data
(3) Instrumental Techniques in Food and Drug Analysis
(4) Food and Drugs II
(5) Toxicology, Occupational and Public Health

The lecture time for the whole course is 132 hours. An additional 308 hours is spent by students in formal laboratory work. Students who have not previously taken an approved course in microbiology are required to complete unit 44.101 Introductory Microbiology (84 hours) in addition to the above program.

**2.** *Research project*

A short research project (with report) of approximately 4 months' duration full-time (400 hours laboratory work) is selected in relation to the combined interests of the student and the supervisor.

**2.583G Analytical Science (Chemistry)**

This program provides a more broadly based training in methods of chemical analysis than 2.581G.

**1.** *Formal course work*

Students are required to complete all of the following courses of lectures and associated laboratory work.

(1) Classical methods of chemical analysis
(2) Instrumental analysis
(3) Toxicology, occupational and public health
(4) Special instrumental analysis methods

The lecture time for the whole course is 98 hours. An additional 196 hours is spent in formal laboratory sessions.

**2.** *Project*

A short project (with report) requiring 400 hours of laboratory work, which may be either original research work or development work. The field of work will be selected considering the combined interests of the student and supervisor.

## 5510
## Food and Drug Analysis Graduate Diploma Course

### Diploma in Food and Drug Analysis
### DipFDA

According to demand the course may be available on a full-time basis over one year or on a part-time basis over two years.

The course in food and drug analysis is designed to provide systematic training at an advanced level for chemists who wish to extend their acquaintance with analytical techniques, and thus is suitable for those who may wish to practice as public analysts. It is also suitable for those who wish to work in the food or pharmaceutical industry. The prime aim is to present discussions of the principles and design of analytical methods which are therefore presented on a comparative basis.

It is considered that the techniques involved in the handling of foods and drugs together with those discussed in the ancillary subjects of the course provide a firm basis of approach to many other fields.

Intending students are referred to the conditions for the award of graduate diplomas set out later in this handbook.

**Year 1**

| **Part-time**** | | **Hours per week** |
|---|---|---|
| 2.231G | Food and Drugs I | 4 |
| 2.371G | Treatment of Analytical Data | 1* |
| 2.281G | Instrumental Techniques in Food and Drug Analysis | 4 |
| | | 9 |

**Year 2**

| | | |
|---|---|---|
| 2.242G | Food and Drugs II Pharmacognosy and Microscopy of Crude Drugs | 4 |
| 2.251G | Toxicology, Occupational and Public Health | 3 |
| 44.101 | Introductory Microbiology | 3† |
| | | 10 |

*For 20 weeks.
†Offered in Session 1 only, at 6 hpw.
**Full-time students take Years 1 and 2 in the one year.

## History and Philosophy of Science

**Head of School**
Professor J. Ronayne

The School of History and Philosopy of Science offers a graduate program of coursework and research leading to the award of the degree of Master of Science and Society. The course is designed for graduates in the natural sciences, the applied sciences, technology and the social sciences or other relevant discipines, who have a special interest in or concern with problems in the contemporary relationships between science and society, government and politics. The conditions for the award of the degree are set out later in this handbook.

## 8780
## Master of Science and Society Graduate Course

### Master of Science and Society
### MScSoc

The MScSoc pass program comprises 8 units of the course, which should normally be completed over 4 sessions of part-time (evening) study. A unit of the course requires 28 hours of seminar classwork and additional private study.

The following core units are common to the programs of all candidates:

62.716G Science and Society in the Twentieth Century*
62.713G Project*

Candidates may select 4 further units from the following list:

62.701G Philosophy and Methodology of Science
62.709G The Scientific Community
62.710G Science, Philosophy and Social Values
62.714G Knowledge, Power and Public Policy
62.715G Cause, Belief and Progress in the History of Science
62.718G Science in National Cultures: Comparative Historical Perspectives
62.720G The Sociology of Scientific Knowledge
15.716G Science, Technology and Economic Development
26.568G Technology and Alternative Development
30.960G Technology and Organisations
53.309G Social and Technological Forecasting (2 units)

Selected candidates may undertake a third-year MScSoc honours degree program of advanced study which includes a dissertation based on supervised research into particular aspects of the relationships between science and technology and science and its institutions.

*2 units.

## Mathematics

Head of School
Professor G. Brown

The School of Mathematics offers graduate courses leading to the award of the degrees of Master of Mathematics (MMath) and Master of Statistics (MStats). (The School also offers the pass degree of MA. For further details see the Faculty of Arts Handbook.)

### 8740
### Master of Mathematics Graduate Course

#### Master of Mathematics
#### MMath

The Master of Mathematics Course is intended for honours graduates in pure or applied mathematics, but others may be admitted after completing a qualifying course. The course may be completed in one year of full-time or two years of part-time study. The course may be taken as a preliminary step towards the award of a PhD in mathematics. It also provides advanced training for persons specializing in the teaching of mathematics in tertiary institutions. In addition an appropriate program may provide training for those employed or seeking employment in the area of industrial mathematics.

The program consists of seven lecture courses from 10.194G, the duration of each being two hours per week for one session. With the approval of the Head of the School of Mathematics a student may substitute for one or more of these lecture courses a reading course supervised by a member of staff. Again with this approval a student may substitute for at most two of these courses graduate courses offered either within or outside the School of Mathematics. Students are also required to participate in relevant departmental seminars. In addition, students are required to undertake a project supervised by a staff member, consisting of either a critical review of the literature in a specific field of mathematics, or a short research project. It is anticipated that students will spend three hours per week for two sessions on their project. Each candidate's proposed program of study requires the approval of the Head of the School of Mathematics.

The conditions for the award of the degree are set out later in this handbook.

### 8750
### Master of Statistics Graduate Course

#### Master of Statistics
#### MStats

The Master of Statistics Course covers a wide range of statistical theory and practice and provides advanced training for practising statisticians. The course may be completed in two years of full-time or four years of part-time study, and it is available to graduates with a pass degree in statistics or an honours degree in a related field (commonly mathematics) with supporting study in statistics. Honours graduates in statistics may be exempted from a maximum of half the course. The conditions for the award of the degree are set out later in this handbook.

The academic requirement for the degree is 24 credits.

Each candidate's program of study must be approved by the Head of the School.

| **Compulsory Subjects** | | **Credits** |
|---|---|---|
| 10.381G | Experimental Design I | 2 |
| 10.383G | Stochastic Processes | 2 |
| 10.385G | Multivariate Analysis I | 2 |
| 10.390G | Statistical Inference | 2 |
| 10.392G | Project | 2 |
| **Elective Subjects** | | |
| 10.382G | Experimental Design II | 2 |
| 10.384G | Time Series | 2 |
| 10.386G | Multivariate Analysis II | 2 |
| 10.387G | Sample Survey Design | 2 |
| 10.388G | Sequential Analysis | 2 |
| 10.389G | Non-Parametric Methods | 2 |
| 10.391G | Special Topic* A | 2 |
| 10.393G | Special Topic* B | 2 |
| 10.394G | Discrete Distributions | 2 |
| 10.212M | Optimal Control Theory *or* | 3 |
| 10.222M | Higher Optimal Control Theory | |

Up to 6 credits may be taken in graduate subjects offered by other Departments or Schools within the University, subject to the approval of the Head of School. Such subjects include:

| | | |
|---|---|---|
| 8.403G | Theory of Land Use/Transport Interaction | 2 |
| 8.405G | Urban Transport Planning Practice | 2 |
| 8.417G | Transport and Traffic Flow Theory | 4 |
| 10.212L | Optimization Methods *or* | 3 |
| 10.222L | Higher Optimization Methods | |
| 15.423 | Econometrics B | 2 |
| 18.771G | Simulation in Operations Research | 2 |

*To be arranged: eg biological statistics, further work on order statistics, population statistics, non-linear programming, discrete distribution theory.

## Optometry

Head of School
Professor H. B. Collin

The School of Optometry offers a formal graduate course leading to the award of the degree of Master of Optometry (MOptom). This course comprises the study of three elective graduate subjects and of advanced Clinical Optometry, together with the preparation of a thesis on an assigned project. It may be completed in one year of full-time study, or (to meet the needs of practising optometrists) in two or three years of part-time study. The course provides advanced training in clinical and theoretical aspects of Optometry, with opportunities for specialization in fields such as contact lenses, occupational optometry, and orthoptics.

Conditions for admission and for the award of the degree of Master of Optometry are set out later in this handbook.

### 8760
### Master of Optometry Graduate Course

#### Master of Optometry
#### MOptom

| | | Hours per week |
|---|---|---|
| 31.701G | Advanced Clinical Optometry | 4 |
| | Three elective graduate subjects chosen from the list below (each 4 hours) | 12 |
| 31.799G | Project | 8 |
| | | 24 |

**Elective Graduate Subjects**

| | | |
|---|---|---|
| 31.702G | Advanced Physiological Optics | 4 |
| 31.703G | Pleorthoptics and Binocular Vision | 4 |
| 31.704G | Advanced Contact Lens Studies | 4 |
| 31.705G | Advanced Contact Lens Practice | 4 |
| 31.706G | Occupational Optometry | 4 |
| 31.707G | Clinical Photography | 4 |

The six elective graduate subjects offered are quite independent, and any three of them are suitable for a student seeking advanced professional training of a general nature. If clinical specialization is aimed at, the student would be advised to elect the graduate subjects shown below:

| *Specialization* | *Graduate Subjects* |
|---|---|
| Contact Lenses | **1.** Advanced Contact Lens Studies<br>**2.** Advanced Contact Lens Practice<br>**3.** Clinical Photography |
| Occupational Optometry | **1.** Occupational Optometry<br>**2.** Pleorthoptics and Binocular Vision<br>**3.** Advanced Physiological Optics |
| Orthoptics | **1.** Pleorthoptics and Binocular Vision<br>**2.** Clinical Photography |

## Physics

Head of School
Professor H. J. Goldsmid

Executive Assistant to Head of School
Dr J. R. Hanscomb

Administrative Officer
Mrs P. Shaw

### 8730
### Master of Physics Graduate Course

#### Master of Physics
#### MPhysics

The School of Physics offers a graduate course leading to the award of the Master of Physics degree (MPhysics).

The Master of Physics degree course is intended for honours graduates in physics. Others may be admitted if they have submitted evidence of such academic and professional attainments as may be approved by the Faculty of Science on the recommendation of its Higher Degree Committee. Applicants with other qualifications may be admitted after completing a qualifying examination approved by the Faculty of Science.

The subject matter of the course provides an advanced training in a branch of physics, the topic of which is determined during the year preceding that in which it is offered.

Students undertaking the masters course by formal study must enrol in *one* of the following subjects:

| | |
|---|---|
| 1.801G | Energy Alternatives |
| 1.802G | Astrophysics |
| 1.803G | Acoustics |
| 1.804G | Biophysics |
| 1.805G | Applied Physics |

Enrolment in any one of the above subjects normally involves at least five units of lecture material, a literature survey, and small research project.

# Conditions for the Award of Higher Degrees

## First Degrees

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

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

## Higher Degrees

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

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

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

Higher Degrees

| Title | Abbreviation | Calendar/Handbook |
|---|---|---|
| Doctor of Science | DSc | Calendar |
| Doctor of Letters | DLitt | Calendar |
| Doctor of Laws | LLD | Calendar |
| Doctor of Medicine | MD | Calendar<br>Medicine |
| Doctor of Philosophy | PhD | Calendar<br>and all handbooks |
| Master of Applied Science | MAppSc | Applied Science |
| Master of Architecture | MArch | Architecture |
| Master of Archives Administration | MArchivAdmin | Professional Studies |

**Higher Degrees (continued)**

| Title | Abbreviation | Calendar/Handbook |
|---|---|---|
| Master of Arts | MA | Arts<br>Military Studies |
| Master of Biomedical Engineering | MBiomedE | Engineering |
| Master of Building | MBuild | Architecture |
| Master of the Built Environment<br>Master of the Built Environment (Building Conservation) | MBEnv | Architecture |
| Master of Business Administration | MBA | AGSM |
| **Master of Chemistry** | **MChem** | **Sciences*** |
| Master of Commerce (Honours) | MCom(Hons) | Commerce |
| Master of Commerce | MCom | Commerce |
| Master of Education | MEd | Professional Studies |
| Master of Educational Administration | MEdAdmin | Professional Studies |
| Master of Engineering<br>Master of Engineering *without supervision* | ME | Applied Science<br>Engineering<br>Military Studies |
| Master of Engineering Science | MEngSc | Engineering<br>Military Studies |
| Master of Environmental Studies | MEnvStudies | Applied Science |
| Master of General Studies | MGenStud | General Studies |
| Master of Health Administration | MHA | Professional Studies |
| Master of Health Personnel Education | MHPEd | Medicine |
| Master of Health Planning | MHP | Professional Studies |
| Master of Industrial Design | MID | Architecture |
| Master of Landscape Architecture | MLArch | Architecture |
| Master of Laws | LLM | Law |
| Master of Librarianship | MLib | Professional Studies |
| **Master of Mathematics** | **MMath** | **Sciences*** |
| Master of Nursing Administration | MNA | Professional Studies |
| **Master of Optometry** | **MOptom** | **Sciences*** |
| Master of Paediatrics | MPaed | Medicine |
| **Master of Physics** | **MPhysics** | **Sciences*** |
| **Master of Psychology** | **MPsychol** | **Sciences§** |
| Master of Public Administration | MPA | AGSM |
| Master of Safety Science | MSafetySc | Engineering |
| **Master of Science**<br>Master of Science *without supervision* | **MSc** | Applied Science<br>Architecture<br>Engineering<br>Medicine<br>Military Studies<br>**Sciences*§** |
| Master of Science (Acoustics) | MSc(Acoustics) | Architecture |

| Title | Abbreviation | Calendar/Handbook |
|---|---|---|
| **Master of Science and Society** | **MScSoc** | **Sciences*** |
| **Master of Science (Biotechnology)** | **MSc(Biotech)** | **Sciences§** |
| Master of Science (Building) | MSc(Building) | Architecture |
| Master of Science (Industrial Design) | MSc(IndDes) | Architecture |
| **Master of Science (Psychology)** | **MSc(Psychol)** | **Sciences§** |
| Master of Social Work | MSW | Professional Studies |
| **Master of Statistics** | **MStats** | **Sciences*** |
| Master of Surgery | MS | Medicine |
| Master of Surveying<br>Master of Surveying *without supervision* | MSurv | Engineering |
| Master of Surveying Science | MSurvSc | Engineering |
| Master of Town Planning | MTP | Architecture |

**Graduate Diplomas**

| | | |
|---|---|---|
| **Graduate Diploma** | **GradDip** | Applied Science<br>Architecture<br>Engineering<br>**Sciences*§** |
| | **DipFDA** | **Sciences*** |
| | DipEd | Professional Studies |
| | DipIM-ArchivAdmin | |
| | DipIM-Lib | |

*Faculty of Science.
§Faculty of Biological Sciences.

**Doctor of Philosophy (PhD)**

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

Qualifications

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

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

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

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

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

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

Registration

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Thesis

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

(1) the greater proportion of the work described must have been completed subsequent to registration for the PhD degree;

(2) it must be an original and significant contribution to the knowledge of the subject;

(3) it must be written in English except that a candidate in the Faculty of Arts may be required by the Faculty on the recommendation of the supervisor to write the thesis in an appropriate foreign language;

(4) it must reach a satisfactory standard of expression and presentation.

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

**12.** The thesis must present the candidate's own account of the research. In special cases work done conjointly with other persons may be accepted, provided the Committee is satisfied on the candidate's part in the joint research.

**13.** Every candidate shall be required to submit with the thesis a short abstract of the thesis comprising not more than 350 words.

The abstract shall indicate:

(1) the problem investigated;

(2) the procedures followed;

(3) the general results obtained;

(4) the major conclusions reached;

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

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

**15.** The candidate shall give in writing two months' notice of intention to submit the thesis.

**Entry for Examinations**

**16.** Four copies of the thesis shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses. The candidate may also submit any work previously published whether or not such work is related to the thesis.

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

**18.** There shall normally be three examiners of the thesis appointed by the Professorial Board on the recommendation of the Committee, at least two of whom shall be external to the University.

**19.** At the conclusion of the examination each examiner shall submit to the Committee a concise report on the merits of the thesis and shall recommend to the Committee that:

(1) the candidate be awarded the degree without further examination; or

(2) the candidate be awarded the degree without further examination subject to minor corrections as listed being made to the satisfaction of the head of the school*; or

(3) the candidate be awarded the degree subject to a further examination on questions posed in the report, performance in this further examination being to the satisfaction of the Committee; or

(4) the candidate be not awarded the degree but be permitted to resubmit the thesis in a revised form after a further period of study and/or research; or

(5) the candidate be not awarded the degree and be not permitted to resubmit the thesis.

**20.** If the performance at the further examination recommended under Rule **19.** (3) is not to the satisfaction of the Committee the Committee may permit the candidate to re-present the same thesis and submit to a further oral, practical or written examination within a period specified by them but not exceeding eighteen months.

**21.** The Committee shall, after consideration of the examiners' reports and the reports of any oral or written or practical examination, recommend whether or not the candidate may be admitted to the degree.

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

**Master of Chemistry (MChem)**

**1.** The degree of Master of Chemistry by formal course work may be awarded by the Council on the recommendation of the Higher Degree Committee of the Faculty of Science (hereinafter referred to as the Committee) to a candidate who has satisfactorily completed an approved program of advanced study.

Qualifications

**2.** (1) An applicant for registration shall hold an approved degree of Bachelor with Class I or Class II honours in Chemistry.

(2) An applicant for registration with an approved degree at a standard below honours Class II may be accepted following satisfactory performance at a qualifying examination approved by the Committee.

(3) In special circumstances a person may be permitted to register as a candidate for the degree by submitting evidence of such academic and professional attainments as may be approved by the Committee.

Registration

**3.** (1) An application to register for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least two months before the commencement of the session in which the candidate desires to register.

(2) An approved applicant shall register as a student in full-time or part-time attendance at the University.

(3) A candidate for the degree shall be required to undertake the appropriate course of study and pass the prescribed examinations. Under the supervision of a member of the academic staff, a candidate shall be required to present a report on a short research project (approximately 400 hours laboratory work) to be assessed by two examiners.

(4) A candidate shall not be considered for the award of the degree until the lapse of one academic year from the date of registration in the case of a full-time candidate or two academic years from the date of registration in the case of a part-time candidate.

Project

**4.** Three copies of the report referred to in paragraph **3.** (3) above shall be retained by the University. The University shall be free to allow the report to be consulted or borrowed and, subject to the provisions of the Copyright Act, 1968, the University may issue the report in whole or in part, in photostat or microfilm or other copying medium.

Recommendation for Admission to Degree

**5.** Having considered the candidate's work in the prescribed course of study the Committee shall recommend whether or not the candidate should be admitted to the degree. Satisfactory completion of the project shall be regarded as part of the final examination.

Fees

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

**Master of Mathematics (MMath)**

**1.** The degree of Master of Mathematics by formal course work may be awarded by the Council on the recommendation of the Higher Degree Committee of the Faculty of Science (hereinafter referred to as the Committee) to a candidate who has satisfactorily completed an approved program of advanced study.

Qualifications

**2.** (1) An applicant for registration shall hold an approved degree of Bachelor with Class I or Class II honours in Mathematics.

(2) An applicant for registration, with an approved degree at a standard below honours Class II may be accepted following satisfactory performance at a qualifying examination approved by the Committee.

Registration

(3) In special circumstances a person may be permitted to register as a candidate for the degree by submitting evidence of such academic and professional attainments as may be approved by the Committee.

**3.** (1) An application to register for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least two months before the commencement of the session in which the candidate desires to register.

(2) An approved applicant shall register as a student in full-time or part-time attendance at the University.

(3) A candidate for the degree shall be required to undertake the appropriate course of study and pass the prescribed examinations. Under the supervision of a member of the academic staff, a candidate shall be required to submit a report consisting of a critical review of the literature in an approved branch of Mathematics or a report on a short research project. In either case the report will be assessed by two examiners, and the candidate may be required to attend an oral examination. The report is to be presented in a form approved by the Head of the School of Mathematics.

(4) A candidate shall not be considered for the award of the degree until the lapse of one academic year from the date of registration in the case of a full-time candidate or two academic years from the date of registration in the case of a part-time candidate.

**4.** Having considered the examiners' reports and the candidate's other work in the prescribed course of study, the Committee shall recommend whether or not the candidate should be admitted to the degree.

Recommendation for admission to Degree

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

Fees

**1.** The degree of Master of Optometry by formal course work may be awarded by the Council on the recommendation of the Higher Degree Committee of the Faculty of Science (hereinafter referred to as the Committee) to a candidate who has satisfactorily completed an approved program of advanced study.

**Master of Optometry (MOptom)**

**2.** (1) An applicant for registration for the degree shall have been admitted to the degree of Bachelor in the discipline of Optometry in the University of New South Wales or other approved University at a standard acceptable to the Committee.

Qualifications

(2) In special circumstances a person may be permitted to register as a candidate for the degree by submitting evidence of such academic and professional attainments as may be approved by the Committee.

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

**3.** (1) An application to register for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least two full calendar months before the commencement of the course.

Registration

(2) An approved applicant shall register as a student in either full-time or part-time attendance at the University.

(3) A candidate for the degree shall be required to undertake the appropriate course of study and pass the prescribed annual examinations. Under the supervision of a member of the academic staff a candidate shall be required to undertake a specified project, the satisfactory completion of which shall be regarded as part of the annual examinations.

**4.** Having considered the results of the candidate's work in the prescribed course of study the Committee shall recommend whether or not the candidate should be admitted to the degree.

Recommendation for Admission to Degree

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

Fees

**Master of Physics (MPhysics)**

**1.** The degree of Master of Physics by formal course work may be awarded by the Council on the recommendation of the Higher Degree Committee of the Faculty of Science (hereinafter referred to as the Committee) to a candidate who has satisfactorily completed an approved program of advanced study.

Qualifications

**2.** (1) An applicant for registration shall hold an approved degree of Bachelor with Class I or Class II Honours in Physics.

(2) An applicant for registration, with an approved degree at a standard below honours Class II may be accepted following satisfactory performance at a qualifying examination approved by the Committee.

(3) In special circumstances a person may be permitted to register as a candidate for the degree by submitting evidence of such academic and professional attainments as may be approved by the Committee.

Registration

**3.** (1) An application to register for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least two months before the commencement of the session in which the candidate desires to register.

(2) An approved applicant shall register as a student in full-time or part-time attendance at the University.

(3) A candidate for the degree shall be required to undertake the appropriate course of study and pass the prescribed examinations. Under the supervision of a member of the academic staff, a candidate shall be required to submit a report consisting of a critical review of the literature in an approved branch of Physics and a report on a short research project. In either case the report will be assessed by two examiners, and the candidate may be required to attend an oral examination. The report is to be presented in a form approved by the Head of the School of Physics.

(4) A candidate shall not be considered for the award of the degree until the lapse of one academic year from the date of registration in the case of a full-time candidate or two academic years from the date of registration in the case of a part-time candidate.

Recommendation for Admission to Degree

**4.** Having considered the examiners' reports and the candidate's other work in the prescribed course of study the Committee shall recommend whether or not the candidate should be admitted to the degree.

Fees

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

**Master of Psychology (MPsychol)**

**1.** The degree of Master of Psychology by formal course work may be awarded by the Council on the recommendation of the Higher Degree Committee of the Faculty of Biological Sciences (hereinafter referred to as the Committee) to a candidate who has satisfactorily completed an approved program of advanced study.

The degree shall be awarded in two grades, namely Pass and Honours. There shall be two classes of Honours, namely Class I and Class II.

Qualifications

**2.** (1) An applicant for registration shall hold an approved degree of Bachelor with Honours Class I or Class II in Psychology at a standard acceptable to the Committee.

(2) An applicant for registration, with an approved degree at a standard below Honours Class II may be accepted following satisfactory completion of a qualifying course and examination approved by the Committee.

(3) In special cases a person may be permitted to register as a candidate for the degree by submitting evidence of such academic and professional attainments as may be approved by the Committee.

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

**Registration**

**3.** (1) An application to register for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least two months before the commencement of the academic year.

(2) An approved applicant shall register as a student in full-time or part-time attendance at the University.

(3) A candidate for the degree shall be required to:

(a) undertake the specified courses of advanced study;

(b) except in exceptional circumstances pass the prescribed examinations at the first attempt;

(c) submit a research thesis on an approved topic, prepared under the supervision of a member of the academic staff.

(4) The minimum period of registration before the award of the degree shall be of four sessions for full-time students, and six sessions for part-time students.

**Research Thesis**

**4.** (1) Every candidate shall submit three copies of the research thesis. All copies shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses or reports. A candidate may submit also for examination any work the candidate has published whether or not such work is related to the research thesis.

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

**Recommendation for Admission to Degree**

**5.** Having considered the results of the candidate's work in the prescribed course of study and the skill and competence attained in relevant aspects of practical professional work the Committee shall recommend whether or not the candidate should be admitted to the degree.

**Fees**

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

## Master of Science (MSc)

**1.** The degree of Master of Science may be awarded by the Council on the recommendation of the Higher Degree Committee of the appropriate Faculty or Board of Studies (hereinafter referred to as the Committee) to a candidate who has demonstrated ability to undertake research by the submission of a thesis embodying the results of an original investigation.

**Qualifications**

**2.** (1) An applicant for registration for the degree shall have been admitted to the degree of Bachelor in the University of New South Wales, or other approved university or tertiary institution in an appropriate school or department at a standard acceptable to the Committee.

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

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

**Registration**

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

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

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

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

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

(c) student working externally to the University

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

(5) At least once a year and at any other time that the Committee sees fit, the candidate's supervisor shall present to the head of school or department in which the candidate is registered a report on the progress of the candidate. The Committee shall review the report and may, if it decides as a result of its review that the progress of a candidate is unsatisfactory, cancel registration or take such other action as it considers appropriate.

(6) Unless otherwise recommended by the Committee, no candidate shall be awarded the degree until the lapse of four complete sessions from the date of registration, save that the case of a candidate who obtained the degree of Bachelor with Honours or who has had previous research experience, this period may be reduced by up to two sessions with the approval of the Committee. A candidate who is fully engaged in research for the degree shall present for examination not later than six academic sessions from the date of registration. A candidate not fully engaged in research shall present for examination not later than twelve academic sessions from the date of registration. In special cases an extension of these times may be granted by the Committee.

Thesis

**4.** (1) A candidate for the degree shall be required to submit three copies of the thesis referred to in paragraph **3.** (4) which shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses. The candidate may submit also for examination any work the candidate has published whether or not such work is related to the thesis.

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

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

Recommendation for Admission to Degree

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

Fees

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

**Master of Science (MSc) *without supervision***

**1.** Where it is not possible for candidates to register under the normal conditions for the degree of Master of Science, Master of Engineering or Master of Surveying by reason of their location at centres which are distant from University Schools or where effective supervision is not practicable registration may be granted in these categories under the following conditions:

Qualifications

**2.** An applicant for registration shall have been admitted to a degree of Bachelor in the University of New South Wales at a standard acceptable to the Higher Degree Committee of the appropriate Faculty (hereinafter referred to as the Committee).

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

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

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

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

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

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

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

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

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

**1.** The degree of Master of Science (Biotechnology) may be awarded by the Council on the recommendation of the Higher Degree Committee of the Faculty of Biological Sciences (hereinafter referred to as the Committee) to a candidate who has satisfactorily completed an approved program of advanced study. **Master of Science (Biotechnology) (MSc(Biotech))**

**2.** (1) An applicant for registration shall hold an approved degree of Bachelor with Honours Class I or Class II in Biological Technology or other relevant discipline. **Qualifications**

(2) An applicant for registration with an approved degree at a standard below Honours Class II may be accepted following satisfactory completion of a qualifying course of not less than one year and examination approved by the Committee.

(3) In special cases a person may be permitted to register as a candidate for the degree by submitting evidence of such academic and professional attainments as may be approved by the Committee.

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

Registration

**3.** (1) An application to register for the degree shall be made on the prescribed form which shall be lodged with the registrar at least two months before the commencement of the academic year.

(2) An approved applicant shall register as a student in full-time or part-time attendance at the University.

(3) A candidate for the degree shall be required to undertake the specified course of advanced study and pass the prescribed examinations. Under the supervision of a member of the academic staff, a candidate shall be required to undertake a specified project, the satisfactory completion of which shall be regarded as part of the examinations.

(4) The minimum period of registration before the award of the degree shall be two sessions for full-time students and four sessions for part-time students.

Recommendation for Admission to Degree

**4.** Having considered the results of the candidate's work in the prescribed course of study the Committee shall recommend whether or not the candidate should be admitted to the degree.

Fees

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

**Master of Science (Psychology) (MSc(Psychol))**

**1.** The degree of Master of Science (Psychology) by formal course work may be awarded by the Council on the recommendation of the Higher Degree Committee of the Faculty of Biological Sciences (hereinafter referred to as the Committee) to a candidate who has satisfactorily completed an approved program of advanced study.

Qualifications

**2.** (1) An applicant for registration shall hold the degree of Doctor of Philosophy in an approved area of Psychology acceptable to the Committee.

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

Registration

**3.** (1) An application to register for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least two months before the commencement of the academic year.

(2) An approved applicant shall register as a student in full-time or part-time attendance at the University.

(3) A candidate for the degree shall be required to undertake the specified courses of advanced study and, other than in exceptional circumstances, pass the prescribed examinations at the first attempt.

(4) The minimum period of registration before the award of the degree shall be three sessions for full-time students, and six sessions for part-time students. Students with advanced standing may have the minimum period reduced by up to one-third of the program.

Recommendation for Admission to Degree

**4.** Having considered the results of the candidate's work in the prescribed course of study and the skill and competence attained in relevant aspects of practical professional work, the Committee shall recommend whether or not the candidate should be admitted to the degree.

Fees

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

**Master of Science and Society (MScSoc)**

**1.** The degree of Master of Science and Society may be awarded at honours or pass level by the Council on the recommendation of the Higher Degree Committee of the Faculty of Science (hereinafter referred to as the Committee) to a candidate who has satisfactorily completed an approved program of advanced study.

Qualifications

**2.** (1) An applicant for registration for the degree shall have been admitted to a degree of Bachelor in the University of New South Wales or other approved university or tertiary education institution of acceptable standing, at a level approved by the Committee. Normally an honours degree or equivalent in science, applied science/technology, a social science or other relevant discipline, or a pass degree together with suitable professional experience would be deemed an appropriate qualification.

(2) In exceptional cases an applicant may be registered as a candidate for the degree by submitting evidence of such academic and professional attainment as may be approved by the Committee.

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

Registration

**3.** (1) An application to register for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least two months before the commencement of the course.

(2) An approved applicant shall register as a student in part-time attendance at the University.

(3) (a) A Candidate for the Pass degree shall undertake the approved course comprising of at least eight units which normally will be taken over four sessions.

(3) (b) A candidate for the Honours degree will undertake an additional two session program of advanced study including a dissertation based on research approved by the Committee on the recommendation of the School of History and Philosophy of Science.

(4) No candidate shall be considered for the award of the degree until the lapse of four sessions in the case of a pass candidate or six sessions in the case of an honours candidate.

(5) The progress of a candidate shall be reviewed annually by the Committee and as a result of such review the Committee may terminate the candidature or take such other action as it considers appropriate.

Recommendation for Admission to Degree

**4.** Having considered the candidate's results in the prescribed course of study the Committee shall recommend whether the candidate may be admitted to the degree.

Fees

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

**Master of Statistics (MStats)**

**1.** The degree of Master of Statistics may be awarded by the Council on the recommendation of the Higher Degree Committee of the Faculty of Science (hereinafter referred to as the Committee) to a candidate who has satisfactorily completed an approved program of advanced study.

Qualifications

**2.** (1) An applicant for registration for the degree shall have been admitted to the degree of Bachelor at a standard acceptable to the Committee and with major studies in the field of Statistics, in the University of New South Wales or other approved University.

(2) In special circumstances a person may be permitted to register as a candidate for the degree by submitting evidence of such academic and professional attainments as may be approved by the Committee.

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

**Registration**

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

(2) A candidate for the degree shall be required to undertake the appropriate course of study and pass the prescribed annual examinations. Under the supervision of a member of the academic staff a candidate shall be required to undertake a specified project, the satisfactory completion of which shall be regarded as part of the annual examinations.

(3) No candidate shall be considered for the award of the degree until a lapse of four complete sessions from the date of registration, save that in the case of a candidate who obtained the degree of Bachelor with Honours in Statistics this period may, with the approval of the Committee be reduced by up to two sessions by exemption from appropriate specified courses of study.

**Recommendation for Admission to Degree**

**4.** Having considered the results of the candidate's work in the prescribed course of study the Committee shall recommend whether or not the candidate should be admitted to the degree.

**Fees**

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

## Graduate Diploma

**Graduate Diploma (GradDip)**

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

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

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

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

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

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

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

# Subject Descriptions

## Identification of Subjects by Number

A subject is defined by the Professorial Board as 'a unit of instruction approved by the University as being a discrete part of the requirements for a course offered by the University'.

Each approved subject of the University is identifiable both by number and by name as this is a check against nomination of subject other than the one intended.

Subject numbers are allocated by the Registrar and the system of allocation is based on the following guidelines:

**1.** The authority offering the subject, normally a School of the University, is indicated by the number before the decimal point.

**2.** Each subject number is unique and is not used for more than one subject title.

**3.** Subject numbers which have not been used for some time are not used for new subject titles.

**4.** Graduate subjects are indicated by a suffix 'G' to a number with three digits after the decimal point. In other subjects three or four digits are used after the decimal point.

Subjects taught are listed in full in the handbook of the faculty or board of studies responsible to the particular course within which the subjects are taken. Subject descriptions are contained in the appropriate section in the handbooks.

The **identifying numerical prefixes** for each subject authority are set out below.

Servicing Subjects are those taught by a school or department outside its own faculty, and are published at the end of **Undergraduate Study** and **Graduate Study** of the relevant school. Their subject descriptions are also published in the handbook of the faculty in which the subject is taught.

**HSC Exam Prerequisites**

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

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

**Information Key**

The following is the key to the information which may be supplied about each subject: S1 (Session 1); S2 (Session 2); F (Session 1 *plus* Session 2, ie full year); S1 or S2 (Session 1 *or* Session 2, ie choice of either session); SS (single session, ie which session taught is not known at time of publication); L (Lecture, followed by hours per week); T (Laboratory/ Tutorial, followed by hours per week); Sem (Seminar, followed by hours per week) hpw (hours per week); C (Credit *or* Credit units), CR (Credit Level), DN (Distinction).

| | School, Department etc | Faculty | Page |
|---|---|---|---|
| | *Subjects also offered for courses in this handbook | | |
| 1 | School of Physics | Science | 175 |
| 2 | School of Chemistry | Science | 181 |
| 4 | School of Metallurgy* | Applied Science | 186 |
| 5 | School of Mechanical and Industrial Engineering* | Engineering | 188 |
| 6 | School of Electrical Engineering and Computer Science* | Engineering | 189 |
| 7 | School of Mining Engineering | Applied Science | |
| 8 | School of Civil Engineering | Engineering | |
| 9 | School of Wool and Pastoral Sciences | Applied Science | |
| 10 | School of Mathematics | Science | 190 |
| 11 | School of Architecture | Architecture | |
| 12 | School of Psychology | Biological Sciences | 201 |
| 13 | School of Textile Technology | Applied Science | |
| 14 | School of Accountancy* | Commerce | 205 |
| 15 | School of Economics* | Commerce | 207 |
| 16 | School of Health Administration | Professional Studies | |
| 17 | Biological Sciences | Biological Sciences | 210 |
| 18 | School of Mechanical and Industrial Engineering (Industrial Engineering) | Engineering | |
| 21 | Department of Industrial Arts | Architecture | |
| 23 | School of Nuclear Engineering | Engineering | |
| 25 | School of Applied Geology* | Applied Science | 210 |
| 26 | Department of General Studies* | Board of Studies in General Education | 214 |
| 27 | School of Geography* | Applied Science | 214 |
| 28 | School of Marketing | Commerce | |
| 29 | School of Surveying* | Engineering | 218 |
| 30 | Organizational Behaviour* | Commerce | 218 |
| 31 | School of Optometry | Science | 218 |
| 32 | Centre for Biomedical Engineering | Engineering | |
| 35 | School of Building | Architecture | |
| 36 | School of Town Planning | Architecture | |
| 37 | School of Landscape Architecture | Architecture | |
| 38 | School of Food Technology | Applied Science | |
| 39 | Graduate School of the Built Environment | Architecture | |
| 40 | Professorial Board | | |
| 41 | School of Biochemistry | Biological Sciences | 220 |
| 42 | School of Biotechnology | Biological Sciences | 221 |

| | School, Department etc | Faculty | Page |
|---|---|---|---|
| | *Subjects also offered for courses in this handbook | | |
| 43 | School of Botany | Biological Sciences | 223 |
| 44 | School of Microbiology | Biological Sciences | 224 |
| 45 | School of Zoology | Biological Sciences | 226 |
| 46 | Faculty of Applied Science | Applied Science | |
| 47 | Faculty of Engineering | Engineering | |
| 48 | School of Chemical Engineering and Industrial Chemistry* | Applied Science | 227 |
| 50 | School of English | Arts | |
| 51 | School of History | Arts | |
| 52 | School of Philosophy* | Arts | 228 |
| 53 | School of Sociology* | Arts | 230 |
| 54 | School of Political Science | Arts | |
| 55 | School of Librarianship | Professional Studies | |
| 56 | School of French | Arts | |
| 57 | School of Drama | Arts | |
| 58 | School of Education* | Professional Studies | 231 |
| 59 | Department of Russian | Arts | |
| 60 | Faculty of Arts (Bachelor of Social Science) | Arts | |
| 61 | Department of Music | Arts | |
| 62 | School of History and Philosophy of Science* | Arts | 232 |
| 63 | School of Social Work | Professional Studies | |
| 64 | School of German Studies | Arts | |
| 65 | School of Spanish and Latin American Studies | Arts | |
| 66 | Subjects Available from Other Universities | | |
| 67 | Faculty of Science | Science | 236 |
| 68 | Board of Studies in Science and Mathematics | Board of Studies in Science and Mathematics | 236 |
| 70 | School of Anatomy* | Medicine | 237 |
| 71 | School of Medicine | Medicine | |
| 72 | School of Pathology* | Medicine | 238 |
| 73 | School of Physiology and Pharmacology* | Medicine | 238 |
| 74 | School of Surgery | Medicine | |
| 75 | School of Obstetrics and Gynaecology | Medicine | |
| 76 | School of Paediatrics | Medicine | |
| 77 | School of Psychiatry | Medicine | |
| 79 | School of Community Medicine* | Medicine | 240 |
| 80 | Faculty of Medicine* | Medicine | 240 |
| 81 | Medicine/Science/Biological Sciences | Medicine | |
| 85 | Australian Graduate School of Management | AGSM | |
| 90 | Faculty of Law | Law | |
| 97 | Division of Postgraduate Extension Studies | | |

# Physics

## Undergraduate Study

## Physics Level I Units

### 1.001 Physics I — F L3T3

*Prerequisites:*

| | *HSC Exam Percentile Range Required* |
|---|---|
| *2 unit Mathematics or* | *71-100* |
| *3 unit Mathematics or* | *21-100* |
| *4 unit Mathematics* | *1-100 or* |
| *and* | *(for 1.001 only) 10.021B* |
| *2 unit Science (Physics) or* | *31-100* |
| *2 unit Science (Chemistry) or* | *31.100* |
| *4 unit Science (Multistrand)* | *31.100* |

*Co-requisite: 10.021C or 10.001 or 10.011.*

*This refers to the 2 Unit Mathematics subject which is related to the 3 Unit Mathematics subject. It does not refer to the subject 2 Unit Mathematics (Mathematics in Society).

Aims and nature of physics and the study of motion of particles under the influence of mechanical, electrical, magnetic and gravitational forces. Concepts of force, inertial mass, energy, momentum, charge, potential, fields. Application of the conservation principles to solution of problems involving charge, energy and momentum. Electrical circuit theory, application of Kirchoff's Laws to AC and DC circuits. Uniform circular motion, Kepler's Laws and rotational mechanics. Properties of matter: solids, liquids, gases. The wave theories of physics, transfer of energy by waves, properties of waves. Application of wave theories to optical and acoustical phenomena such as interference, diffraction and polarization.

### 1.011 Higher Physics I — F L3T3

*Prerequisites: As for 1.001; plus permission of the Head of the School of Physics. Co-requisite: 10.001 or 10.011.*

For students of all Faculties except Medicine who have a good secondary school record and who wish to do a more challenging course.

Vector algerbra, kinematics, uniform circular motion, coriolis acceleration, dynamics of particles, motion in a resistive medium, work and energy, gravitation, rotational motion of rigid bodies about fixed axis, rotational motion about a fixed point. Harmonic motions, waves in elastic media. Sound waves, physical optics, polarization and double refraction. Electric charges, electric intensity, electric flux, Gauss' law, electric potential, capacity, dielectric materials, electric current and resistance, DC circuits, magnetic field, field due to current, electromagnetic induction, inductance, magnetic materials, transients, AC circuits, electronics, diode, rectifier circuit, simple power supplies, electronic amplifier systems, single loop feedback systems, signal processing circuits using operational amplifiers.

### 1.021 Introductory Physics I (For Health and Life Scientists) — F L3T3

*Prerequisites: None. Co-requisites: 10.021A & 10.021B, or 10.021B & 10.021C, or 10.001 or 10.011.*

Principally for students majoring in the life and health sciences disciplines. Topics at an introductory level.

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

### 1.031 Physics I (Optometry) — F L3T3

*Prerequisites: None. Co-requisites: As for 1.021.*

The description of motion, dynamics, statics, conservation of momentum and energy, rotation, elasticity and vibration, wave motion, fluids, temperature and expansion, heat and heat transfer, the theory of heat, electric charge, electric field, electric energy, electric circuits, electromagnetism, applied electricity, alternating current, analog electronics, digital electronics, modern physics.

### 1.041 Laboratory Computers in Physical Sciences — S1 *or* S2 L2T4

*Prerequisites: As for 1.001. Co-requisite: 10.001, and 1.021 or 1.001 or 1.011. Excluded: Programs 0601, 0610 & 0611, 6806.*

Fundamentals of binary logic, binary arithmetic, arithmetic operations as logical algorithms. Electronic logic devices, principles of computer operation, microprocessors and microcomputer architecture. Machine language and BASIC programming in microcomputers. Fundamentals of real world interfacing techniques, flow of data and control across the interface. Mathematical modelling of the real world in BASIC, iteration and simulation techniques, laboratory experiments collecting real world data via an interface and analysing it in the microcomputer. The developing role of the laboratory computer in scientific research.

### 1.061 Computer Applications in Experimental Science I — S2 L2T4

*Prerequisites: 6.611. Co-requisite: 1.001, 10.001 or 10.011. Excluded: 1.041, 1.042, 1.952.*

Review of binary logic variables, arithmetic operations as logical algorithms on binary variables, computer architecture and machine language instruction sets. Microprocessor and microcomputer architecture; Apple II microcomputer architecture, disc operating system, graphics, languages. Computer modelling of real physical systems iterative techniques. Fundamentals of interfacing, data and control flow across the interface. Transducers, encoding. Data collection techniques used in Experimental Sciences. Labratory experiments involving direct data collection via interfaces, data reduction and comparison with computer models. The developing role of the laboratory computer in experimental science.

## Physics Level II Units

### 1.002 Mechanics, Waves and Optics — S1 L3T1

*Prerequisites: 1.001 or 1.011, 10.001 or 10.011. Co-requisite: 10.2111. Excluded: 1.992, 10.4111, 10.4211.*

Harmonic motion, systems of particles, central force problems, Lagrange's equations, coupled oscillations, travelling waves, pulses, energy and momentum transfer, polarization, birefringence, interference, thin films, gratings, lasers, holography, fibre optics, Faraday effect, photoelasticity.

### 1.012 Electromagnetism and Thermal Physics — S2 L3T1

*Prerequisites: 1.001 or 1.011, 10.001 or 10.011. Co-requisite: 10.2111. Excluded: 1.972.*

Electric field strength and potential, Gauss' law, Poisson's and Laplace's equations, capacitance, dielectrics and polarization, magnetism, electro-magnetic induction, Maxwell's equations, electromagnetic waves. Laws of thermodynamics, kinetic theory, microscopic processes, entropy, solid state defects, Helmholtz and Gibbs functions, Maxwell's relations, phase diagrams, chemical and electrochemical potential.

### 1.022 Modern Physics — F L1½T½

*Prerequisites: 1.001 or 1.011, 10.001 or 10.011. Co-requisite: 10.2112. Excluded: 1.9322, 1.982.*

Special theory of Relativity: time dilation, length contraction, simultaneity, Lorentz transformations, energy and mass. Photon properties, de Broglie relations, Uncertainty principle, operators in quantum mechanics, postulates of quantum mechanics, potential wells, steps and barriers, harmonic oscillator, H atom, angular momentum, magnetic moment, electron spin, nuclear spin. Atomic and molecular spectra, lasers, quantum statistics, free electron model of a metal, band theory; nuclear size, density, mass; nuclear models, fission and fusion, nuclear forces.

### 1.032 Laboratory — F T3

*Prerequisites: 1.001 or 1.011, 10.001. Excluded: 1.9222.*

Alternating current circuits, complex impedance, resonance, mutual inductance, introductory electronics, diode and characteristics and circuits, power supplies, transistor characteristics, single stage and coupled amplifiers, experiments using AC circuits. Experimental investigations in a choice of areas including radioactivity, spectroscopy, properties of materials, Hall effect, nuclear magnetic resonance, photography, vacuum systems.

### 1.042 Measurement and Measurement Control Systems — S2 L2T3

*Prerequisites: 1.001 or 1.011, 10.001. Excluded: 1.9422, 1.962.*

Basics of instrumental measurement; errors of observation and their treatment: statistical design of experiments and analysis of data; transducers; measurement and measurement control systems; systems operating in the digital mode; encoding, actuation, display, system input/output consideration; some special purpose systems: signal averaging systems, real time spectrum analysis systems, etc.

### 1.052 Methods in Mathematical Physics — S2 L3T1

*Prerequisites: 1.001 (or 1.011); 10.001 (or 10.011). Co-requisites: 10.2111 (or 10.2211), 10.2112 (or 10.2212), 10.1113 (or 10.1213).*

Differential and integral equations in physics. Fourier series and transform. Distributions (statistics, quantum mechanics). Legendre and Laguerre polynomials (hydrogen atom). Orthonormal functions. Integral equations, infinite matrices. Potential equation, Green's theorem and functions. Waves, group velocity. Calculus of variations and its applications in classical, continuum and quantum mechanics, variational approach to eigenvalues, Sturm-Liouville theory, solution of boundary value problems in spherical and cylindrical geometry.

## Terminating Physics Level II Units

### 1.9222 Electronics — S1 L1T2

*Prerequisites: 1.001 or 1.001 or 1.021. Excluded: 1.032.*

The application of electronics to other disciplines. Includes: principles of circuit theory and analogue computing; amplifers, their specification and application, transducers; electronic instrumentation; industrial data acquisition.

### 1.9322 Introduction to Solids — S2 L2T1

*Prerequisites: 1.001 or 1.011 or 1.021. Excluded: 1.022, 4.402, 4.412.*

Introductory quantum mechanics and atomic physics; crystal structure; point and line defects; introductory band theory; conductors, semi-conductor and insulators; energy level diagrams.

### 1.9422 Introduction to Physics of Measurement — S1 L1½T1½

*Prerequisites: 1.001 or 1.011. Excluded: 1.042*

Resolution; accuracy and sensitivity of instruments, errors of observation; experimental design; transducers; thermometry; electrical noise; servo systems; mechanical design of apparatus; optical instruments; optical fibres; photometry; calorimetry; analogue to digital conversion and digital instruments; measurement of very large and very small quantities.

## Physics Level III Units

### 1.0133 Quantum Mechanics — S1 L1½T½

*Prerequisites: 1.022; 10.2112. Excluded: 2.023A, 10.222F, 1.013.*

Revision of basic concepts, harmonic oscillator systems, spherically symmetric systems, angular momentum, H atom, first-order perturbation theory, identical particles, Exclusion Principle, atomic structure, spin-orbit coupling, Helium atom, introductory quantum theory of molecules.

### 1.0143 Nuclear Physics — S2 L1½T½

*Co-requisite: 1.0133. Excluded: 1.013.*

Nuclear shell model; theory of beta decay; the deuteron, nucleon-nucleon scattering; theories of nuclear reactions, resonances; mesons and strange particles, elementary particle properties and interactions; symmetries and quark models; strong and weak interactions.

### 1.023 Statistical Mechanics and Solid State Physics — S1 L3T1

*Prerequisites: 1.012, 1.022, 10.2112.*

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

### 1.0333 Electromagnetism — S1 L1½T½

*Prerequisites: 1.012, 10.2111, 10.2112. Excluded: 10.222C, 1.033.*

Electromagnetic fields; Maxwell's equations, Poynting theorem, electromagnetic potentials, electromagnetic waves. Reflection and transmission, Fresnel equations, waveguides, radiation fields, dipoles and antenna theory.

### 1.0343 Advanced Optics — S2 L1½T½

*Co-requisite: 1.002. Excluded: 1.033.*

Fresnel and Fraunhofer diffraction, Fourier transforms, filtering, coherence length and time, stellar interferometers, laser theory, nonlinear optics.

### 1.043 Experimental Physics A — F T4

*Prerquisite: 1.032.*

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

### 1.0533 Experimental Physics B1 — S1 T4

*Prerequisite: 1.032. Excluded: 1.053.*

Selected experiments and projects. Advanced experimental techniques and open ended projects in the areas covered in 1.043 Experimental Physics A together with projects involving electron and nuclear magnetic resonances, low temperature physics and superconductivity. Fourier optics, holography.

### 1.0543 Experimental Physics B2 — S2 T4

*Prerequisite: 1.032. Excluded: 1.053.*

As for 1.0533 Experimental Physics B1.

### 1.1133 Advanced Quantum Mechanics — S2 L1½T½

*Co-requisite: 1.0133. Excluded: 2.023A, 10.222F.*

Formal structure, matrix formalism, relativistic quantum mechanics, spin, scattering theory, Born approximation, phase shifts, many particle systems, occupation number formalism.

### 1.133 Electronics — S1 L2T4

*Prerequisites: 1.9222 or 1.032.*

Extension of AC circuit theory. Revision of transistors, parameters, Multi-stage discrete amplifiers, bias, coupling, stability. Positive feedback, oscillators, Integrated amplifiers, properties. Negative feedback. Regulated power supplies. Narrow band amplifiers, power and pulse amplifiers. Modulation, AM FM chopper amplifiers. Pulse circuits, gates, flip-flops, scalers, Schmitt trigger, integrated circuits. Thyristors.

### 1.1433 Biophysics — S1 L2T1

*Prerequisites: 1.012, 1.022.*

Thermodynamics in Biology, Electrochemical potentials, Donnan equilibrium, irreversible processes, diffusion and applications to biological systems. Membrane potentials, Nernst potential, Goldman and Nernst-Planck equation, generalized approach. Active transport. Membrane structure. The nerve impulse, activation and inactivation, Hogkin and Huxley equations. Muscle, contractive process, thermodynamics. Ecological ensemble theory, global thermodynamics interaction of species, ecological associations.

### 1.1533 Biophysical Techniques — S2 L2T1

*Prerequisites: 1.012, 1.022, 1.032.*

The theory and application of physical techniques of relevance to the study of biological systems. Techniques considered may include optical and electron microscopy X-ray and neutron diffraction, magnetic resonance, lasers, light scattering, calorimetry, fluorescence, electrochemical techniques and electrophysiological methods and dielectric measurements.

### 1.1633 Astrophysics — S2 L1½T½

*Prerequisites: 1.022.*

Stellar radiation, spectra classification. Hertzsprung-Russell diagrams, determination of stellar masses and radii. Equations of stellar structure, energy sources in stars, nuclear reaction cycles, energy transport, equations of state, degeneracy, opacity. Properties of main sequence stars, stellar evolution, structure of red giants and white dwarfs. The solar atmosphere.

### 1.1733 Conceptual Framework of Physics — S2 L2T1

*Prerequisites: 1.012, 1.022. Co-requisites: 1.0133, 1.023.*

Physics and metaphysics, the place of speculation in theory formation. Space and time, coordinate systems, nature of time. Fundamental physical phenomena, electrical, gravitational, inertial, nuclear phenomena, entropy and probability. Field theory, formulation, action at a distance, propagation, energy. Relativity, postulates, simultaneity, limiting speeds, mass energy. Relationship between micro and macrocosmos, statistics, entropy and information, arrow of time. Matter and anti-matter and energy, conservation laws, inertial mass, field energy. Quantum processes, granularity, measurements and uncertainty principle, determinism versus indeterminism, nuclear phenomena.

### 1.3033 Mechanical Properties of Materials — S1 L1½T½

*Co-requisite: 1.023. Excluded: 4.403.*

Properties of materials in relation to their structure: atomic and molecular structure of solids; elasticity, inelasticity, long-range (rubber) elasticity, viscoelasticity; plasticity; brittle fracture; viscosity and surface tension of liquids; adhesion; friction and lubrication.

### 1.3133 Electrical, Optical and Thermal Properties of Materials — S2 L1½T½

*Co-requisite: 1.023.*

Review of electronic structure and lattice vibrations in crystalline materials. electrons and holes in semiconductors. Solid state devices. Photoconductivity. Optical absorption. Luminescence. Dielectric and magnetic phenomena. Thermal expansion and thermal conductivity.

### 1.3233 Measurement and Non-destructive Testing — S1 L1½T½

*Prerequisite: 1.032.*

Design and analysis of experiments. Dynamics of measurement systems, 1st and 2nd order response, introduction to servomechanisms. Metrology, standards legislation. Techniques of mechanical, thermal, optical, photometric, fluidic and acoustic measurement. Introduction to nondestructive testing: radiography, surface crack and flaw detection, acoustic emission, magnetic and eddy current methods, acoustic spectroscopy.

### 1.3333 Applications of Radiation — S2 L2T0

*Co-requisites: 1.0333, 1.0343.*

The present and potential uses of electro-magnetic radiation over the whole spectrum. Microscopy, interferometry and optical spectroscopy. Applications of thermal radiation, microwaves, radio waves, polarized light. Principles and applications of lasers. Holography, X-ray spectroscopy, diffractometry and radiography. Special radiation sources and detectors.

### 1.3533 Marine Acoustics — S1 L1½T½

Wave theory: general wave equation for fluids, viscoelastic media and solids. Travelling and standing wave solutions. Wave Guides: fluid and solid wave guides, ray and mode theories. Sound Transmission in the ocean and application of reflection and refraction theory, scattering and diffraction effects.

### 1.5133 Classical Mechanics and Field Theory — S1 L1½T½

*Prerequisites: 1.002 (or 10.411B), 10.1113, 10.2111, 10.2112.*

Lagrange's equations and applications, variational principles, Hamiltonian formulation, canonical transformations, Poisson brackets, Hamilton-Jacobi equation, continuous systems and fields.

### 1.5233 Electrodynamics — S2 L1½T½

*Prerequisites: 1.022, 10.1113, 10.2111, 10.2112. Co-requisite: 1.0333. Excluded: 10.222C.*

Special relativity, covariant formulation of electrodynamics, stress tensor, radiation from moving charges, Lienard-Wiechert potentials, synchrotron radiation, bremsstrahlung, electro-magnetic mass, radiative damping, multipole expansion for fields, scattering.

### 1.5333 Radiation and Matter — S2 L1½T½

*Prerequisites: 1.012, 1.022, 10.2111, 10.2112. Co-requisites: 1.0133 or 10.222F or 2.023A, 1.0333 or 10.222C.*

The interaction of electromagnetic radiation with matter. Blackbody radiation; Einstein coefficients. Dipole radiation; shape and broadening of spectral lines. Quantum mechanical transition probabilities. Propagation and dispersion of radiation. Scattering theory. Radiative transfer.

### 1.5433 Plasmas and Laser Fusion — S2 L1½T½

*Prerequisites: 1.012, 1.022. Excluded: 1.513.*

Microscopic and macroscopic descriptions of plasma, electromagnetic waves in plasma, stress tensor, ponderomotive force, laser-plasma interactions, momentum transfer and instabilities, non-linear force, self-focussing mechanisms, laser induced nuclear fusion, theoretical and experimental progress and prospects.

### 1.5533 General Relativity — S1 L1½T½

*Prerequisites: 1.012, 1.022, 10.1113, 10.2111, 10.2112. Excluded: 1.523.*

Relativistic kinematics and dynamics, tensors and tensor operations, Christoffel symbols, formulation of general relativity, curvature of space, geodesics, gravitational field equations, Schwarzschild solution, tests of the theory, astrophysical and cosmological implications.

### 1.713 Advanced Laser and Optical Applications — F L1½T½

*Co-requisite: 1.002.*

Laser operation, characteristics, theory, design of such types as gas, ion, molecular, excimer and dye lasers. Filter design, multiple beam interference, etalon use, dielectric mirror design. Modulators, theory and application, electro and acousto optic phenomena. Detectors, types, basic theory and design. Solid State and vacuum tube systems. Non-linear Optics, theory and applications. A design study and case history of a typical optical system. Materials processing fundamentals. Laser safety.

### 1.763 Laser and Optical Technology Laboratory I — F L½T3½

*Prerequisite: 1.032.*

Aims to make students conversant with the techniques employed in advanced laser technology and to become familiar with the various components used in such applications. Includes: a study of advanced optical techniques including the construction, operation and characterization of various types of laser; preparation and investigation of optical, electro-optical and other related devices in terms of their basic behaviour and with respect to applications in complex optical systems; a small lecture content on a variety of topics relating to laser applications and including safety aspects.

### 1.773 Laser and Optical Technology Laboratory II — F T4

*Co-requisite: 1.763.*

This laboratory unit extends the work of the 1.763 unit in providing further experience with advanced optical systems. Students visit external establishments where lasers are being used for commercial purposes and are involved with experimental tasks related to these high technology applications. Session 2: each student is required to complete a design study and assembly of an advanced optical system selected to answer a specific problem appropriate to the subject.

## Physics Level IV Units

All Physics honours courses consist of lecture units and project work. Some of the lecture units of which quantum mechanics, statistical mechanics and solid state physics are examples, are taken by all students. Other units which are considered particularly relevant to the type of honours chosen are also prescribed. The actual list of topics in this second category varies from time to time and is partly influenced by student numbers and interest. Examples of such units are given below under each honours subject heading. The project work may be experimental or theoretical and forms a very significant part of each course. Usually two projects are undertaken during the year of study.

Students whose academic records are satisfactory are invited to enrol in the honours year. Full details of courses and projects are then supplied. The approval of the Head of School is required for each program of study.

### 1.104 Physics IV (Honours)

Students doing this honours course should enrol in the single subject 1.104 only. Examples of specific lecture units which may be offered include: astronomy, additional topics in solid state physics, lasers, biophysics etc.

### 1.304 Applied Physics (Honours)

Students doing this honours course should enrol in the single subject 1.304 only. Examples of specific lecture units which may be offered include: physical principles of instrumentation, applied solid state physics, physics of materials etc.

### 1.504 Theoretical Physics IV (Honours)

Students doing this honours course should enrol in the single subject 1.504 only. Examples of specific lecture units which may be offered include: quantum theory of solids, plasma theory, quantum electrodynamics.

### 1.604 Biophysics IV (Honours)

Students taking this honours course should enrol in the single subject 1.604 only. Biophysics, statistical mechanics and solid state physics are examples of prescribed units. Additional lecture units may be selected from those on offer in other Physics honours courses and from Biochemistry and Physiology.

## Servicing Subjects

These are subjects taught within courses offered by other schools or departments in a different faculty.

**For further information regarding the following subject see the Faculty of Arts Handbook.**

### 1.901 Astronomy — S1 or S2 L2T2

Involves an overview of Astronomy, from the Solar System to the galaxies. Includes an exploration of the Solar System, to indicate the advances that have been made, particularly and most recently with space probes, in our understanding of planetary systems. The characteristics of stars discussed along with their use in establishing an understanding of stellar evolution. The treatment of galaxies includes consideration of the nature of our galaxy and its relation to other external systems, concluding with a brief discussion of aspects of observational cosmology. Discussion of such recent topics as black holes, pulsars, quasars.

**For further information regarding the following subject see the Faculty of Architecture Handbook.**

### 1.931 Physics I (Building)

*4 credit points; compulsory. Prerequisites: nil.*

Mechanics of solids: kinematics. Newton's Law of motion, work and energy. Atomistic description of mechanical properties of matter. Atomic structure of matter. Elasticity. Plasticity: dislocations, fracture, viscosity. Electrostatics, electromagnetism and DC circuits: Coulomb's Law. Electric field. Electric potential. Capacitance. Electrical energy sources. Conductors. Resistivity. Atomic view of conduction. EMF. Kirchoff's Laws. Magnetic induction. Torque on a coil in magnetic field. Moving coil meter. Wheatstone's bridge. Potentiometer. Faraday's Law. Transient circuits.

Wave motion, heat light and sound: simple harmonic motion. Wave motion. Interference, Doppler effect. Energy transfer. Heat, heat capacity. Joule's equivalent. Thermometry. Convenction. Conduction. Radiation. Black body. Emittance. Absorptance. Light. Electro-magnetic spectrum. Huygens' Principle. Curved mirrors. Lenses. Dispersion. Interference. Polarization. Photometry. Colorimetry Sound. Longitudinal waves. Overtones. Intensity levels. Decibels. Quality of sound.

**For further information regarding the following subjects see the Faculty of Engineering Handbook.**

### 1.951 Physics I (Mechanical Engineering) — F L2T2

*Prerequisites: As for 1.001 Physics I.*

For students in the School of Mechanical Engineering.

Physical properties of solids, liquids and gases: microscopic theory of elasticity, friction, fracture in solids, viscosity in liquids and kinetic theory of gases. Dynamics of solids and fluids: Newton's laws, energy and momentum conservation, rotational mechanics, fluid mechanics. Compressional waves: acoustics. Thermostatic properties of matter: concepts of thermodynamics, thermal properties of liquids and solids. Electric fields and currents: electrostatics, direct-current circuits. Electromagnetism: magnetic forces and fields, electro-magnetic induction. Non-steady electric currents, transients in RC, LR and LC circuits, alternating-current circuits. Optics: geometric optics, optical instruments, interference and diffraction, polarization.

### 1.961 Physics I (Electrical Engineering) F L3T3

*Prerequisite: As for 1.001 Physics 1.*

For students in the School of Electrical Engineering.

Electrostatics in vacuum, electrostatics in dielectrics, steady state currents, magnetostatics in vacuum, ferromagnetism, electromagnetic induction, transient currents. Vectors, motion in one dimension, motion in a plane, particle dynamics, work and energy, the conservation of energy, conservation of linear momentum, collisions, rotational kinematics, rotational dynamics, simple harmonic motion, gravitation. Temperature, heat and the first law of thermodynamics, kinetic theory of gases. Waves in elastic media, sound waves, geometrical optics, interference, diffraction, gratings and spectra, polarization.

### 1.971 Physics I (Surveying) F L3T3

*Prerequisite: As for 1.001 Physics I.*

For students in the School of Surveying.

Aims and nature of physics, linear and rotational mechanics, hydrostatics, elasticity, gravitation, temperature, electricity and magnetism, wave motion, optical instruments, interference and diffraction, lasers and atomic clocks. The importance in surveying of precise frequency, time, speed and distance measurements.

### 1.981 Physics I (Civil Engineering) S1 L2T3 and S2 L2T1

*Prerequisite: As for 1.001 Physics I.*

For students in the School of Civil Engineering.

Aims of physics and its relation to civil engineering. Simple harmonic motion and its relation to wave motion. Electrical and magnetic forces, Electromagnetism DC and AC circuits, bridges. Application of waves to physical optics to explain such phenomena as diffraction, interference and polarization. Holography. Acoustic and mechanical waves, attenuation, velocity of propagation. Elastic moduli. Non-destructive testing, instrumentation, techniques and theory. Emphasis on the physics involved in non-destructive testing and the aspects of vibration important to civil engineering.

### 1.962 Physics of Measurement (Surveying) S1 L1T2

*Prerequisite: 1.971.*

For students in the School of Surveying.

Resolution, accuracy and sensitivity of instruments. Errors of observation and their treatment. Experimental design. Displacement transducers. Transducers for other mechanical quantities. Thermometry. Electrical noise. Dynamic response of measuring systems. Servosystems. Mechanical design of apparatus. Microscopes, telescopes and other optical instruments. Lenses, optical fibres and other optical components. Photometry. Colorimetry. Measurements under adverse ambient conditions. Analogue-to-digital conversion. Digital instruments. Measurements of very large and very small quantities.

### 1.972 Electromagnetism (Electrical Engineering) S2 L2T2

*Prerequisite: 1.961 or 1.001 or 1.011, 10.001. Co-requisites: 10.2111, 10.2112. Excluded: 1.012.*

Electrostatics in vacuum, Electrostatics in Dielectrics, electric currents, magnetostatics in vacuum, magnetic scalar potential, magnetostatics in magnetic media, time varying fields, Maxwell's equations.

### 1.982 Solid State Physics (Electrical Engineering) S1 L2½T2

*Prerequisite: 1.961 or 1.001 or 1.011, 10.001. Co-requisites: 10.2111, 10.2112. Excluded: 1.012.*

The concepts of waves and particles, introductory quantum mechanics, atomic structure, optical spectra and atomic structure, structural properties of solids, band theory and its applications, uniform electronic semiconductors in equilibrium, excess carriers in semiconductors.

### 1.992 Mechanics and Thermal Physics (Electrical Engineering) F L1½T½

*Prerequisite: 1.961, 10.001 or 10.011. Co-requisites: 10.2111. Excluded: 1.002, 1.012.*

Particle mechanics, harmonic motion, central force problems, systems of particles, Lagrange's equations with applications, coupled oscillations, wave equation. Thermodynamic laws, entropy, kinetic theory, M-B distribution, microscopic processes, Maxwell's relations, chemical potential, phase diagrams, multicomponent systems, electrochemical potential, statistics of defects in solids.

## Graduate Study

Not all graduate subjects are necessarily offered in any one year.

### 1.118G Methods of Theoretical Physics

For PhD degree, MSc and MPhysics degree course students.

**1.** Response functions and Green's functions. **2.** Symmetry and group theory. **3.** Many particle systems. **4.** Tensor calculus and variational techniques.

### 1.128G Methods of Experimental Physics

For PhD degree, MSc and MPhysics degree course students.

**1.** Signal processing and retrieval. **2.** Resonance spectroscopy techniques. **3.** Diffraction and scattering techniques. **4.** Electron microscopy.

### 1.801G Energy Alternatives

For MPhysics degree course students.

A study of energy alternatives: solar thermal and solar electric energy; energy from fossil fuels; conversions, hydrogen, nuclear fusion and fission, wind, ocean and geothermal sources of energy; political and sociological aspects of energy alternatives.

### 1.805G Applied Physics

For MPhysics degree course students.

A study of advanced physical instruments, data handling and control, measurement technology and materials science with special reference to physics in industry.

## Servicing Subjects

For further information regarding the following subject see the Faculty of Architecture handbook.

### 1.927G Acoustic Theory — S1 L1½T½

*2 credit points.*

Sources of acoustic radiation; simple, dipole, quadrupole, plane, impulsive source, random source, aerodynamic sources. Free field propagation in fluids, interference and diffraction, absorption, shock waves. Boundary effects; reflection and transmission at fluid/fluid and fluid/solid interfaces, fluid waveguides, solid waveguides. Reception and analysis; transducers, Fourier analysis, statistical methods, impulse measurement.

# Chemistry

Students wishing to take 8 or more Level III Chemistry units are required to transfer to the Pure and Applied Chemistry Course (3910) before the commencement of Year 2. If Year 2 studied in the Science and Mathematics course is similar to Year 2 of Course 3910, the transfer may still be made before the commencement of Year 3.

The Pure and Applied Chemistry Course which enables specialization in Chemistry is described in detail earlier in this handbook.

## Undergraduate Study

## Chemistry Level I Units

### 2.111 Introductory Chemistry — S1 L2T4

*Prerequisite: None.*

*Note:* Students who have passed 2.121 or 2.131 may not enrol in 2.111 or 2.141. Students meeting the 2.121 or 2.141 prerequisite are not permitted to enrol in 2.111 without the permission of the Head of the School of Chemistry. Students who enrol in 2.111 must pass 2.111 before they can proceed to 2.121 or 2.131 or 2.141.

Classification of matter and the language of chemistry. The gas laws and the Ideal Gas Equation, gas mixtures and partial pressure. The structure of atoms, cations and anions, chemical bonding, properties of ionic and covalent compounds. The Periodic classification of elements, oxides, hydrides, halides and selected elements. Acids, bases, salts, neutralisation. Stoichiometry, the mole concept. Electron transfer reactions. Qualitative treatment of reversibility and chemical equilibrium, the pH scale. Introduction to the diversity of carbon compounds.

### 2.121 Chemistry IA — S1 or S2 L2T4

*Prerequisites:*

| | *HSC Exam Percentile Range Required* |
|---|---|
| *2 unit Mathematics* or* | *71-100* |
| *3 unit Mathematics or* | *21-100* |
| *4 unit Mathematics* | *1-100* |
| *and* | |
| *2 unit Science (Physics) or* | *31-100* |
| *2 unit Science (Chemistry) or* | *31-100* |
| *4 unit Science (multistrand) or* | *31-100* |
| *2 unit Science (Geology) or* | *51-100* |
| *2 unit Science (Biology)* | *51-100* |
| *or* | |
| *2.111.* | |

*This refers to the 2 Unit Mathematics subject which is related to the 3 Unit Mathematics subject. It does not refer to the subject 2 Unit Mathematics (Mathematics in Society).

Stoichiometry and solution stoichiometry. Properties of gases; kinetic molecular theory. Thermochemistry. Atomic structure, electron configurations and the periodic table. Types of chemical bonds, electronegativity, molecular geometry. Periodicity of physical and chemical properties of common representative elements and compounds. Liquids and solids, changes of state, phase diagrams. Types of solids. Solutions and their properties. Colloids. Facts and theories about reaction kinetics.

*Note:* Students who have passed 2.121 or 2.131 may not enrol in 2.111 or 2.141. Students meeting the 2.121 or 2.141 prerequisite are not permitted to enrol in 2.111 without the permission of the Head of the School of Chemistry. Students who enrol in 2.111 must pass 2.111 before they can proceed to 2.121 or 2.131 or 2.141.

### 2.131 Chemistry IB — S1 or S2 L2T4

*Prerequisite: 2.111 or 2.121.*

Chemical equilibrium, equilibrium constants, quantitative calculations applied to acid-base and solubility equilibria; buffers, titrations, chemical analysis. Oxidation and reduction reactions, electrode potentials. Chemical thermodynamics, entropy, free energy. Chemistry of carbon compounds, stereoisomerism; alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, aldehydes, ketones, carboxylic acids and derivatives, amines.

### 2.141 Chemistry IM — F L2T4

*Prerequisites: As for 2.121 Chemistry 1A.*

*Note: As for note, 2.121 Chemistry IA.*

The syllabus is an integrated one of 2.121 and 2.131 (see above). Students majoring in Chemistry may take 2.141 in lieu of 2.121 and 2.131.

## Chemistry Level II Units

### 2.002A Physical Chemistry — S1 or S2 L3T3

*Prerequisites: 2.121 or 2.141 and 10.011 or 10.001 or 10.021B & 10.021C.*

Thermodynamics: first, second and third laws of thermodynamics; statistical mechanical treatment of thermodynamic properties; applications of thermodynamics: chemical equilibria, phase equilibria, solutions of nonelectrolytes and electrolytes, electrochemical cells. Kinetics: order and molecularity; effect of temperature on reaction rates; elementary reaction rate theory. Surface chemistry and colloids: adsorption, properties of dispersions; macromolecules and association colloids.

### 2.002B Organic Chemistry — F or S1 or S2 L3T3

*Prerequisite: 2.131 or 2.141.*

Chemistry of the more important functional groups; aliphatic hydrocarbons, monocyclic aromatic hydrocarbons, halides, alcohols, phenols, aldehydes, ketones, ethers, carboxylic acids and their derivatives, nitro compounds, amines and sulphonic acids.

### 2.002D Analytical Chemistry — SS L2T4

*Prerequisites: 2.121 & 2.131 or 2.141, 10.001 or 10.011 or 10.021B & 10.021C.*

Chemical equilibria in analytical chemistry. Acid-base, complex formation, redox systems, solid/solution, and liquid/liquid equilibria with applications to volumetric, gravimetric and complexometric analysis, and to liquid/liquid extractions. Spectrophotometry, basic principles. Chromophores. Fundamentals of precision. Electrochemistry, theory and applications to electrodeposition and potentiometry; ion selective electrodes. radioactive tracer techniques. Data evaluation in analytical chemistry. Qualitative analysis.

### 2.042C Inorganic Chemistry — SS L2T4

*Prerequisites: 2.121 or 2.131 or 2.141.*

Chemistry of the non-metals including B, C, Si, N, P and S. Chemistry of the metals of groups IA, IIA, and Al. Typical ionic, giant-molecule and close-packed structures. Transition metal chemistry, including variable oxidation states, paramagnetism, Werner's theory, isomerism of six and four-coordinate complexes, chelation, stabilization of valency states. Physical methods of molecular structure determination. Chemistry of Fe, Co, Ni, Cu, Ag, Au and Hg.

## Chemistry Level II/III Units

### 2.003E Nuclear and Radiation Chemistry — F or S1 or S2 L2T4

*Prerequisites: 2.121 & 2.131, or 2.141, and 10.001 or 10.011 or 10.021B & 10.021C.*

Fundamental particles, nuclear structure and properties. Nuclear transformations. Properties of nuclear radiations. Interaction of radiation with matter. Detection and measurement of nuclear radiations. Nuclear pulse spectrometry. Nuclear instrumentation. Radiation chemistry: primary and secondary processes in the absorption of ionizing radiation in gases, liquids and solids. Free radical detection and reactions. Technological applications and techniques. Preparation of radionuclides in high energy machines and nuclear reactors. Radiochemical techniques. Handling precautions. Chemistry of nuclear transformations. Chemistry of reactor fuel cycles. Applications of radionuclides in chemistry, biology and industry.

### 2.003H Molecular Spectroscopy and Structure — S2 L3T3

*Prerequisite: 2.121 & 2.131, or 2.141.*

Absorption and emission of radiation. Atomic spectra. Molecular spectroscopy: vibrational, including infrared and Raman; UV-visible; instrumentation and sample handling. Magnetic resonance. Mass spectometry with particular reference to structure determination. Laboratory and tutorial work to illustrate the above, including inspection of major instruments.

### 2.003J Fundamentals of Biological and Agricultural Chemistry — SS L2T4

*Prerequisites: 2.121 & 2.131, or 2.141. Excluded: 2.013L, 41.101.*

Aspects of the chemical and physical properties of materials important in biological systems. Methods of separation, of purification and estimation, and correlations of structure with reactivity. Methods of separation and identification, such as gel permeation, discussed as appropriate to each topic. Significance of isomerism in biological systems, optical and geometrical, absolute configuration. Amino acids, peptides and introduction to protein structure. Relevant properties, acid/base properties, pK values, zwitterion, isoelectric points. Simple peptide synthesis. Treatment of carbohydrates, establishment of structures, reactivity. Chemistry of monosaccharides, disaccharides and polysaccharides. Methods of analysis, chemical and physiochemical. Fats, correlation of properties with saturated and unsaturated fatty acid composition. Structural chemistry of fatty acids. Reaction of unsaturated fatty acids, urea complexes. Detergents. Trace elements in biological systems. Chemistry of common heterocyclic systems with emphasis on molecules of biological importance.

### 2.003K Solid State Chemistry — SS L2T4

*Prerequisites: 2.121 & 2.131, or 2.141, and 10.001 or 10.011.*

The determination of crystal structures by single crystal diffraction: X-ray and neutron diffraction methods. Practical and automated aspects of the solution of crystal structures: applications to inorganic, molecular and macromolecular crystals. Patterns of solid state structure: the structures of crystals with unusual and valuable chemical and physical properties. Solid state reactions, surface properties and catalysis. Applications of EPR, NMR and mass spectrometry.

### 2.013A Introductory to Quantum Chemistry — S1 L2T4

*Prerequisites: 1.001 or 1.011, 2.121 & 2.131, or 2.141, and 10,001 or 10.011 or 10.021B & 10.021C.*

Quantum mechanical concepts. Particle in a box. Rotational and vibrational motions — spectra. The hydrogen atom. Angular momentum. Many electron atoms; effects of electron spin; atomic spectra. Molecular spectroscopy and valence; electronic structure and spectra of molecules. The Frank-Condon principle. Delocalization; Huckel M. O. theory. Ligand field theory. Photoelectron spectroscopy. Magnetic resonance: basic principles and experimental techniques; spin density effects in ESR spectra; theory of nuclear shielding and spin-spin coupling; relaxation processes.

## Chemistry Level III Units

### 2.003A Physical Chemistry — SS L3T3

*Prerequisite: 2.002A.*

Thermodynamics, including non-ideal systems; advanced electrochemistry; statistical thermodynamics; applications to gases, liquids and chemical equilibria; states of matter.

### 2.003B Organic Chemistry — S1 or S2 L2T4

*Prerequisite: 2.002B.*

*Alicyclic Chemistry.* Stereochemistry of acyclic systems; classical and non-classical strain in cyclic systems; stereochemistry and conformation of monocyclic and polycyclic compounds; synthesis, reactions and rearrangement of monocyclic compounds including stereochemical selectivity; transannular reactions in medium rings. Synthesis and reactions of fused and bridged polycyclic systems. *Heterocylic Chemistry.* Synthesis and reactions of the following heteroaromatic systems; pyridine, quinoline, isoquinoline. Flavones and isoflavones; pyrimidine; pyrrole, furan, thiophen. Indole, imidazole.

### 2.003C Inorganic Chemistry — S1 or S2 L2T4

*Prerequisite: 2.042C.*

Coordination chemistry: valence bond and crystal field theory and their application to magnetic and spectral properties of complexes. Factors affecting the stability of complexes; unusual oxidation states of transition metals. Chemistry of the groups IIIA (the lanthanides and actinides), IVA, VA, VIA and VIIA. More advanced chemistry of groups IIIB, IVB, VB, VIB and VIIB and the noble gases.

### 2.003D Instrumental Analysis — SS L2T4

*Prerequisites: 2.002A and 2.002D.*

Selected spectrophotometric methods of analysis: infrared, emission, flame, precision spectroscopy, spectrofluorimetry, X-ray fluorescence, mass spectroscopy. Instrumental chromatography, thermal analysis. Electrochemical and kinetic methods. Introduction to automation and data processing.

### 2.003L Applied Organic Chemistry — S2 L2T4

*Prerequisite: 2.002B. Excluded: 2.033L.*

Discussion at advanced level of the chemistry of selected commercially important groups of organic materials. Mechanisms of reaction and physical properties, together with methods of examination, in overall unit approach, correlating structure with behaviour. Emphasis on breakdown to model systems. Theory of physical techniques, refractometry, polarimetry etc. from basis of additivity. Fatty acids with emphasis on unsaturation, thermal and oxidative polymerizations, alkyl resins, analysis of mixtures. Waxes and sterols; selected natural and synthetic macromolecules; polymerization processes, including treatment of initiators, chain transfer agents, retarders. Vulcanization and sulphur-olefin reactions. Photochemical processes; electro-organic chemistry. Fine chemicals, soaps and detergents. Aspects of metal catalysis in industry.

### 2.003M Organometallic Chemistry — SS L2T4

*Prerequisite: 2.002B.*

Synthesis, structure and reactions of metal alkyyls and aryls; metal carbonyls, isonitriles and acetylides; compounds of metals with unsaturated hydrocarbons; organic chemistry of boron, silicon, phosphorus and arsenic; application of organometallic compounds in organic synthesis and homogeneous catalysis.

### 2.013B Synthetic Organic Chemistry — S2 L2T4

*Prerequisite: 2.003B.*

Introduction, aims, stereochemical and positional problems, recognition of sub-units. Modern functional group transformations with particular reference to positional and stereochemical control. Spectroscopic markers. Electrocyclic reactions, formation, contraction and expansion of rings, Diels-Alder and related cycloadditions, photochemistry, Woodward-Hoffman rules, protecting groups. Representative syntheses of compounds of theoretical and biological interest, eg cubane, Dewar benzene, caryophyllene, reserpine, corrins.

### 2.013C Advanced Inorganic Chemistry — SS L2T4

*Prerequisite: 2.042C. Co-requisite: 2.003C.*

Reaction mechanisms involving metal complexes. Spectroscopic methods for investigating metal complexes, including infrared, electronic and Mössbauer spectroscopy. Inorganic crystal chemistry: structures and properties of simple compounds. Cluster compounds, metal-metal bonding, extended electronic interactions. $\pi$-Complexes, carbonyls, nitrosyls, ethylene complexes, and sandwich-type compounds; methods of preparation, reactions, evidence for structures and type of bonding involved.

### 2.013D Advanced Analytical Chemistry — F or S2 L2T4

*Prerequisite: 2.002D. Co-requisite: 2.003D.*

Sampling of biological, environmental and industrial materials. Preparation for analysis. Approaches to analysis of gases, waters, soils and geological materials, plants and biological materials, ceramics, ferrous and non-ferrous metals and alloys. Chemical microscopy.

### 2.013E Advanced Nuclear and Radiation Chemistry — L2T4

*Prerequisite: 2.003E.*

Only available to non-Chemistry majors. It may not be included in course programs 0201, 0202, 0203, 0204, 0241, 0242, 0262 and Course 3910.

Advanced nuclear instrumentation and special counting methods; isotope effects and isotope separation methods; nuclear reactors, accelerators and isotope production; isotope labelling techniques; radiation sources and their uses; hot atom and recoil reactions; actinide chemistry and nuclear reactor fuel processing; environmental radioactivity; biochemical applications including radioimmunoassay techniques and the preparation of short lived radiopharmaceuticals; isotopic methods applied to chemical measurements; industrial tracer applications. *Laboratory classes* involve experiments associated with the above topics.

### 2.013L Chemistry and Enzymology of Foods F L1T2

*Prerequisite: 2.002B. Excluded: 2.003J, 2.043L, 2.023L, 2.053L.*

The chemistry of food constituents at an advanced level and the relationship between the chemistry and enzymology associated with the origin and handling of foodstuffs. Treatment of the stability of constituents, changes in colour and texture occurring during processing and storage. Methods of assessment, chemical and physical. General classification of constituents, role of free and combined water. Fixed oils and fats, rancidity of enzymic and autoxidative origin, antioxidants — natural and synthetic — theories on mechanisms of action, carbohydrates, reactivity, role in brewing processes, carbohydrate polymers, starch structure, enzymic susceptibility and mode of action, estimations, enzymic degradation and enzymic browning, reactions and stability of natural pigments, vitamins, preservatives.

### 2.023A Quantum Theory of Atoms and Molecules F L2T1

*Prerequisites: 2.002A, 10.2111 & 10.2112.*

Wave mechanics — linear operators; Schrödinger wave equation, applications, method of solution; variation principle, linear combinations, perturbation theory. Many-electron problems — central field method; electron spin; Fermi-Dirac statistics; angular momentum operators; Coulomb repulsion two-electron operator; spin-orbit coupling; Russell-Saunders and jj coupling; Zeeman effect; vector coupling and Wigner coefficients; allowed transitions. Group theory — symmetry operations; matrix representation; irreducible representation; characters of a group; non-rigid molecules; antisymmetry operators.

### 2.023B Natural Product Chemistry S2 L2T4

*Prerequisite: 2.003B.*

The isolation, structure determination, synthesis and biosynthesis, and the reactions of selected classes of organic compounds of biological significance. The chemistry of plant and animal products — terrestrial and marine. Examples from carbohydrates, terpenoids and steroids, alkaloids and other naturally-occurring heterocyclic systems. Interdisciplinary aspects of the topic.

### 2.023L Biological and Agricultural Chemistry SS L2T4

*Prerequisite: 2.002B. Excluded: 2.053L, 2.013L, 2.043L.*

Water supplies, bore water, methods of examination and assessment. Origin of plant constituents of importance to food industries. Oxygen and nitrogen heterocyclic chemistry as required for natural pigments, phenolics, tannins, methods of estimation. Photochemical processes. Toxic and nontoxic constituents, alkaloids, enzyme inhibitions, preparation, assessment and active site concepts. Animal feeds, fodders, silage formation. Soil and plant nutrients. Fractionations of carbohydrates, proteins. Structure and glyceride fractionation of fats. Agricultural chemicals, feed additives. Insecticides, pesticides, natural and synthetic. Fungicides, herbicides and plant growth hormones. Synthesis formulation, stability and degradation processes. Extensions in vitamin chemistry. Trace metals in plant and animal metabolites.

### 2.033A Physical Chemistry of Macromolecules S2 L2T4

*Prerequisites: 1.012 or 2.002A and 2.002B or 2.003J.*

Macromolecules in solution; determination of molecular size; gel permeation chromatography, diffusion, sedimentation, viscometry, osmometry and light scattering. Spectroscopic properties: circular dichroism and optical rotary dispersion; conformation of macromolecules in solution; helix-random coil transitions. Macromolecules in the solid state; X-ray diffraction; basic structural features.

### 2.043A Environmental Chemistry S2 L3T3

*Prerequisites: 2.002A, 2.002D.*

Physico-chemical aspects of atmosphere chemistry: dispersion of colloids and solid matter, photochemical reactions. Hydrological cycle: reactions in the sea, rivers and estuaries; chemical characteristics of surface and sub-surface waters. Corrosion of metals.

*and either*
Simple digital and analogue computer models of ecological systems based on chemical data and physico-chemical properties.

*or*
Distribution of elements and nutrient cycles in water; organic carbon cycles, oxygen balance (redox processes in aquatic systems). Chemical models of these processes (including an introduction to simple computing). Practical project (mostly field work) dealing with nutrient cycles.

### 2.043L Chemistry and Enzymology of Foods F L2T4

*Prerequisite: 2.002B. Excluded: 2.013L, 2.023L, 2.053L.*

Reference: 2.043L and 2.053L: only one of these double units may be chosen.

As for 2.013L but in greater detail and depth.

### 2.053A Chemical Kinetics and Reaction Mechanisms SS L3T3

*Prerequisite: 2.002A*

Basic kinetic concepts, mechanisms of elementary processes and fundamental theories of kinetics. Gas-phase systems, unimolecular and free-radical reactions. Reactions involving excited species, pyrolysis, photolysis, mass spectrometry; comparison of flash photolysis and pulse radiolysis. Reactions in solution. Surface kinetics and catalysis. Fast reactions. Applications of the above concepts to inorganic and organic reaction mechanisms.

### 2.053L Biological and Agricultural Chemistry F L2T4

*Prerequisite: 2.002B. Excluded: 2.023L, 2.013L, 2.043L.*

Reference: 2.043L and 2.053L: only one of these double units may be chosen.

As for 2.023L but in more detail and depth.

**2.063A Advanced Molecular Spectroscopy** **S2 L2T4**

*Prerequisite: 2.013A.*

Theory: Born-Oppenheimer approximation; theory of transition probabilities; group theory; normal mode analysis.

Spectra: rotational, vibrational and electronic structure in molecural spectra, including microwave, infrared, Raman, UV-visible and photoelectron spectra. Kinetic spectroscopy. Lasers.

## Chemistry Level IV Unit

**2.004 Chemistry Honours**

An honours program consisting of selected series of lectures on advanced topics in Chemistry and a research project.

Students intending to seek admission to this course should consult the School re selection of units in the earlier years and apply to the Head of the School for consideration for admission at the end of Year III (or completion of requirements for the pass degree).

## Servicing Subjects

These are subjects taught within courses offered by other schools or departments in a different faculty.

**81.002 Chemistry and Biochemistry for Medical Students**

Conjoint subject with the School of Biochemistry.

**For further information regarding the following subjects see the Faculty of Applied Science and Engineering Handbooks.**

**2.030 Organic Chemistry** **S1 L1P4 S2L1**

*Prerequisite: 2.002B.*

The spectroscopic identification of organic compounds, free radical chemistry and electro-organic processes, various aspects of the organic industrial processes such as industrial synthesis based on petrochemicals, and organometallic reactions of industrial interest. Selected topics from the dyestuff, pharmaceutical and agricultural industries discussing syntheses and reactions including degradation.

**2.951 Chemistry IME** **S2 L2T3**

*Prerequisite: Nil.*

A treatment of chemistry which illustrates the application of the principles of chemistry to problems of concern to mechanical engineers. Topics: Chemistry of materials, thermochemistry, chemical kinetics and equilibrium, radioactivity and nuclear power, electrochemistry and corrosion of metals. Introduction to organic chemistry, structure and properties of polymers, fuels and lubricants. Surface chemistry.

**2.981 Chemistry ICE** **S1 L3T3 S2 L2**

*Prerequisite: As for 2.121 Chemistry IA.*

Classification of matter and theories of the structure of matter. Atomic structure and the properties of compounds. Chemical change and energy concepts. Equilibrium and energy changes. Ionic equilibria. Introduction to colloidal systems.

## Graduate Study

**2.231G Food and Drugs I and II and 2.242G (Including Pharmacognosy and Microsopy of Crude Drugs)** **F L1T3**

Regarded as a unit, and may be spread over two years.

Treatment of the food section develops from considerations of proximate analysis — gross determination of classes of food components — to detailed examinations within the groups for more important compounds. Conversely the course in drug work progresses from the examination of simple materials, including identification of unknowns by macro and micro procedures to the examination of compounded materials. A background section on food handling is included, while some attention is given to chemotherapy etc in the drug course.

Subject-matter covers treatment of the main classes of foodstuffs, such as: *Foods:* Origin, general introduction to analytical methods, relation to likely adulterations and impurities, groups of constituents; carbohydrates, sugars, by physical and chemical methods, jams and preserves, pectin, agar, alginates, oils and fats; protein foods, meat, gelatin, fish products; dairy products, milk, cream, cheese, etc.; fermented liquids, beer, wine, spirits, minor constituents. Principles of food processing, dehydration, quick freezing, canning; cereal products; beverages and flavouring essences; nutritional aspects, vitamins in detail; preservatives and food additives; radiation chemistry of food products. *Drugs:* Elements of pharmacology chemotherapy and modes of action, galenicals, identification tests for alkaloids, etc. Analytical chemistry of analgesics, sedatives, hypnotics, steroid hormones, antihistamines, etc. Antibiotics, penicillin, streptomycin, aureomycin, sulphonamides. Activity of enzyme preparations; antiseptics and disinfectants; soaps and detergents.

*Pharmacognosy and Microscopy of Crude Drugs*
A graded subject of 20 hours, progressive from relatively simple structures to the examination of adulterated mixtures. Examples from the series: hairs and textile fibres of natural origin, woods, stems, leaves, and barks. Seeds, fruits, rhizomes and roots. Flowers, dried juices and gums. Reactions of cell wall and cell contents. Steps in characterization of unknown powders, adulterants of food and drug powders.

**2.251G Toxicology, Occupational and Public Health** **F L1T2**

Important classes of toxic materials found in the environment; treatment of pesticide residues, industrial chemicals of various types, toxic gases, mould metabolites and bacterial toxins occurring in food, carcinogenic substances, toxic metals, etc. Effects of these substances on living organisms, particularly man. Practical work: pesticide residue analysis, blood and urine analysis, gas sampling and analysis, trace metal determination and experiments on the animal metabolism of toxic substances.

### 2.271G Chemistry and Analysis of Foods — F L1T3

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

### 2.281G Instrumental Techniques in Food and Drug Analysis — F L1T3

Principles involved in modern instrumental techniques; detailed application and interpretation of results. UV, IR, NMR, and ESR, emission and atomic adsorption spectroscopy, polarography, X-ray methods, flueorescence spectroscopy and gas chromatography. Services 2.231G, 2.242G and 2.251G but is also suitable as a single subject for those wishing to familiarize themselves with modern tecniques.

### 2.371G Treatment of Analytical Data — F L1

Errors of measurement, the treatment, interpretation and comparison of sets of measurements, associated data and problems involving analysis of variance. Topics: Description of sets of measurements, graphical representations, calculation of measures of location and spread; probability and random errors, binomial, normal and Poisson distributions; comparisons of sets of measurements, tests of significance; associated data, linear regression analysis; analysis of variance; biological assays, bacteriological counts, sampling problems.

### 2.581G Advanced Analytical Chemistry

*Lectures:* **1.** Analytical flame spectroscopy. **2.** Advanced electrochemical analysis. **3.** Chromatography. **4.** Analytical chemistry of pollutants. **5.** Emission, IR, mass and XRF spectroscopy. **6.** Calculations and statistics in analytical chemistry. **7.** Chemical analysis of organic and biological materials. **8.** Operations and applications of minicomputers in chemistry. **9.** Chemical microscopy.

*Laboratory:* Practice, instruction and visits.

*Research Project.*

### 2.582G Food and Drug Chemistry

*Lectures/Laboratory†:* **1.** Food and drugs I. **2.** Treatment of analytical data. **3.** Instrumental techniques in food and drug analysis. **4.** Food and drugs II. **5.** Toxicology, occupational and public health.

*Research Project.*

### 2.583G Analytical Science (Chemistry)

*Lectures/Laboratory* **1.** Classical methods of chemical analysis: Solution equilibria, precipitation and complex formation, gravimetric, titrimetric and spectrophotometric methods, use of organic reagents, ion exchange and solvent extraction. **2.** Instrumental analysis: Advanced treatment of modern instrumental methods including molecular and atomic spectroscopy, chromatography and electrochemistry. **3.** Toxicology, occupational and public health. **5.** Special instrumental methods: Theory, instrumentation and applications of X-ray fluorescence spectroscopy, inductively coupled plasma atomic emission spectroscopy and mass spectrometry. Principles of automation and data processing.

*Project.*

# Metallurgy

## Undergraduate Study

### 4.024 Metallurgy Project — S1 6 S2 3

An experimental investigation of some aspects of metallurgy. Includes three weeks laboratory work during the mid-year recess.

### 4.054 Metallurgy Seminar — F L2

Lectures on the preparation and presentation of technical papers. Each student is required to prepare and present a paper on a nominated subject.

### 4.302 Chemical and Extraction Metallurgy I — F L1T2

*Co-requisite: 2.002A.*

Metal extraction from ores in terms of unit operations and overall systems, illustrated by the extraction of iron, copper, aluminium and other metals. Elementary process analysis. Laboratory — analysis and solution of problems.

### 4.303 Chemical and Extraction Metallurgy II — F L3T2

*Prerequisites: 4.302, 4.602 and 4.402 or 4.412. Co-requisite: 4.222.*

Metallurgical thermodynamics, application to equilibria involving liquid metals, slags, gases and the solid state. Electrochemistry; corrosion; hydrometallurgy. Kinetics applied to metallurgical processes. Process assessment and selection.

### 4.314 Chemical and Extraction Metallurgy IIIA — S1 L3 T1½

*Prerequisite: 4.303.*

Kinetics of interphase transfer in metallurgical systems. Advances in pyrometallurgy related to fuel utilization, agglomeration, emission, recycling. Advances in hydrometallurgy. Corrosion and oxidation, selection of materials.

### 4.324 Chemical and Extraction Metallurgy IIIB — S2 L3½T1

*Prerequisite: 4.303.*

A selection of advanced topics in chemical and extractive metallurgy.

### 4.402 Physical Metallurgy I — S1 L3T3 S2 L2T4

*Co-requisites: 2.002A, 4.502. Excluded: 1.9322, 4.412, 4.422.*

The crystal structure of metallic phases. Crystal defects. Physical properties of solids. X-ray diffraction. Phase equilibrium in alloy systems. The genesis of microstructure. Mechanisms of phase transformations, departures from equilibrium, metastable transition phases. Heat treatment of alloys. Structure of carbon steels and cast irons. Optical metallography.

**4.403 Physical Metallurgy II** **F L4T5**

*Prerequisite: 4.402. Excluded: 1.3033.*

Diffusion in metals. Nucleation of phase transformations. Mechanisms of precipitation in the solid state. Metallography and properties of commercial alloys. Geometry of deformation in metals. Introduction to dislocation theory and its application to mechanical behaviour of alloys. Zone theory of solids — application to electrical, thermal and magnetic properties and to theory of alloys. Preferred orientation in metals. Optical, X-ray and electron metallography.

**4.404 Physical Metallurgy III** **S1 L3T4½ S2 L3T1½**

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

**4.412 Metallurgical Phases — Structure and Equilibrium, Part 1** **S1 L3T3**

*Co-requisites: 2.002A, 4.302. Excluded: 1.9322, 4.402.*

The crystal structure of metallic phases. Crystal defects. Physical properties of solids. Phase equilibrium in alloy systems. The genesis of microstructure. Metallogragphy.

**4.414 Physical Metallurgy IIIA** **S1 L3T1½**

*Prequisite: 4.403.*

Applications of dislocation theory to work hardening and annealing processes. Phase transformations in alloys. Mathematical crystallography, reciprocal lattice, diffraction. Electron and X-ray metallography.

**4.422 Metallurgical Phases — Structure and Equilibrium, Part 2** **S2 L2T4**

*Prerequisite: 4.412. Co-requisite: 4.303. Excluded: 4.402.*

X-rays and X-ray diffraction. Mechanism of phase transformations, departures from equilibrium, metastable transition phases. Principles of heat treatment. Optical and X-ray examination of metallurgical materials.

**4.502 Mechanical Metallurgy** **S1 L2T2 S2 L1T2**

*Co-requisite: 4.402.*

Combination of 4.512 and 4.522.

**4.512 Mechanical Properties of Solids** **S1 L2T2**

*Co-requisite: 4.402.*

The nature and significance of mechanical properties. Analysis of stress and strain. Stress/strain/time relationships. Influence of stress state, temperature, strain rate and environment on mechanical behaviour. Modes of failure under load. Mechanical testing.

**4.522 Mechanical Metallurgy** **S2 L1T2**

*Prerequisite: 4.512.*

Flow and fracture in metals. Plasticity theory. Principles of metal shaping processes. Relationship between formability and conventional mechanical test results. Fracture mechanics. Fractography. Defects and their significance. Experimental methods related to stress analysis flow and fracture.

**4.504 Mechanical and Industrial Metallurgy** **S1 L3T0 S2 L3T6**

*Prerequisites: 4.403 or 4.433, 4.502 or 4.522.*

The application of metallurgical principles to industrial processing with particular reference to casting, welding , shaping, properties and selection of materials. Metal finishing. Metallurgical aspects in engineering design. Fracture mechanics, design against fatigue, brittle and ductile fracture.

**4.602 Metallurgical Engineering I** **S2 L3T2**

*Co-requisite: 4.302.*

Mass and energy accounting in metallurgical processes. An introduction to the principles and applications of transport processes in systems with specific reference to industrial processes in primary and secondary metallurgy.

**4.613 Metallurgical Engineering IIA** **S1 L2T1**

*Prerequisite: 4.602.*

An extension of the principles and applications of transport processes to metallurgical systems. The principles of metallurgical heating and cooling including fuels, refractories and furnace design and operation. Solidification in moulds, continuous casting. *Process Economics:* As for 48.031 Chemical Engineering IIA Unit 6.

**4.703 Materials Science** **S2 L2T1**

*Co-requisite: 4.403.*

The application of the principles of physical metallurgy to the development of modern materials. Particular attention is paid to the structure property relationships that determine the design of materials. The topics covered include materials used for structural purposes, high temperature application, corrosive environments, nuclear engineering, fuel cells, magnetic applications.

# Mechanical and Industrial Engineering

## Undergraduate Study

### 5.006 Engineering E — S1 L/T6

*Prerequisite: as for 5.010. Excluded: 5.010, 5.020, 5.030.*

*Mechanics:* Composition and resolution of forces, laws of equilibrium. Friction. Statics of rigid bars, pin-jointed frames, and beams. Kinetics of the plane motion of a particle, equations of motion, dynamic equilibrium, work and energy. Kinetics of systems of particles. Rotation of rigid bodies about a fixed axis. *Engineering Drawing:* Graphic communication. First and third angle orthographic projection. Descriptive geometry fundamentals and their application to engineering problems. Australian standard engineering drawing practice. *Introduction to Design:* Engineering method, problem identification, creative thinking, mathematical modelling, computer-aided design, materials and processes, communication of ideas, the place of engineering in society.

### 5.010 Engineering A — S1 or S2 L4T2

*Prerequisite:*

| | *HSC Exam Percentile Range Required* |
|---|---|
| *Either* | |
| *2 unit Science (Physics) or* | *31-100* |
| *4 unit Science (multistrand) or* | *11-100* |
| *2 unit Industrial Arts or* | *31-100* |
| *3 unit Industrial Arts* | *11-100* |

*Note:* Students who wish to enrol in this subject in courses other than the full-time courses in Aeronautical Engineering, Civil Engineering, Industrial Engineering, Mechanical Engineering and Naval Architecture can make up for the lack of the prerequisite by work taken in Physics in the first half of the first year.

*Statics:* Composition and resolution of forces, laws of equilibrium. Friction. Statics of rigid bars, pin-jointed frames, and beams. Simple states of stress. Statics of fluids. *Introduction to Engineering Design:* Engineering method, problem identification, creative thinking, mathematical modelling, computer-aided design, materials and processes, communication of ideas, the place of engineering in society. *Introduction to Materials Science:* The structure and properties of the main types of engineering materials, with emphasis on the way in which properties may be controlled by controlling structure.

### 5.020 Engineering B — S2 L4T2 or L/T6

*Prerequisite: 5.0101 or 5.010 or 8.170.*

*Engineering Dynamics:* Kinematics of a particle in the plane: rectilinear and curvilinear motion; motion relative to a translating frame of reference. Kinetics of a particle in the plane: Newton's second law; D'Alembert's principle; work, power and energy; belt and rope drives; gear trains. Virtual work. Kinetics of a system of particles: impulse and momentum; moment of momentum; impact. Fixed-axis rotation of a rigid body: angular momentum; equation of motion; moment of inertia; energy; centre of percussion. Steady mass flow: theoretical principles; Pelton wheel. *Mechanics of Solids:* 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.

### 5.030 Engineering C — S1 or S2 L2T4 or L/T6

*Prerequisites: as for 5.010.*

*Engineering Drawing:* Graphic communication. First and third angle orthographic projection and isometric projection. Descriptive geometry fundamentals and their application to engineering problems with special emphasis on visualization of problems and development of methods for their solution. Australian standard engineering drawing practice. Applications involving detail and assembly drawings, functional dimensioning and tolerancing.

*and one of the following options* (determined by the course of study)

**1.** *Production Technology* — F L/T3
(Mechanical, Industrial and Aeronautical Engineering and Naval Architecture students must take this option.) Description and appraisal of the processes classified as: forming from liquid or solid, material removal, material joining. Machines. Analysis of the primary functions of the machine tools and an appraisal of their limitations. Principles of operation of common machine tools and illustrations of their use.

**2.** *Introduction to Chemical Industry*
(Chemical Engineering and Industrial Chemistry students must take this option.) The chemical industry in Australia. The role of professional societies. Special topics on the engineering and chemical aspects of the industry, ie pollution control, energy sources, food and biochemicals and polymers, mineral processing, safety, etc. A visit to a factory in the Sydney area and the preparation of a short report after an introduction to information retrieval by university librarians.

**3.** *Introduction to Metallurgical Engineering*
(Metallurgy students must take this option.) History and significance of the exploitation of metals. Ores, mineral economics, mineral processing, and metal extraction and processing methods illustrated by reference to the Australian mineral and metal industries. Properties, uses and applications of metallic materials. The role of the metallurgist in industry and in processing and materials research, and in relation to conservation and the environment.

**4.** *Introduction to Mining Engineering*
(Mining Engineering students must take this option.) Mineral deposits; metallic, non-metallic and fuels. Elements of prospecting and exploration. Basic mining techniques. Mining phases; development, exploitation, beneficiation and withdrawal. Mining and the environment. Mining services. Relevance of basic science and engineering subjects to mining design and operations.

**5.** *Introduction to Ceramic Engineering*
(Ceramic Engineering students take this option.) The classification of materials. The nature of ceramics. The materials science approach. The scope of the ceramic industry. The origin, classification, physical properties and uses of clay minerals and other non-clay raw materials. Principal unit operations used in the ceramic industry. Drying and firing of ceramics, melt forming, pot forming and other forming procedures.

# Electrical Engineering and Computer Science

## Computer Science

## Undergraduate Study

### 6.606 Computing Science Honours

### 6.611 Computing I — S1 or S2 L3T3

*Prerequisite: As for 10.001. Co-requisite: 10.001 or 10.011. Excluded: 6.600, 6.620, 6.021D (1.041 excluded for students enrolled in Program 6806 and Computer Science programs in the Science and Mathematics course).*

Introduction to programming: design and correctness of algorithms and data structures; programming in a high-level algorithmic language which provides simple, high level program control and data structuring facilities. Problem solving: basic ideas of problem solving; introduction to abstract structures used for computing solutions to problems. Introduction to propositional logic, computing machinery, computer arithmetic, artificial intelligence, and operating systems.

### 6.613 Computer Organization and Design — S2 L2T3

*Prerequisites: 6.631 or 6.021E, 6.021D or 6.620 or 6.621 (Pass Conceded (PC) awarded prior to Session 2, 1983, is not acceptable for these subjects). Excluded: 6.0318.*

Bussing structures (asynchronous and synchronous); input/output organization; polling, interrupt and DMA control; parallel and serial device and processor communication and interfacing. Memory organization; CPU and control unit design. Processes: synchronization and communication. Microprocessor case studies.

### 6.621 Computing IIA — S1 or S2 L3T2

*Prerequisites: 6.611 (Pass Conceded (PC) awarded prior to Session 2, 1983, is not acceptable for this subject), 10.001 or 10.011. Excluded: 6.620, 6.021D.*

For those students who intend to take further subjects in computer science.

Expansion and development of material introduced in 6.611 Computing I. Systematic program development: introduction to programming language semantics, reasoning about programs, program derivation, abstract programs, realization of abstract programs (conversion from abstract to concrete). Practice in programming in a high-level programming language. Data-structures: arrays, lists, sets, trees; recursive programming. Introduction to computer organization: a simple machine architecture. Introduction to operating systems.

### 6.622 Computer Applications — S2 L3T2

*Prerequisite: 6.641. Excluded: 6.646, 6.633.*

Simulation: discrete event simulation, pseudo-random number generation, simple queueing theory. Non-numeric programming: artificial intelligence, symbolic computing. Database systems: data base models: relational, hierarchical and network structures; query languages; case study of Ingres; data base security.

### 6.631 Computing IIB — S1 or S2 L3T2

*Prerequisites: 6.620 or 6.621 or 6.021D (Pass Conceded (PC) awarded prior to Session 2, 1983, is not acceptable for these subjects), 6.600 (CR). Excluded: 6.021E.*

*Assembler programming:* programming in a low level machine oriented language in order to illustrate the mapping of higher level language constructs onto a typical machine and the interaction between operating systems and devices. *Digital Logic Design:* Boolean algebra and logic gates, simplification of Boolean functions, combinational logic, medium scale integration building blocks, clocked sequential circuits, registers and memory, computer arithmetic.

### 6.632 Operating Systems — S1 L2T3

*Prerequisites: 6.631 or 6.021E, 6.641 (Pass Conceded (PC) awarded prior to Session 2, 1983, is not acceptable for these subjects). Excluded: 6.672.*

Introduction to operating systems via an intensive case study of a particular system, namely the UNIX Time-sharing system which runs on the PDP11 computer. Includes system initialization, memory management, process management, handling of interrupts, basic input/output and file systems. A comparison of UNIX with other operating systems. General principles for operating system design.

### 6.633 Data Bases and Networks — S2 L3T2

*Prerequisite: 6.641 (Pass Conceded (PC) awarded prior to Session 2, 1983, is not acceptable for this subject). Excluded: 6.622, 6.652, 14.608.*

*Data Base Management Systems:* data models; relational and network structures; data description languages; data manipulation languages; multi-schema structures. Data integrity and security; recovery; privacy. *Computer Networks:* economic and technological considerations; digital data transmission; error detection and recovery; network configurations; circuit switching, packet switching; communication protocols, current international standards; data compression; encryption and decryption.

### 6.641 Computing IIC — S1 or S2 L3T2

*Prerequisite: 6.620 or 6.021D or 6.621 (Pass Conceded (PC) awarded prior to Session 2, 1983, is not acceptable for these subjects), 6.600 (CR).*

*Design of Data Structures:* abstraction, representation, manipulation and axiomatization. Key transformations (hashing), balanced and multiway trees, introduction to graphs. *Files:* sequential access, random access, merging, sorting and updating. File organizations and introduction to data base systems. *Programming in Logic:* descriptive programming languages, symbolic manipulation, pattern matching and associative programming. *Software Engineering:* a survey of some current techniques in problem specification and program design.

### 6.642 Design and Analysis of Algorithms — S1 L3T2

*Prerequisite: 6.641 (Pass Conceded (PC) awarded prior to Session 2, 1983, is not acceptable for this subject).*

Techniques for the design and performance analysis of algorithms for a number of classes of problems. Analysis of algorithms: order notation, recurrence equations, worst case and expected order statistics. Design of efficient algorithms: recursion, divide and conquer, balancing; backtracking algorithms, branch and bound, dynamic programming; set manipulation problems; fast search algorithms, balanced optimal and multiway trees; graph representations and algorithms; pattern matching algorithms. NP — complete problems. Design and specification of programs: modularization, interface design, introduction to formal specification techniques.

### 6.643 Compiling Techniques and Programming Languages — S2 L3T2

*Prerequisite: 6.641 (Pass Conceded (PC) awarded prior to Session 2, 1983, is not acceptable for this subject). Excluded: 6.672.*

**1.** Language description: phrase structure grammars, Chromsky classifications, context-free grammars, finite state grammars, Backus Naur Form, syntax graphs, LL(k), LR(k), LAL(k). **2.** Lexical analysis: translation of an input (source) string into a (machine independent) quasi-terminal symbol string. Finite state recognizers. **3.** Syntax analysis: top-down compilation for LL(1) grammars using syntax graph driven analysers or recursive descent. Bottom-up compilation for simple- and weak-precedence and LR(k) grammars. **4.** Semantic analysis: program translation and code generation; attributed grammars. **5.** Compiler generators: automatic generation of compilers for LALR(1) grammars. **6.** Code optimization by systematic program transformation. **7.** Run-time organization: activation record stacks, heap management.

### 6.646 Computer Applications — S1 L3T2

*Prerequisite: 6.620 or 6.021D or 6.621 (Pass Conceded (PC) awarded prior to Session 2, 1983, is not acceptable for these subjects), or 6.600 (CR), one of 10.311A, 10.321A, 10.301, 10.331, 45.101‡ or equivalent. Excluded: 6.622.*

The use of computers for solving problems with a substantial mathematical and operational research content: includes use of some standard software packages. Topics selected from: discrete event simulation; a simulation language; pseudo random number generation; simple queueing theory, applications of mathematical programming; dynamic programming; statistical calculations; critical path methods; computer graphics, artificial intelligence.

### 6.647 Business Information Systems — S1 L3T2

*Prerequisite: 6.641 (Pass Conceded (PC) awarded prior to Session 2, 1983, is not acceptable for this subject), 14.501. Excluded: 14.603, 14.604, 14.605.*

Introduction to accounting systems — general ledger, debtors and creditors; models of business information systems; integrated business systems. System specification, system analysis, system design and implementation; testing and debugging. Managing a project team, project control. The COBOL programming language. File organization and design; sequential, indexed sequential, random, inverted, B-tree file organizations; data dictionaries, program generators, automatic system generators. A major project, written in COBOL, is undertaken as a team exercise.

### 6.649 Computing Practice — S2 L3T2

*Prerequisite: 6.641 (Pass Conceded (PC) awarded prior to Session 2, 1983, is not acceptable for this subject). Co-requisites: 6.633 or 6.643 or 6.647.*

Not offered in 1984.

Can only be counted with at least 3 other Level III Computer Science units.

For students majoring in Computer Science who seek a programming career in government or commercial industry. Topics, related to current computing practice, include: Comparative study of computer hardware in current popular use; Comparative study of the 'popular' programming languages, eg COBOL, RPG, BASIC, FORTRAN, PL/1, APL. Job control languages. Data Preparation procedures. Keyboard entry. Verification. Word processing; report preparation; documentation. Social implications of computing. Professional responsibilities and ethics. Project management; software engineering; psychology of computer programming.

# Mathematics

## Undergraduate Study

*Note:* When a unit is listed as a prerequisite or co-requisite, the appropriate higher unit may be substituted.

Many units in the School of Mathematics are offered at two levels. The higher level caters for students with superior mathematical ability. Where both levels are offered grades higher than Credit are only awarded in the ordinary level in exceptional circumstances.

Students should note that all of the Mathematics honours programs require them to take most of their Mathematics units at higher level. However, students should not think that the higher level units are intended only for those in honours programs. Any student with the ability to undertake higher units benefits from so doing.

#### First Year Mathematics

*10.001 Mathematics I.* This is the standard subject and is generally selected by the majority of students in the Faculties of Science, Biological Sciences, Engineering and Applied Science who intend to pursue further studies in mathematics, computer science, physics, chemistry or engineering.

*10.011 Higher Mathematics I* (day course only). This subject has the same purpose as 10.001, but is aimed at the more mathematically able students, including those who may wish to take an honours degree in mathematics. It covers all the material in 10.001, plus other topics, at greater depth and sophistication. It is intended for students who have obtained high marks in the 3 unit mathematics course of the Higher School Certificate as well as for those who have taken the 4 unit course.

General Mathematics

This is a combination of the single session units 10.021B and 10.021C and provides for students who do not intend studying mathematics beyond first year but whose other studies require some knowledge of basic mathematical ideas and techniques. It is particularly designed to meet the needs of such students in Biological Sciences, Optometry, Applied Psychology and Wool and Pastoral Sciences. However, students who select this subject should weigh seriously the implications of their choice because *no further mathematical units are normally available*. A student with meritorious performance in 10.021C may be permitted to proceed to a certain limited number of second year subjects intended for biologists and chemical engineers. The single unit 10.021B is also available to students seeking a prerequisite for 10.001.

Mathematics as a Subsidiary Subject

The School also provides the sequence of two units 10.031 and 10.032 at the second and third levels respectively, for students in the Science and Mathematics Course and the Faculty of Science who are mainly interested in the chemical and biological sciences. These courses offer an introduction to mathematical techniques for scientists and engineers.

There is also the Level II unit in Statistics, 10.331, which provides an introduction to statistical procedures commonly used in Science, and which also leads to the Level III units 10.3321 Regression Analysis and Experimental Design, 10.3322 Applied Stochastic Processes and, with a Credit Pass, to 10.312B Experimental Design (Applications) and Sampling.

For both the above Level II units the entry qualification is a pass in 10.001 Mathematics I, but in appropriate cases students who have passed in 10.021C General Mathematics IC at a satisfactory level may be given permission to enrol.

### 10.001 Mathematics I — F L4T2

*Prerequisite:*

| | *HSC Exam Percentile Range Required* |
|---|---|
| *2 unit Mathematics* or* | *71-100* |
| *3 unit Mathematics or* | *21-100* |
| *4 unit Mathematics* | *1-100* |
| *or* | |
| *10.021B.* | |

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

*This refers to the 2 Unit Mathematics subject which is related to the 3 Unit Mathematics subject. It does not refer to the subject 2 Unit Mathematics (Mathematics in Society).

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

### 10.011 Higher Mathematics I — F L4T2

*Prerequisite:*

| | *HSC Exam Percentile Range Required* |
|---|---|
| *3 unit Mathematics* | *71-100* |
| *or* | |
| *4 unit Mathematics* | *11-100* |

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

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

### 10.021B General Mathematics IB — S1 L4T2

*Prerequisite:*

| | *HSC Exam Percentile Range Required* |
|---|---|
| *2 unit Mathematics* or* | *51-100* |
| *3 unit Mathematics or* | *11-100* |
| *4 unit Mathematics* | *1-100* |
| *or* | |
| *10.021A.* | |

*Excluded: 10.011, 10.001.*

*This refers to the 2 Unit Mathematics subject which is related to the 3 Unit Mathematics subject. It does not refer to the subject 2 Unit Mathematics (Mathematics in Society).

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

### 10.021C General Mathematics IC — S2 L4T2

*Prerequisite: 10.021B. Excluded: 10.001, 10.011.*

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

### 10.031 Mathematics — F L1T1

*Prerequisite: 10.001 or 10.011 or 10.021C (CR).*

*Note A: A unit, together with 10.032, which is available to Faculty of Science students as one of a sequence of two units constituting a terminating service course in mathematics. As such it is mutually exclusive to any other Level II or Level III unit in Pure and/or Applied Mathematics and/or Theoretical Mechanics except that 10.412A may be taken with 10.031 and 10.032.*

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

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

### 10.032 Mathematics — F L1T1

*Prerequisite: 10.031.*

*Note A: As for Note A in 10.031 Mathematics.*

*Note B: Mathematics 10.032 is included for students desiring to attempt only one Level III Mathematics unit. If other Level III units in Pure Mathematics, Applied Mathematics or Theoretical Mechanics are taken, 10.032 Mathematics will not be counted.*

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

### 10.081 Mathematics IX — S2 L4T2

*Co-requisites: 10.001 or 10.011, 6.611 or 1.041.*

Elementary logic, truth tables, finite structures, recurrence relations, combinatorics. Use of mathematics for real-world problems (mathematical modelling); practical applications of calculus to topics such as population dynamics.

### 10.612 Mathematical Software — F L1½T½

*Prerequisites: 6.621, 10.111A, 10.2112 (or equivalent).*

Review of FORTRAN 77. Desirable attributes of mathematical software. Linear Algebra: numerically stable methods for matrix factorizations and solving systems of linear equations, condition numbers and scaling, methods for matrices with special structure, calculation of eigenvalues and eigenvectors. Calculus: numerical quadrature methods, special methods for singular, oscillatory and infinite integrals, adaptive methods, multiple integrals. Numerical solution of ordinary differential equations. Initial value and boundary value methods. Further examples and assignments chosen from more advanced areas of the above topics. Extensive use is made of computers and currently available software packages.

## Pure Mathematics

### 10.111A Pure Mathematics II — Linear Algebra — F L1½T1

*Prerequisite: 10.001 or 10.011. Excluded: 10.121A.*

Vector spaces, linear transformations and matrices, change of basis. Eigenvalues and eigenvectors, generalised eigenvectors. Functions of matrices. Linear systems of differential equations including the use of Laplace transform. Inner products, orthogonalisation, projections. Unitary and self-adjoint transformations. Quadratic and Hermitian forms.

### 10.1113 Pure Mathematics II — Multivariable Calculus — S1 or S2 L1½T1

*Prerequisite: 10.001 or 10.011. Excluded: 10.1213.*

Multiple integrals, partial differentiation. Analysis of real valued functions of one and several variables.

### 10.1114 Pure Mathematics II — Complex Analysis — S1 or S2 L1½T1

*Prerequisite: 10.001 or 10.011. Excluded: 10.1214.*

Analytic functions, Taylor and Laurent series, integrals. Cauchy's Theorem, residues, evaluation of certain real integrals.

### 10.1115 Pure Mathematics II — Finite Mathematics A — S1 L1½T½

*Prerequisite: 10.001.*

Positional number systems, floating-point arithmetic, Rational arithmetic, congruences, Euclid's algorithm, continued fractions, Chinese remainder theorem, Fermat's theorem, applications to computer arithmetic. Polynomial arithmetic, division algorithm, factorisation, interpolation, finite field. Codes, error-correcting codes, public-key cryptography.

### 10.1116 Pure Mathematics II — Finite Mathematics B — S2 L1½T½

*Prerequisite: 10.1115 (or any other Year 2 Mathematics half-unit).*

Introduction to combinatorial computing, recurrence relations, examples of divide and conquer strategies, backtrack and branch and bound algorithms. Finite Fourier transforms, roots of unity, convolutions, applications to fast multiplication and the analysis of pseudo-random numbers. Boolean algebra, switching circuits.

### 10.121A Higher Pure Mathematics II — Algebra — F L2T½

*Prerequisite: 10.011 or 10.001 (DN). Excluded: 10.111A, 10.1111.*

Linear Algebra: vector spaces, commutative rings, polynomials, modules, linear transformations, eigenvectors, invariant subspaces, canonical forms, linear functions, bilinear and multi-linear algebra. Group Theory: subgroups, quotient groups, isomorphisms,Lagrange's theorem, Sylow's theorem.

### 10.1213 Higher Pure Mathematics II — Multivariable Calculus — S1 L2T½

*Prerequisite: 10.011 or 10.001 (DN). Excluded: 10.1113.*

As for 10.1113 but in greater depth.

### 10.1214 Higher Pure Mathematics II — Complex Analysis — S2 L2T½

*Prerequisite: 10.1213. Excluded: 10.1114.*

As for 10.1114 but in greater depth.

### 10.1111 Pure Mathematics III — Group Theory — S1 L1½T½

*Prerequisite: 10.001. Co-requisites: 10.111A, 10.1113, 10.1114, 10.2111, 10.2112. Excluded: 10.121A.*

Mathematical systems, groups, determination of small groups, homomorphisms and normal subgroups.

### 10.1112 Pure Mathematics III — Geometry — S2 L1½T½

*Prerequisite: 10.001. Co-requisite: 10.1111. Excluded: 10.121C, 10.1424.*

Elementary concepts of Euclidean, affine and projective geometries.

**10.1121 Pure Mathematics III — Number Theory** **SS L1½T½**

*Prerequisites: ***. Excluded: 10,1421, 10.121C.*

Euclidean algorithm, congruences, sums of squares, diophantine equations.

**10.1123 Pure Mathematics III — Logic and Computability** **SS L1½T½**

*Prerquisites: ***.*

The propositional calculus — its completeness and consistency; Turing machines; unsolvable problems; computability and Church's thesis; Godel's incompleteness theorems.

**10.1124 Pure Mathematics III — Combinatorial Topology** **SS L1½T½**

*Prerequisites: ***.*

Elementary combinatorial topology of surfaces.

**10.1125 Pure Mathematics III — Ordinary Differential Equations** **S1 L1½T½**

*Prerequisites: 10.111A ***. Excluded: 10.1425, 10.122E.*

Systems of ordinary differential equations; variations of constants formula; stability; Poincare space; Lyapunov's direct method.

**10.1126 Pure Mathematics III — Partial Differential Equations** **S1 L1½T½**

*Prerequisites: 10.1113, 10.1114. Co-requisite: 10.1125, 10.1426.*

System of partial differential equations; characteristic surfaces; classifications; Cauchy problem; Dirichlet and Neumann problems; the maximum principle; Poisson's formula; conformal mapping.

**10.1127 Pure Mathematics III — History of Mathematics** **S2 L1T1**

*Prerequisites: 10.111A, 10.1113, 10.1114, 10.2111, 10.2112.*

Topics from the History of Mathematics, with emphasis on the development of those ideas and techniques used in undergraduate courses. Students are expected to read widely and to present written material based on their readings.

**10.1128 Pure Mathematics III — Foundations of Calculus** **S1 L1½T½**

*Prerequisites: ***. Excluded: 10.122B.*

Properties of the real numbers. Convergence of sequences and series. Properties of continuous and differentiable functons of a real variable.

***Students are not normally permitted to attempt a Level III Pure Mathematics unit unless they have completed at least two Level II units from 10.111A, 10.1113, 10.1114, 10.2111 and 10.2112.

**10.1129 Pure Mathematics III — Real Analysis** **S2 L1½T½**

*Prerequisites: 10.2112, 10.1128. Excluded: 10.122B.*

Taylor's Theorem. Sequences and series of functions and applications. Metric spaces and the contraction maping principle. Fourier Series.

**10.1521 Pure Mathematics III — Combinatorics and its Applications** **SS L1½T½**

*Prerequisites: ***.*

Generating functions, their properties and applications to partitions and recurrence relations. Branching processes, trees and the analysis of their paths, the analysis of algorithms and the Galton-Watson process. Coding theory and other design problems, Latin squares, block designs and error-correcting codes.

**10.1522 Pure Mathematics III — Differential Geometry** **SS L1½T½**

*Prerequisites: 10.1113. Co-requisites: ***. Excluded: 10.1325, 10.112C, 10.122C.*

Curves and surfaces in space. Gaussian curvature, The Gauss Theorem, The Gauss Bonnet Theorem.

**10.1523 Pure Mathematics III — Functional Analysis and Applications** **S1 or S2 L1½T½**

*Prerequisites: 10.111A, 10.2112. Excluded: 10.122B.*

Geometry of Hilbert spaces, approximation problems, linear operators, filters, spectral methods for differential equations.

**10.122B Higher Pure Mathematics III — Real Analysis and Functional Analysis** **F L1½T½**

*Prerequisites: 10.121A or 10.111A (DN), 10.1213 or 10.1113 (DN). Excluded: 10.1128.*

The limit processes of analysis; introduction to Lebesgue integration; introduction to metric spaces. Hilbert spaces; linear operators; Fourier series.

**10.1321 Higher Pure Mathematics III — Rings and Fields** **S1 L1½T½**

*Prerequisites: 10.121A or 10.111A (DN).*

Rings; integral domains; factorisation theory. Fields; algebraic and transcendental extensions. Introduction to algebraic number theory; quadratic reciprocity.

**10.1322 Higher Pure Mathematics III — Galois Theory** **S2 L1½T½**

*Co-requisite: 10.1321.*

Galois fields. Galois groups. Solution of equations by radicals. Further algebraic number theory.

*** See footnote in previous column.

**10.1323 Higher Pure Mathematics III — Complex Analysis** **S1 L1½T½**

*Prerequisites: 10.1214 or 10.1114 (DN). Co-requisites: 10.122B (strongly recommended).*

Topics in advanced complex function theory chosen from the following: Conformal mapping. Analytic continuation. Entire and meromorphic functions. Elliptic functions. Asymptotic methods. Integral formulae. Harmonic functions.

**10.1324 Higher Pure Mathematics III — Integration and Fourier Analysis** **S2 L1½T½**

*Co-requisite: 10.122B.*

Lebesgue integration; measure theory. Fourier transforms.

**10.1325 Higher Pure Mathematics III — Differential Geometry** **S1 L1½T½**

*Prerequisites: 10.121A or 10.111A (DN), 10.1213 or 10.1113 (DN). Excluded: 10.1522.*

Curves and surfaces in space; classification of surfaces. Curvature; geodesics.

**10.1326 Higher Pure Mathematics III — Calculus on Manifolds** **S2 L1½T½**

*Co-requisite: 10.1325.*

Manifolds; vector fields; flows. Introduction to Morse theory. Differential forms; Strokes' theorem; the Gauss-Bonnet theorem.

**10.1421 Higher Pure Mathematics III — Number Theory** **S1 L1½T½**

*Excluded: 10.1121.*

Prime numbers; number theoretic functions; Dirichlet series; partitions. Continued fractions; diophantine approximation; p-adic numbers.

**10.1422 Higher Pure Mathematics III — Groups and Representations** **S2 L1½T½**

*Prerequisites: 10.121A or 10.111A (DN) and 10.1111 (DN).*

Abelian groups; composition series; nilpotent groups; soluble groups. Representations and characters of finite groups; induced representations.

**10.1423 Higher Pure Mathematics III — Topology** **S1 L1½T½**

*Prerequisites: 10.1213 or 10.1113 (DN).*

Naive set theory; the axiom of choice. Metric and topological spaces; compactness.

**10.1424 Higher Pure Mathematics III — Geometry** **S2 L1½T½**

*Prerequisites: 10.121A or 10.111A (DN) and 10.1111 (DN). Excluded: 10.1112.*

Axioms for a geometry; affine geometry, Desargues' theorem; projective geometry.

**10.1425 Higher Pure Mathematics III — Ordinary Differential Equations** **S1 L1½T½**

*Prerequisites: 10.121A or 10.111A (DN), 10.1213 or 10.1113 (DN). Co-requisites: 10.122B (strongly recommended). Excluded: 10.1125.*

Existence and uniqueness theorems. Linearisation. Qualitative theory of autonomous systems.

**10.1426 Higher Pure Mathematics III — Partial Differential Equations** **S1 L1½T½**

*Co-requisite: 10.1425. Excluded: 10.1126.*

Classification, Characteristics. Cauchy problem; Dirichlet and Neumann problems. Distributions.

**10.123 Pure Mathematics IV**

An honours program consisting of the preparation of an undergraduate thesis together with advanced lecture courses on topics chosen from fields of current interest in Pure Mathematics. With the permission of the Head of Department, the subject may also include advanced lecture courses given by other Departments or Schools.

## Applied Mathematics

**10.2111 Applied Mathematics II — Vector Calculus** **S1 or S2 L1½T1**

*Prerequisite: 10.001 or 10.011. Excluded: 10.2211, 4.813.*

Vector fields; divergence, gradient, curl of a vector; line, surface, and volume integrals. Gauss' and Stokes' theorems. Curvilinear co-ordinates.

**10.2112 Applied Mathematics II — Mathematical Methods for Differential Equations** **S1 or S2 L1½T1**

*Prerequisites: 10.001 or 10.011. Excluded: 10.2212, 4.813.*

Series solution or ordinary differential equations; numerical methods. Partial differential equations: separation of variables. Fourier series, Bessel functions.

**10.2113 Applied Mathematics II — Introduction to Linear Programming** **S1 or S2 L1½T½**

*Prerequisite: 10.001. Excluded: 10.2213.*

Mathematical expression of practical optimization problems. Calculus methods for simple problems. Feasible regions and graphical methods.

Linear programming: the standard problem, basic solutions, fundamental theorem, simplex tableau, initial solution, unbounded and multiple solutions, degeneracy, duality; the dual simplex method, post optimal analysis.

**10.2115 Applied Mathematics II — Discrete-Time Systems** **S2 L1½T½**

*Prerequisite: 10.001. Excluded: 10.2215.*

Introduction to discrete-time dynamic systems. Difference equations: existence and uniqueness of solutions, general solution of linear equations. Linear systems: dynamics, stability, and oscillations, z-transforms, state-space methods. Nonlinear systems: equilibrium points, limit cycles.

Applications selected from problems of importance in engineering, biological, social, management, and economic systems.

**10.211E Applied Mathematics II — Numerical Methods** **F L1T1**

*Prerequisite: 10.001.*

Errors, their generation, propagation, estimation and avoidance. Solution of non-linear equations in one and two variables. Roots of polynomials. Lagrange interpolation. Differences and the elements of difference equations. Quadrature methods, classical and Romberg. Solution of ordinary differential equations: Taylor expansion, Runge-Kutta and predictor-corrector methods. Boundary value problems involving linear ordinary differential equations. Extensive practical work carried out either on a modern pocket calculator or on the University computer.

**10.2211 Higher Applied Mathematics II — Vector Analysis** **S1 L1½T1**

*Prerequisite: 10.011 or 10.001 (DN). Excluded: 10.2111.*

As for 10.2111 but in greater depth.

**10.2212 Higher Applied Mathematics II — Mathematical Methods for Differential Equations** **S2 L1½T1**

*Prerequisite: 10.2211. Excluded: 10.2112.*

As for 10.2112 but in greater depth.

**10.2213 Higher Applied Mathematics II — Introduction to Linear Programming** **S1 L1½T½**

*Prerequisite: 10.011 or 10.001 (DN). Excluded: 10.2113.*

Mathematical expression of practical optimization problems. Calculus methods for simple problems. Feasible regions.

Linear programming: the standard problem, basic solutions, fundamental theorem, simplex tableau, initial solution, unbounded and multiple solutions, degeneracy, revised simplex method, duality, dual simplex method, post optimal analysis.

**10.2215 Higher Applied Mathematics II — Discrete-Time Systems** **S2 L1½T½**

*Prerequisite: 10.011 or 10.001 (DN). Excluded: 10.2115.*

As for 10.2115, but in greater depth and with additional material on positive linear systems and Markov chains.

**10.212A Applied Mathematics III — Numerical Analysis** **F L1½T½**

*Prerequisites: 10.2112, 10.111A. Excluded: 10.222A.*

Theory of Interpolation and approximation, using polynomials, splines, rational functions and Fourier methods. Numerical quadrature including Gaussian and Clenshaw-Curtis rules, adaptive methods and methods for singular and oscillatory integrands. Sets of linear equations and their numerical solution, matrix eigenvalue problems. Numerical solution of ordinary and partial differential equations, boundary value problems, introduction to finite element methods.

**10.212L Applied Mathematics III — Optimization Methods** **F L1½T½**

*Prerequisites: 10.1113 (at least 1 further unit chosen from the following: 10.111A, 10.1114, 10.2111, 10.2112, 10.2113). Excluded: 10.222L.*

Theory of unconstrained and constrained multivariable optimization; including necessary and sufficient optimality conditions, stationary points, Lagrange multipliers, Kuhn-Tucker conditions, convexity and duality. Numerical methods: one dimensional minimization methods, unconstrained multivariable methods (including steepest descent, Newton, quasi-Newton and conjugate gradient methods) and constrained multi-variable methods (including linear programming, quadratic programming and penalty functions). A selection of special methods from branch and bound, geometric and separable programming.

**10.212M Applied Mathematics III — Optimal Control Theory** **F L1½T½**

*Prerequisites: 10.1113 & 10.1114, 10.111A. Excluded: 10.222M.*

Introduction to dynamical systems and their control. Open and closed loop control systems. Mathematical description of dynamical systems. Transform methods for linear systems. Stability, feedback and control. State space, observability and controllability. Optimal control. Dynamic programming and the Bellman equation with applications. The Pontryagin maximum principle. Applications. Calculus of variations.

[Examples and applications are drawn not only from the physical sciences but also from economics, resource and financial management, social and biological sciences.]

### 10.222A Higher Applied Mathematics III — Numerical Analysis F L1½T½

*Prerequisites: 10.2212 or 10.2112 (DN), 10.121A or 10.111A (DN). Excluded: 10.212A.*

As for 10.212A but in greater depth.

### 10.222C Higher Applied Mathematics III — Maxwell's Equations and Special Relativity F L1½T½

*Prerequisites: 10.2211 or 10.2111 (DN), 10.2212 or 10.2112 (DN), 10.1214 or 10.1114 (DN), 1.001. Excluded: 1.033.*

Electrostatics; Poisson and Laplace equations, potential theory, boundary value problems, spherical harmonics, Green's functions, dielectrics. Magnetic fields and forces; applications, magnetohydrodynamics. Electromagnetic fields, electromagnetic potentials, waves and radiation, vector and scalar wave equations, spherical waves, applications. Lorentz transformation, relativistic electrodynamics.

### 10.222F Higher Applied Mathematics III — Quantum Mechanics F L1½T½

*Prerequisites: 10.2211 or 10.2111 (DN), 10.2212 or 10.2112 (DN),10.121A or 10.111A (DN), 10.1213 or 10.1113 (DN), 10.1214 or 10.1114 (DN). Excluded: 1.013.*

Review of physical basis for quantum mechanics, simple harmonic oscillator, hydrogen atom. General formalism, angular momentum, perturbation theory and other approximation methods. Scattering problems.

### 10.222L Higher Applied Mathematics III — Optimization Methods F L1½T½

*Prerequisites: 10.1213 or 10.1113 (DN) (at least 1½ further units chosen from the following: 10.121A or 10.111A (DN), 10.1214 or 10.1114 (DN), 10.2211 or 10.2111 (DN), 10.2212 or 10.2112 (DN), 10.2213 or 10.2113 (DN), 10.2214 or 10.2114 (DN)). Excluded: 10.212L.*

As for 10.212L but in greater depth.

### 10.222M Higher Applied Mathematics III — Optimal Control Theory F L1½T½

*Prerequisites: 10.1213 or 10.1113 (DN), 10.1214 or 10.1114 (DN), 10.121A or 10.111A (DN). Excluded: 10.212M.*

As for 10.212M but in greater depth and including: Liapunov functions and the stability of non-linear systems. Further optimal control theory. Stochastic and Adaptive Control.

### 10.223 Applied Mathematics IV

An honours program consisting of the preparation of an undergraduate thesis together with advanced lecture courses. Lecture topics include selections from: advanced optimization and control theory, functional analysis and applications, numerical analysis, mathematics of economic models and of economic prediction, stability theory of differential and differential-difference equations, stochastic processes, statistical mechanics, quantum physics, astro-physics. With permission of the Head of Department, the subject may also include advanced lecture courses given by other Departments or Schools.

### 10.233 Applied Mathematics IV (Short Course)

6 units consisting of the preparation of an undergraduate thesis together with advanced lecture courses. Lecture topics include selections from: advanced optimization and control theory, functional analysis and applications, mathematics of economic models and of economic prediction, stability theory of differential and differential-difference equations, stochastic processes. With permission of the Head of Department, the subject may also include advanced lecture courses given by other Departments or Schools.

## Statistics

### 10.311A Theory of Statistics II — Probability and Random Variables S1 L4T3

*Prerequisite: 10.001 or 10.021C (CR). Excluded: 10.321A, 10.301, 10.331, 45.101.*

*Note:* The evening course for 10.3111A, subject to sufficient enrolment, runs at 3½ hours per week throughout the year.

An introduction to axiomatic treatment of probability. Variates (univariates, multivariates, expectations, moment generating and probability generating functions). Standard distributions. Sampling distributions.

### 10.311B Theory of Statistics II — Basic Inference S2 L4T3

*Prerequisite: 10.311A. Excluded: 10.321B, 10.301, 10.331, 45.101.*

Point estimation (moments, maximum likelihood, minimum $\chi^2$, etc.) Confidence interval estimation, exact and approximate. Elementary Neyman-Pearson theory of tests of significance, standard significance tests. Regression (including curvilinear) on a single fixed variable. Analysis of variance. Non-parometric methods.

### 10.321A Higher Theory of Statistics II — Probability and Random Variables S1 L5T3

*Prerequisite: 10.001. Excluded: 10.311A, 10.301, 10.331, 45.101.*

10.311A at greater depth and covering a slightly wider field.

### 10.321B Higher Theory of Statistics II — Basic Inference S2 L5T3

*Prerequisite: 10.321A. Excluded: 10.311B, 10.301, 10.331, 45.101.*

10.311B at greater depth and covering a slightly wider field.

### 10.312A Theory of Statistics III — Probability and Stochastic Processes S1 L2T2

*Prerequisites: 10.311A, 10.111A, 10.1113. Excluded: 10.322A.*

Elementary treatment of probability and moment generating functions and characteristic functions. Convergence in distribution. Central Limit Theorem. Convergence in probability. Weak law of large numbers. Poisson processes Elementary treatment of Markov chains. Birth-and-death processes. Queueing theory.

**10.312B Theory of Statistics III — Experimetal Design (Applications) and Sampling** **S2 L2T2**

*Prerequisite: 10.311B or 10.331 (normally CR). Excluded: 10.322B.*

Principles of good experimental design. Completely randomized experiment, randomized block experiment in detail. Latin squares. Contrasts. Analysis of factorial experiments. Multiple comparison methods. Random models. Split plot design. Sampling theory.

**10.312C Theory of Statistics III — Experimental Design (Theory)** **S1 L2T2**

*Prerequisites: 10.311B, 10.111A, 10.1113. Co-requisites: 10.312B, plus any two Level III Pure Mathematics or Applied Mathematics or Theoretical Mechanics or Computer Science units. Excluded: 10.322C.*

Matrix theory. Cochran-James theorem. Multivariate normal. Quadratic forms. Independence. The General Linear Hypothesis. Gauss-Markov theorem. Hypothesis testing. Analysis of variance.

**10.312D Theory of Statistics III — Probability Theory** **S2 L2T2**

*Prerequisites: 10.311A, 10.111A, 10.1113, 10.2112. Excluded: 10.322D.*

Rigorous treatment of probability and moment generating functions and characteristic functions. Convergence in probability. Weak law of large numbers. Almost sure convergence. Strong law of large numbers. Compound distributions. Branching process. Advanced treatment of Markov chains. Markov chains with continuous parameter.

**10.312E Theory of Statistics III — Statistical Inference** **S2 L2T2**

*Prerequisites: 10.311B, 10.111A, 10.1113. Co-requisites: Any two Level III Pure Mathematics or Applied Mathematics or Theoretical Mechanics units or Computer Science. Excluded: 10.322E.*

Bayesian inference and decision theory. Classical inference. Contingency tables (large sample and exact tests). Order Statistics. Non-parametric methods.

**10.312F Theory of Statistics III — Statistical Computing** **SS L2T2**

*Prerequisites: 10.311B or 10.321B or 10.3321, 6.621, 6.641.*

Processing of data for statistical purposes: storage, retrieval, manipulation. Array and sequential processing. Standard statistical operations, and their efficient coding. Probability distributions, discrete and continuous; their inverses. Generation of (pseudo-) random variables from specific distributions and their use in simulation. Modular package construction, and the use of packages (eg STATAPL, IDAP, INSTAPAK, SPSS).

A project, to construct a small package consistent with general specifications and with safeguards against common errors.

**10.3321 Regression Analysis and Experimental Design** **S1 L1½T½**

*Prerequisite: 10.331 or 10.311B or approved equivalent. Excluded: 10.312B or 10.322B.*

A revision of linear regression with extension to multiple and stepwise linear regression. Analysis of block designs, Latin squares, factorial designs, variance component and mixed model analyses. Bioassay, logit models. Contingency tables.

**10.3322 Applied Stochastic Processes** **S2 L1½T½**

*Prerequisite: 10.331 or 10.311A or 10.321A, or approved equivalent. Excluded: 10.312A, 10.322A.*

An introduction to processes in discrete and continuous time. Markov chains and Markov Processes, branching processes, Time Series with moving average models.

**10.322A Higher Theory of Statistics III — Probability and Stochastic Processes** **S1 L2½T2**

*Prerequisites: 10.321A, 10.111A, 10.1113. Excluded: 10.312A.*

As for 10.312A but in greater depth.

**10.322B Higher Theory of Statistics III — Experimental Design (Applications) and Sampling** **S2 L2½T2**

*Prerequisites: 10.321B, 10.111A, 10.1113. Excluded: 10.312B.*

As for 10.312B but in greater depth.

**10.322C Higher Theory of Statistics III — Experimental Design (Theory)** **S1 L2½T2**

*Prerequisites: 10.321B, 10.111A, 10.1113. Co-requisites: 10.322B, plus any two Level III Pure Mathematics or Applied Mathematics or Theoretical Mechanics or Computer Science units. Excluded: 10.312C.*

As for 10.312C but in greater depth.

**10.322D Higher Theory of Statistics III — Probability Theory** **S2 L2½T2**

*Prerequisites: 10.321A, 10.111A, 10.1113. Excluded: 10.312D.*

As for 10.312D but in greater depth.

**10.322E Higher Theory of Statistics III — Statistical Inference** **S2 L2½T2**

*Prerequisites: 10.321B, 10.111A, 10.1113. Co-requisites: Any two Level III Pure Mathematics or Applied Mathematics, Theoretical Mechanics units or Computer Science. Excluded: 10.312E.*

As for 10.312E but in greater depth.

**10.323 Theory of Statistics IV**

Specialised study, from the topics set out, for students attempting honours in the Science and Mathematics or Arts courses with a major in Statistics. Mathematical basis. Experimental design; response surfaces. Stochastic processes. Theories of inference. Sequential analysis. Non-parametric methods. Multivariate analysis. Mathematical programming. Information theory. Discrete distributions. Project.

### 10.301 Statistics SA — F L1½T½

*Prerequisite: 10.001 or 10.021C. Excluded: 10.331, 10.311A, 10.311B, 10.321A, 10.321B, 45.101.*

Probability, random variables, independence, binomial, Poisson and normal distributions, transformations to normality, estimation of mean and variance, confidence intervals, tests of hypotheses, contingency tables, two sample tests of location, simple and multiple linear regression, analysis of variance for simple models.

### 10.331 Statistics SS — F L1½T½

*Prerequisite: 10.001 or 10.021C (CR). Excluded: 10.311A, 10.311B, 10.321A, 10.321B, 10.301, 45.101.*

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.

## Theoretical and Applied Mechanics

### 10.4111 Theoretical Mechanics II — Introduction to Theoretical Mechanics — S1 L1½T½

*Prerequisites: 10.001, 1.001 or 5.006. Co-requisites: 10.2111, 10.2112, 10.1113. Excluded: 1.992, 10.002, 10.411B, 10.421B, 10.4211.*

Revision of vectors, kinematics. Dynamics of particles including simple harmonic motion and projectiles. Systems of particles. Conservation principles. Work, energy and power. Rotating frames of reference and the motion of rotating bodies.

### 10.4112 Theoretical Mechanics II — Introduction to Hydrodynamics — S2 L1½T½

*Prerequisites: 10.001. Co-requisites: 10.4111 or 1.002. Excluded: 1.992, 10.002, 10.411A, 10.421A, 10.4212.*

Equations of continuity and motion. Bernoulli's equation for an incompressible liquid. Kelvin's theorem. Some irrotational flow problems in one, two and three dimensions.

### 10.4211 Higher Theoretical Mechanics II — Introduction to Theoretical Mechanics — S1 L1½T½

*Prerequisites: 10.011 or 10.001 (DN), 1.001 or 5.006. Co-requisites: 10.2211, 10.2212, 10.1113. Excluded: 1.992, 10.002, 10.411B, 10.421B, 10.4111.*

As for 10.4111, but in greater depth.

### 10.4212 Higher Theoretical Mechanics II — Introduction to Hydrodynamics — S2 L1½T½

*Prerequisites: 10.011 or 10.001 (DN). Co-requisites: 10.4211. Excluded: 10.421A, 10.411A, 10.4112.*

As for 10.4112 but with additional topics chosen from aerofoil theory, water waves and sound waves.

### 10.412A Theoretical Mechanics III — Dynamical and Physical Oceanography — F L1½T½

*Prerequisites: 10.2111 & 10.2112 or 10.031, 1.001. It is recommended that one of the following be taken concurrently: 10.4112 or 1.3533.*

A brief review of the basic physical features of the oceans and the physical properties of sea water. Elementary hydrodynamics. An introductory discussion of turbulence. Geostrophy, dynamic heights and the inference of currents from hydrographic measurements. Ekman layers. Wind-driven ocean circulation, western boundary currents. Surface and internal waves, tides. Thermohaline processes: mixing, entrainment, double-diffusive phenomena, mixed layers and gravity currents.

### 10.412B Theoretical Mechanics III — Continuum Mechanics — F L1½T½

*Prerequisites: 10.2111, 10.2112, 10.111A, 10.1113, 10.1114. Co-requisites: 10.411A or 1.012 or 1.913. Excluded: 10.422B.*

Cartesian tensors, stress and strain in continuous media. Equations of equilibrium and motion. Equations of elasticity. Bending and torsion of beams. Plane elasticity (if time available). Viscous flow of liquids (if time available).

### 10.412D Theoretical Mechanics III — Mathematical Methods — F L1½T½

*Prerequisites: 10.2112, 10.111A, 10.1113, 10.1114. Excluded: 10.422D.*

An elementary treatment of mathematical methods for problems arising mainly in physics and engineering (waves and vibrations; diffusion and heat conduction; electromagnetic, gravitational and hydrodynamic fields and potentials; linear systems and signal analysis). Ordinary and partial differential equations. Integral equations. General Fourier series — orthogonal functions and eigenfunction expansions. Fourier and Laplace transforms. Calculus of variations and variational methods. Green functions. Perturbation methods.

### 10.4129 Theoretical Mechanics III — Applied Time Series Analysis — S2 L1½T½

*Prerequisites: 10.2112 or 10.031 or 10.022. Co-requisites: 10.331 or equivalent; 10.4331 or 10.412D or equivalent.*

Classification of random processes, sampling for discrete analysis, Fourier analysis, spectra, filtering. Cross-spectra, estimation and hypothesis testing, confidence limits, application to experiment planning. Course emphasis is on computer analysis of actual data.

### 10.422A Higher Theoretical Mechanics III — Fluid Dynamics — S2 L3T1

*Prerequisite: 10.421A or 10.411A (DN). Co-requisite: 10.422B.*

Compressible flow, viscous flow, boundary layers, hydrodynamic stability, simple wave motions in fluids.

### 10.422B Higher Theoretical Mechanics III — Mechanics of Solids — S1 L3T1

*Prerequisites: 10.111A, 10.1113, 10.1114, 10.2111, 10.2112, 10.421B or 10.411B (DN) or 1.012. Excluded: 10.412B.*

As for 10.412B Theoretical Mechanics III — Continuum Mechanics but in greater depth.

### 10.422D Higher Theoretical Mechanics III — Mathematical Methods — F L1½T½

*Prerequisites: 10.2211 or 10.2111 (DN), 10.2212 or 10.2112 (DN), 10.1213 or 10.1113 (DN), 10.1214 or 10.1114 (DN). Excluded: 10.412D.*

Revision of functions of a complex variable, contour integration. Asymptotic expansions with applications to special functions. Methods of steepest descent and stationary phase. Fourier and Laplace transforms, with applications to partial differential equations and integral equations. Generalized functions. Fredholm theory for boundary value problems. Solution of boundary value problems using Green's functions and eigenfunction expansions. Solution of partial differential equations of first and second order.

### 10.4331 Theoretical Mechanics III — Transform Methods — S1 L1½T½

*Prerequisites: 10.1113, 10.1114, 10.2112 or equivalent. Excluded: 10.412D and 10.422D.*

Fourier Transforms and their properties. Generalized functions. Application of Fourier and Laplace Transforms to the solution of partial differential equations.

### 10.423 Theoretical Mechanics IV

An honours program consisting of the preparation of an undergraduate thesis together with advanced lecture courses on topics chosen from fluid mechanics, solid mechanics, planetary science and special mathematical and numerical techniques applied to partial differential equations. With the permission of the Head of Department, the subject may also include advanced lecture courses given by other Departments or Schools on topics such as optimal control theory, optimization theory, thermodynamics, numerical analysis or statistics.

## Servicing Subjects

These are subjects taught within courses offered by other schools or departments in a different faculty.

**For Further information regarding the following subjects see the Faculty of Applied Science and Engineering Handbooks.**

### 10.022 Engineering Mathematics II — F L2T2

*Prerequisite: 10.001.*

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

### 10.033 Electrical Engineering Mathematics III — F L1½T½

*Prerequisites: 10.111A, 10.1113, 10.1114, 10.2111, 10.2112.*

Numerical Analysis: Interpolation, roots of equations, approximation of definite integrals. Difference equations, Z-transform. Approximate solution of ordinary differential equations. Approximate solution of matrix problems, matrix inversion, eigenvalue and eigenvector problems.

Partial Differential Equations: Characteristics. Continuous and discrete Fourier transforms. Autocorrelation. Spectral density. Laplace transform. Potential theory. Numerical solution of parabolic, elliptic and hyperbolic partial differential equations.

Optimization.

### 10.341 Statistics SU — F L1½T½

*Prerequisite: 10.001 or 10.011.*

Introduction to probability theory, random variables and distribution functions, Sampling distributions, including those of t, $x^2$ and F. Estimation procedures, including confidence interval estimation with an emphasis on Least Squares and surveying problems, and computer based exercises.

### 10.351 Statistics SM — F L1T½

*Prerequisite: 10.001 or 10.011.*

For students in Aeronautical, Industrial and Mechanical Engineering and Naval Architecture as part of 5.071 Engineering Analysis or 5.072 Statistics/Computing.

Introduction to probability theory, with finite, discrete and continuous sample spaces. Random variables: the standard elementary distributions including the binomial, Poisson and normal distributions. Sampling distributions: with emphasis on those derived from the normal distribution: t, $x^2$ and F. Estimation of parameters: the methods of moments and maximum likelihood and confidence interval estimation. The standard test of statistical hypotheses, and, where appropriate, the powers of such tests. An introduction to regression and the bivariate normal distribution.

### 10.361 Statistics SE — F L1½T½

*Prerequisite: 10.001 or 10.011*

For students in the School of Electrical Engineering.

Introduction to probability theory, Random variables and distribution functions; the binomial, Poisson and normal distributions in particular. Standard sampling distributions, including those of $x^2$ and t. Estimation by moments and maximum likelihood; confidence interval estimation. The Standard tests of significance based on the above distribution with a discussion of power where appropriate.

An introduction to linear regression, auto-regression. Probability limit, law of large numbers and central limit theorem. Multivariate normal distribution. Stochastic processes in discrete and continuous time: Poisson and Gaussian processes.

### 10.381 Statistics SC — S1 or S2 L1T1

Introduction to probability. Random variables. Elementary distribution. Statistical inference. Point estimation. Confidence intervals.

### 11.4320 Geometry

*3 credit points. Prerequisites: nil.*

Plane curves, conics and surfaces of revolution; quadric surfaces; ruled and warped surfaces, convex bodies; spherical trigonometry; projective configurations. Tutorials and project.

## Graduate Study

### 10.194G Advanced Mathematics Lecture Courses

Each year a selection of courses is offered in the following areas:

Algebraic geometry; algebraic topology; categorical and homological algebra; commutative algebra; group theory; Lie groups and algebras; representation theory; group theory and its physical applications; advanced quantum mechanics; differential geometry; differential equations; optimal control theory; functional analysis; applied functional analysis; operator theory; harmonic analysis; advanced numerical analysis; theory of functions; finite mathematics; number theory; logic; theoretical astrophysics; history of mathematics; recent advanced in mathematics; mathematical economics; optimization and control.

### 10.302G Regression Analysis and Experimental Design S1 L1½T½

*Prerequisite: First course in Statistics.*

A revision of linear regression with extension to multiple and stepwise linear regression. Analysis of block designs, Latin squares, factorial designs, variance component and mixed model analyses. Bioassay, logit models. Contingency tables.

### 10.303G Applied Stochastic Processes S2 L1½T½

*Prerequisite: First course in Statistics.*

An introduction to processes in discrete and continuous time. Markov chains and Markov Processes, branching processes, Time Series with moving average models.

### 10.372G Statistical and Experimental Design

The concepts of random variables, means, variances, the common tests and confidence intervals based on the normal distribution, some simple analyses of variance.

Comparative Experiments: Requirements of a good experiment, assumptions underlying the conventional models of standard designs and their analyses, purpose of randomisation; how the physical circumstances of an experiment are related to its formal model on which its analysis is based; the internal estimate of error obtained from the variation left after accounting for all sources of systematic variation, these points illustrated by considering in some detail the fully randomized design, the randomised block design, the $2^2$ factorial fully randomized design, and the fully randomized design with one concomitant variable.

Survey Sampling: the distinction between a survey sample and an experiment planned to compare a set of treatments, and how it affects the inferences that may be made; simple random sampling, stratified random sampling.

### 10.381G Experimental Design I

Modified designs for fixed effects models. Incomplete and balanced incomplete block designs. Confounding and fractional replication. Randomization theory. Multiple comparisons.

### 10.382G Experimental Design II

Extensive treatment of random and mixed models. Combinatorial structure of designs, cross-over and lattice designs, response surfaces.

### 10.383G Stochastic Processes

Discrete parameter, continuous time Markov processes. Brief survey of birth-and-death, immigration, epidemic and predator-prey processes. Introduction to dam and storage problems. Queueing processes. Diffusion approximations.

### 10.384G Time Series

Spectral estimates, discrete and continuous spectra. Periodogram analysis. Probability theory, special processes. Ergodicity, harmonic analysis and linear filters. Estimation and hypothesis testing.

### 10.385G Multivariate Analysis I

Likelihood ratio tests for means, variances and structure. Discriminant, principal component, canonical and factor analysis.

### 10.386G Multivariate Analysis II

The general linear hypothesis and analysis of dispersion. Tests based on roots, distribution theory.

### 10.387G Sample Survey Design

Simple, stratified and systematic random sampling. Estimation of proportions, ratios, and sample sizes. Multi-stage sampling.

### 10.388G Sequential Analysis

The sequential probability ratio test — OC and ASN functions. General theory of sequential tests. Sequential estimation.

### 10.389G Non-Parametric Methods

Sign test, run tests, goodness-of-fit tests. Order statistics and range. Rank-order statistics. Wilcox and signed-rank tests, one- and two-way rank analyses of variance. Rank correlation. Randomization theory and permutation tests. Paired comparisons. Censoring and truncation.

### 10.390G Statistical Inference

Decision theory. General theory of estimation and hypothesis testing.

### 10.391G Special Topic A

To be arranged, eg biological statistics, further work on order statistics, population statistics, non-linear programming, discrete distribution theory.

### 10.392G Project

### 10.393G Special Topic B

To be arranged, eg biological statistics, further work on order statistics, population statistics, non-linear programming, and other topics.

### 10.394G Discrete Distributions

Discrete and lattice distributions — their general properties mostly via generating functions. The structures of contagious (clustered) distributions, with a study of specific examples such as the negative binomial, Neyman and Poisson-Pascal families, together with estimation and fitting procedures.

### 10.401G Seiches and Tides

The equations of motion of a shallow liquid. Shallow water waves, oscillations of rectangular and circular lakes. The tides, their observation and measurement. Newton's equilibrium theory. Harmonic analysis and prediction. Local tides. Oscillations and resonance of harbours and bays.

## Servicing Subjects

These are subjects taught within courses offered by other schools or departments in a different faculty.

**For further information regarding the following subject see the Faculty of Arts Handbook.**

### 10.062G Advanced Mathematics General

For research workers throughout the University requiring employment of advanced mathematics. Topics vary from year to year according to demand and interest.

**For further information regarding the following subjects see the Faculty of Engineering Handbook.**

### 10.061G Advanced Mathematics for Electrical Engineers C3

Boundary value problems in partial differential equations. Selected topics from complex variable analysis, integral transforms, and orthogonal functions and polynomials.

### 10.361G Statistics C3

Probability theory, a survey of random processes with engineering applications — processes in discrete and continuous time. Markov processes, ergodicity, stationarity, auto-correlation, power spectra, estimation of auto-correlation and power spectra.

### 10.371G Statistics C3

Revision of probability and distribuution theory, including estimation of hypothesis testing. Extension of this to include topics such as more complex probabilistic modelling, analyses of modified data (censored, truncated andd missing observations), general statistical inference (decision theory), acceptance testing, and reliability analysis (hazard functions).

### 32.012G Biomedical Statistics S1 L2½ T1½ C4

Statistical assessment of normal and diseased states. Statistical relationships between multiple variables used to assess disease; analysis of variance, regression, factor analysis, discriminant analysis. Progression of diseases over time. Diagnosis and assessment of treatments. Experimental design and sampling. Computation methods.

### 32.101G Mathematical Modelling for Biomedical Engineers S1 L3T1 C4

Model formulation and validation of ordinary and partial differential equations by analytical and numerical techniques.

# Psychology

## Undergraduate Study

### Psychology Level I Unit

### 12.100 Psychology I F L3T2

*Excluded: 12.001.*

An introduction to the content and methods of psychology as a basic science, with emphasis on the biological and social bases of behaviour, relationship to the environment, and individual differences. Training in the methods of psychological enquiry, and in the use of elementary statistical procedures.

### Psychology Level II Units

### 12.200 Research Methods II F L2T1

*Prerequisite: 12.100 (Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable). Excluded: 12.152.*

General introduction to the design and analysis of experiments; hypothesis testing, estimation, power analysis; general treatment of simple univariate procedures; correlation and regression.

### 12.201 Basic Psychological Processes II S2 L2T2

*Prerequisite: 12.100 (Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.) Excluded: 12.052.*

The basic phenomena of behaviour and experience in a biological context.

### 12.202 Complex Psychological Process II — S1 L2T2

*Prerequisite: 12.100 (Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.) Excluded: 12.062.*

Information processing and cognitive functioning, and social bases of behaviour and personality.

### 12.203 Psychology IIA — F L2T2

*Prerequisite: 12.100 (Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.) Co-requisites: 12.200, 12.201, 12.202. Excluded: 12.042.*

Available to Course 3430 students only.

Computing, assessment and introduction to clinical practice.

### 12.204 Human Relations II — S1 L2T2

*Prerequisite: 12.100 (Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.) Excluded: 12.072.*

Social and personality development of the individual; human relations in the family group. Public, industrial and international relations, human relations in a political and economic context.

### 12.205 Individual Differences II — S2 L2T2

*Prerequisite: 12.100 (Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.) Excluded: 12.082.*

Measurement and significance of individual differences in intellectual, motivational and personality functioning. Statistics, to cover the fundamentals of hypothesis testing.

## Psychology Level III Units: Group A

### 12.300 Research Methods IIIA — S1 L2T2

*Prerequisite: 12.200. Excluded: 12.153.*

Analysis of variance for single factor and multifactor designs. Test procedures for planned and post-hoc contrasts defined on parameters of fixed and mixed models. General principles of experimental design.

### 12.304 Personality and Individual Differences III — S1 L2T2

*Prerequisites: 2 Psychology Level II subjects. Excluded: 12.303.*

Personality dynamics and structure and differences in ability and intelligence.

### 12.305 Learning and Behaviour III — S1 or S2 L2T2

*Prerequisites: 12.200 & 12.201. Excluded: 12.253.*

The establishment and elimination of extended sequences of behaviour in complex environments. Implications of the theories and research for applied work.

### 12.322 Abnormal Psychology III — S1 L2T2

*Prerequisites: 12.200 & 12.201. Excluded: 12.603.*

Descriptive psychopathology: symptomatology and diagnostic features of schizophrenia, organic brain syndromes, affective disorders, neurotic disorders, psychopathy, sexual aberrations, and addictions.

## Psychology Level III Units: Group B

### 12.301 Research Methods IIIB — S2 L2T2

*Prerequisites: 12.200 & 12.300. Excluded: 12.163.*

Multivariate statistics and computing. Data analysis using the SPSS and PSY computer programs; their statistical basis.

### 12.310 Physiological Psychology III — S2 L2T2

*Prerequisites: 12.200 & 12.201. Excluded: 12.413.*

Elementary neuropharmacology and neuroanatomy. Brain control of eating, drinking, aggression, copulation, pain perception, memory, language and functional disorders.

### 12.311 Perception III — S1 L2T2

*Prerequisites: 12.200 & 12.201. Excluded: 12.473.*

Studies of infant perception, conflict between vision and other senses, certain illusions, and of the perception of size and distance generally.

### 12.312 Language and Cognition III — S2 L2T2

*Prerequisites: 12.200 & 12.202. Excluded: 12.453.*

The stages involved in the reception of stimulus information from the environment, its analysis, storage, and transmission into responses. Stress on processing of language.

### 12.314 Motivation and Emotion III — S2 L2T2

*Prerequisites: 12.200 & 12.201. Excluded: 12.323.*

An examination of contemporary research regarding 'drives', 'incentives' and 'emotions' as determinants of animal and human action. Theoretical perspectives cover biological and social influences.

### 12.320 Social Psychology III — S1 L2T2

*Prerequisites: 12.200 & 12.202. Excluded: 12.503.*

Contemporary research areas in social psychology. Topics may include the social basis of human interaction, interpersonal relationships, social perception and cognition, and interpersonal communication.

### 12.321 Developmental Psychology III — S2 L2T2

*Prerequisite: 12.200 & 12.202. Excluded: 12.553.*

The development of perception and the development of operational thought; the development of language and its relationship to the development of thought; and the development of reading.

### 12.324 Experimental Psychopathology III S2 L2T2

*Prerequisite: 12.322.*

An examination of the aetiology and mechanisms of behavioural disorders in the light of experimental research and theory construction. Major topics include: aetiology and mechanisms of schizophrenia; affective disorders; psychophysiological disorders; anxiety, depression; driven behaviours.

### 12.325 Social Behaviour III S2 L2T2

*Prerequisites: 12.200 & 12.202.*

Research and theory in applied social psychology. Topics may include the relation of the physical setting to behaviour, cross cultural studies, and race relations.

### 12.330 Psychological Assessment III

*Prerequisites: 12.200, and 1 other Psychology Level II subject. Excluded: 12.042, 12.203, 12.373.*

Not offered in 1984.

Principles and techniques of psychological assessment. Types of tests and their application in selection and allocation procedures.

### 12.331 Counselling Psychology III S2 L2T2

*Prerequisites: 2 Psychology Level II subjects. Excluded: 12.623.*

Principles and techniques of counselling in a variety of contexts. Interviewing, group process and structure, and interpersonal relations.

### 12.332 Behavioural Change III

*Prerequisites: 12.200 & 12.201. Excluded: 12.713.*

Not offered in 1984.

Use of the methods of behavioural change in individual, group and institutional settings. Non-psychological methods of behavioural influence. A comparison of attitude and behavioural change. Definitions of problem behaviour. Ethical issues.

### 12.333 Ergonomics III S1 L2T2

*Prerequisite: 12.200. Excluded: 12.663.*

Aspects of human performance relevant to work design. The principles involved in designing the environment in general, and work in particular, to suit man's capabilities.

### 12.334 Behaviour in Organizations III S2 L2T2

*Prerequisites: 2 Psychology Level II subjects. Excluded: 12.653.*

Theories and research methods for understanding behaviour in organisations and in the environment.

### 12.335 Behavioural Evaluation and Assessment III S2 L2T2

*Prerequisite: 12.322.*

Assessment and evaluation of individual behaviour and behavioural change. Problems of measurement and scale construction; objective versus subjective measures; self report, behavioural and psychophysiological measures. Interviewing and behavioural analysis; psychometric testing and case history taking.

### 12.340 Special Topic III

*Prerequisites: 12.300, 12.304 & 12.305.*

Not offered in 1984.

An occasional elective dealing with a special field of psychology.

## Psychology Level IV Units

### 12.400 Psychology IV (Research-3430) F

*Prerequisite: All requirements for Years 1-3 of the course.*

Psychology IV in the BSc in Psychology degree course. A supervised research thesis and course work to be determined in consultation with the Head of School.

### 12.401 Psychology IV (Course Work-3430) F

*Prerequisite: All requirements for Years 1-3 of the course.*

Psychology IV in the BSc in Psychology degree course. Course work and a supervised group research project to be determined in consultation with the Head of School.

### 12.403 Psychology IV (Research) F

*Prerequisites: 12.100, 12.200. 12.201, 12.202 and 8 Psychology Level III units (see Note), including 12.300, 12.305 and either 12.304 or 12.322 from Group A and 12.301 from Group B, with a weighted average of at least Credit, and at the discretion of the Head of School.*

*Note: Students in program 7312 Physiology/Psychology take 4 Psychology Level III units approved by the Head of the School of Psychology.*

Psychology IV in the Arts, and Science and Mathematics degree courses. A supervised research thesis and course work to be determined in consultation with the Head of School.

### 12.404 Psychology IV (Course Work) F

*Prerequisites: 12.100, 12.200, 12.201, 12.202 and 8 Psychology Level III units, including 12.300, 12.305 and either 12.304 or 12.322 from Group A, with a weighted average of at least Credit, and at the discretion of the Head of School.*

Psychology IV in the Arts, and Science and Mathematics degree courses. Course work and a supervised group research project to be determined in consultation with the Head of School.

## Psychology Servicing Units

These are units taught within courses offered by other schools or departments in a different faculty.

**For further information regarding the following unit see the Faculty of Commerce Handbook.**

### 12.651 Psychology (Industrial Relations) S1 L2T1

*Prerequisite: Nil.*

Problems and limitations affecting social research in industry. Critical review of American research from Hawthorne to Herzberg and of British research from Tavistock and Trist to Emery in Australia. Conflict and organic theories of organization and related theories of motivation and morale. The use of library resources. Practice in the skills and discipline required to obtain and evaluate empirical evidence in this field. Recent developments under the headings of 'participation' and 'democracy in industry'.

**For further information regarding the following units see the Combined Sciences Handbook.**

### 12.741 Psychology (Optometry) F L2T0

*Prerequisite: 12.001 or 12.100.*

*Visual Perception:* The nature and characteristics of visual perception. Topics to be discussed include: psychophysics, the organization of visual perception, the influence of context, and the effects of learning and motivation on perception. Throughout the course emphasis wiill be placed on an examination of relevant experimental data. *Abnormal Psychology:* The concepts of normality and abnormality, and an examination of the principal psychodynamic processes. Causes and symptoms of various mental disorders are introduced with some emphasis on the importance of these symptoms in optometrical practice.

## Graduate Study

### 12.228G Research Project

For students who commenced the degree course before Session 1, 1980.

An individual research project in the general area of clinical or community psychology, with supporting seminars covering the selection and formulation of a problem, the choice of a design, the planning of the general methodology and the analysis of data.

### 12.230G Psychological Problems of Children

An essentially practical course focusing on childhood disorders, such as mental retardation, infantile autism, physical and sensory handicaps, specific learning difficulties, and hyperactivity. Methods of assessment to be studied include standardized tests of child development, behavioural check lists and interviews, and observation of present behaviour. Behavioural change procedures that may be effective in the treatment and management of the behavioural problems in question.

### 12.231G Professional Practice

Supervised work with clients in the School's clinic, and in approved institutions.

### 12.235G Community Psychology

The history, theory, concepts and practices of what has come to be called community psychology. Systematic problem-solving approaches to the resolution of human misery; the social and institutional conditions which promote human well-being. Substantive topics include: models and perspectives in community psychology; values and community intervention; evaluation and research in community psychology; social systems; theory and ecology; coping and social competence; consultation theories; various social issues, eg alcoholism and drug dependence, mental health care.

### 12.237G Biological Aspects of Behavioural Disturbance

A series of lectures and seminars on biological aspects of the aetiology and treatment of behavioural disturbance. Includes: behavioural genetics; organic brain syndromes; schizophrenia; depression; psychophysiology of stress; metabolic and endocrinological aspects of behavioural disturbance; nutrition and behavioural disturbance; psychopharmacology and pharmacotherapy; somatic treatments.

### 12.239G Research and Evaluation Methods in Clinical and Community Psychology

Problems of experimental design in the clinical field; measurement and scaling; analysis of change, including sequential analysis, and the application of the experimental methods to the individual cases. Design and evaluation of community programs.

### 12.240G Graduate and Clinical Seminars

A series of seminars on topics of particular relevance to the practice of clinical psychology, eg the organization and regulation of psychology as a profession; ethical stands in relation to clients, members of other professions, and the public; legal aspects of psychological practice. Additional topics dealing with contemporary issues in clinical psychology are chosen in consultation with students undertaking the seminars.

### 12.241G Graduate Colloquium

Participation in the staff-graduate student colloquium.

### 12.242G Research Thesis

For students who commenced the degree course after Session 1, 1980.

A research thesis involving an investigation into some aspect of clinical or community psychology.

### 12.243G Experimental Clinical Psychology

**1.** The theoretical basis of clinical practice in individual, group, institutional, and community settings; **2.** The application of the principles of experimental psychology to the analysis of both adaptive and maladaptive patterns of behaviour; **3.** The study of a wide range of techniques of behavioural intervention.

### 12.244G Psychological and Behavioural Assessment

The application of the principles of experimental psychology to problems of behavioural assessment in a wide variety of situations, eg lifestyle change; the management of behavioural disorders; institutional behavioural programs. Assessment procedures studied include: psychological tests, behavioural analysis and case history taking, psychophysiological and other objective measures.

### 12.245G Behavioural Health Management

Lectures, practical classes and supervised clinical experience concerned with the theoretical and practical issues associated with the design, implementation and evaluation of behavioural programs for the promotion of positive mental and physical health.

### 12.246G Behavioural Management in Institutions

Application of the principle of behavioural acquisition maintenance and change to the problems of designing appropriate social environments for dependent persons. Ethical and organizational problems facing psychologists working in institutions for dependent children and adults.

### 12.247G Graduate Seminars in Clinical Psychology

A series of seminars on topics of relevance to the practice of experimental clinical psychology. The distinctive features of psychology as both a basic discipline and an area of professional practice. The organization and regulation of psychology as a profession. Contemporary theoretical and social issues in the practice of psychology.

### 12.248G Community Psychology

Models and perspectives in community psychology; evaluation and research. Community intervention. Health care delivery systems.

# Accountancy

## Undergraduate Study

### 14.501 Accounting and Financial Management IA — S1 or S2 L2T2½

*Prerequisite: Nil.*

The basic concepts of financial model building and information systems, including the double-entry recording system, the accounting cycle, income measurement and financial reporting, and an introduction to basic elements of taxation and auditing.

### 14.511 Accounting and Financial Management IB — S1 or S2 L2T2½

*Prerequisite: 14.501.*

Development of basic concepts introduced in 14.501 Accounting and Financial Management IA, including management accounting and operations research, corporate reporting, business finance, system design, elementary computer programming and applications.

### 14.522 Accounting and Financial Management IIA — S1 or S2 L2T2½

*Prerequisites: 14.511 plus*

| | *HSC Exam Percentile Range Required* |
|---|---|
| *2 unit Mathematics or* | *51-100* |
| *3 unit Mathematics or* | *21-100* |
| *4 unit Mathematics* | *1-100* |

The design, production and use of accounting and other quantitative information in the planning and control of organizations, with particular reference to manufacturing activities and to long- and short-term decisionmaking and financial planning.

### 14.542 Accounting and Financial Management IIB — S1 or S2 L2T2½

*Prerequisite: 14.511 plus HSC results as for 14.522.*

Critical examination of concepts and problems in income measurement, asset valuation and financial reporting for various forms of business undertaking with particular reference to corporate organizations, including associated aspects of auditing and taxation and methods of accounting for changing prices.

### 14.563 Accounting and Financial Management IIIA — S1 or S2 L2T2½

*Prerequisite: 14.542.*

Financial Accounting: Advanced aspects of financial accounting and reporting for business enterprises with particular reference to developments in accounting theory and practice and in professional standards, including the financial and accounting aspects of mergers, takeovers and group companies.

### 14.573 Accounting and Financial Management IIIA (Honours) — S1 LT6

*Prerequisite: 14.542.*

Includes 14.563 Accounting and Financial Management IIIA as well as additional and more advanced work in both accounting theory and in the financial management and accountability of corporate enterprises.

### 14.583 Accounting and Financial Management IIIB — S1 or S2 L2T2½

*Prerequisite: 14.522.*

Management Accounting: advanced treatment of management accounting theory and applications including statistical cost analysis, cost accounting, control systems, budgetary and strategic planning and decision models.

### 14.593 Accounting and Financial Management IIIB (Honours) — S2 LT6

*Prerequisite: 14.522.*

Includes 14.583 Accounting and Financial Management IIIB, as well as additional and more advanced work in both management accounting and management information systems.

### 14.601 Law in Society — S1 or S2 L2T1

*Prerequisite:*

| | *HSC Exam Percentile Range Required* |
|---|---|
| *2 unit A English or* | *31-100* |
| *2 unit English or* | *21-100* |
| *3 unit English or* | *11-100* |

The nature of law, the sources of law, the Australian legal system, legal reasoning, the administration of justice, the legal profession, selected areas of substantive law and important issues in law in our society.

### 14.602 Computer Information Systems I — S1 or S2 L2T1

*Prerequisites: 14.511 plus 15.411 or approved studies in computer science.*

Information systems and the organization, architecture of typical commercial application systems, the systems lifecycle, the systems analysis/design task, tools and techniques of the systems analyst, documentation techniques, internal controls and interfacing with the edp auditor, file design concepts, logic and computer hardware, commercial computer programming.

### 14.603 Computer Information Systems II — S2 L2T1

*Prerequisite: 14.602.*

The systems design task; forms driven, data structure and data flow based design methodologies; top-down structured design; introduction to database management techniques; the systems software environment; graphics; communications networks and software; structured programming; program design; COBOL programming.

### 14.605 Information Systems Implementation — S2 L2T1

*Prerequisite: 14.603.*

Supervised implementation of an information systems project in a commercial programming language. Advanced program design and structured techniques, interface with systems software at application implementation level, comparison of a range of programming languages, test data specification, implementation procedures.

### 14.607 Distributed Computer Systems — S2 L2T1

*Prerequisite: 14.603*

Advanced data communication concepts, computer networks, reference to international standards and common industry communictions software packages; transaction processing software and interface with data management systems; local networks; interaction between text processing and data processing; a case study based on a microcomputer network.

### 14.608 Database Systems — S1 L2T1

*Prerequisite: 14.603.*

Advanced data storage concepts, including detailed study of alternative approaches to database management systems. Management information needs and database specification in a commercial environment. Detailed evaluation, with project work, of a microcomputer based database management system. Information retrieval concepts, relational query-systems, security, control and audit considerations.

### 14.611 Information Systems Development — S1 L2T1

*Prerequisite: 14.603 and approval by the Head of the Department of Information Systems.*

A systems analysis and design case study. Information systems project management, data processing administration, on-line systems, design techniques, internal controls.

### 14.613 Business Finance II — S1 or S2 LT3

*Prerequisite: Nil.*

The essential aspects of financial decision-making in business including: factors influencing capital expenditure decisions; alternative approaches to valuation; factors affecting the formulation of the capital structure; influence of the capital market environment.

### 14.614 Business Finance IIIA — S1 L3

*Prerequisite: 14.613.*

Financial decision making within the framework of capital market theory. Includes diversification, risk and return, determinents of risk, efficient market hypothesis with emphasis on Australian evidence, capitalization changes and performance measures, takeovers and mergers.

### 14.615 Business Finance IIIB — S2 L3

*Prerequisite: 14.614.*

Theory and analytical techniques relevant to investment analysis and management. Includes analysis and valuation of securities, properties of accounting numbers, portfolio theory and asset pricing models, capital asset returns and information, bond ratings and yields and financial distress predictions.

### 14.851 Current Developments in Accounting Thought — Financial

*Prerequisite: Admission to BCom degree course at Honours level.*

*As for 14.951G.*

### 14.852 Current Developments in Accounting Thought — Managerial

*Prerequisite: Admission to BCom degree course at Honours level.*

*As for 14.952G.*

# Economics

## Undergraduate Study

## Department of Economics

### 15.001 Microeconomics I — S1 or S2 L2T1½

*Commerce/Arts/Applied Science/Sciences Prerequisite:*

| | *HSC Exam Percentile Range Required* |
|---|---|
| *2 unit A English or* | *31-100* |
| *2 unit English or* | *21-100* |
| *3 unit English* | *11-100* |

Introduction to micro-economic analysis and its application to contemporary policy issues. Indifference curve approach to consumer behaviour, income and substitution effects, market demand, consumer surplus. Isoquants, cost concepts, supply curves. Perfect and imperfect product markets, agricultural intervention schemes. Partial and general equilibrium, concept of efficiency, international trade and tariffs. Productivity of factors of production, labour markets, bilateral monopoly, wage fixing in Australia. Public goods, pollution and property rights.

### 15.002 Microeconomics II — S1 L2T2

*Commerce/Arts/Applied Science/Sciences Prerequisites: 15.011 plus*

| | *HSC Exam Percentile Range Required* |
|---|---|
| *2 unit Mathematics or* | *51-100* |
| *3 unit Mathematics or* | *21-100* |
| *4 unit Mathematics* | *1-100* |

*Excluded: 15.012, 15.072*

Revealed preference theory of demand, index numbers and aggregation; externalities, time preference, consumer surplus and compensation concepts. Short and long-run costs, returns to scale, producer surplus and quasi-rents. Monopolistic competition, oligopoly, cartels, public enterprise. Investment criteria, benefit-cost analysis. Efficiency and equity trade-offs, microeconomic policy in a second best framework.

### 15.003 Macroeconomics III — S1 L2T2

*Commerce/Applied Science/Science Prerequisite: 15.042.*

Macroeconomic theory and policy including an introduction to the theory of economic policy, the structure and dynamic characteristics of macro-models, recent developments in monetary theory and policy, theories of inflation and policy in a dynamic setting.

### 15.011 Macroeconomics I — S1 or S2 L2T1½

*Commerce/Arts/Applied Science/Sciences Prerequisite: 15.001.*

The economics of output, employment and inflation, including social accounting, consumption and investment functions, the Keynesian goods market model, supply and demand for money, interactions between the goods and money markets in equilibrium and disequilibrium situations, inflation and the balance of payments.

### 15.012 Microeconomics II (Honours) — S1 L2T2

*Commerce/Sciences Prerequisites: 15.011 plus HSC results as for 15.002.*
*Arts Prerequisite: Credit in 15.011 or consent of the Head of the Department plus HSC results as for 15.002. Excluded: 15.072, 15.002.*

15.002 Microeconomics II at greater depth.

### 15.013 Macroeconomics III (Honours) — S1 L2T2

*Commerce/Sciences Prerequisite: 15.052.*
*Arts Prerequisite: Credit or better in 15.052 or consent of the Head of the Department plus 15.421 or 15.412.*

15.003 Macroeconomics III at greater depth and includes an introduction to the theory of economic growth.

### 15.024 Advanced Macroeconomics — S1 L4

*Commerce Prerequisite: 15.013.*
*Science Prerequisites: 15.473, 15.013 and 15.153.*

Advanced topics in macroeconomics including economic growth, monetary economics and international economics.

### 15.034 International Trade — S2 L2

*Commerce/Sciences Prerequisite: 15.024.*

Advanced topics in international trade.

### 15.042 Macroeconomics II — S2 L2T2

*Commerce/Arts/Applied Science/Sciences Prerequisites: 15.011 plus HSC results as for 15.002. Excluded: 15.052, 15.062.*

Extensions to the Keynesian model of income determination to include the government and overseas sectors and a more detailed examination of both demand and supply functions; money and financial institutions; an introduction to dynamic economics.

### 15.052 Macroeconomics II (Honours) — S2 L2T2

*Commerce Prerequisite: 15.011 plus HSC results as for 15.002.*
*Arts Prerequisite: Credit in 15.011 or consent of the Head of the Department. HSC results as for 15.002.*
*Sciences Prerequisite: 15.012. Excluded: 15.042 and 15.062.*

15.042 Macroeconomics II, but in greater depth.

### 15.062 Applied Macroeconomics — S1 or S2 L2T1½

*Commerce/Arts/Applied Science/Science Prerequisite: 15.011. Excluded: 15.052.*

Economic growth and fluctuations in Australia. Inflation, unemployment and balance of payments issues. Fiscal, monetary, exchange rate and incomes policies. Changes in the structure of the Australian financial system and its links with the international monetary system. Effects of restrictions on capital markets.

### 15.063 Money Banking and the Financial System — S2 L2T1

*Commerce/Sciences Prerequisite: 15.013 or 15.003 or 15.062 at credit level or better.*
*Arts Prerequisite: 15.013 or 15.062 at credit level or better.*

Theory of financial intermediation, development and structure of Australian financial markets, social accounting (including flow of funds), development and structure of the Australian financial system, development of Australian banking system, overseas banking systems and international capital markets, instalment credit, finance companies and credit unions, housing finance, savings banks and building societies, money markets and merchant banks, insurance institutions, corporate finance and the capital market, the financial system, monetary policy, and the economic deficiencies of the Australian financial system.

### 15.072 Applied Microeconomics — S1 or S2 L2T1½

*Commerce/Arts/Applied Science/Sciences Prerequisite: 15.011. Excluded: 15.012 and 15.002.*

Structural change in the Australian economy. The effect of different market structures on firms and consumer welfare. The consequences of markets failure and the effects of government regulation. Investment decisions in the public and private sectors, including the estimation of future benefits, revenues and costs, the measurement of consumer and producer surplus. The economics of non-renewable and other resources. Australia's international trade and investment and the effects of restrictions on international trade and investment.

### 15.073 Natural and Environmental Resources Economics — S2 L2T1

*Commerce/Applied Science/Sciences Prerequisite: 15.002 or 15.012 or 15.072.*
*Arts Prerequisites: 15.103 or 15.113 or 15.062 and 15.072.*

Classification of renewable and non-renewable resources: reserves, resources and resource base; the concept and measurement of resource scarcity, costs, prices and rents; exhaustion of resources, ore quality, exploration, availability of substitutes; uncertainty of discovery, technical progress, market imperfections; renewable resources, sustainable yield concepts. Policy issues, with particular reference to Australia's role in the international economy.

### 15.103 International Economics — S2 L2T1

*Commerce/Applied Science/Sciences Prerequisite: 15.002 or 15.012.*
*Arts Prerequisites: 15.002 or 15.072 plus 15.402 or 15.421.*
*Excluded: 15.113.*

The International economy, Australian balance of payments, international institutions. Comparative costs, gains from trade, effects of resource endowments on trade. Government intervention, including tariffs and quotas. Customs unions. Foreign exchange markets. Foreign investment. Balance of payments adjustment mechanisms, internal and external balance. International monetary system. Foreign aid. Proposals for a new international economic order.

### 15.113 International Economics (Honours) — S2 L2T2

*Commerce/Sciences Prerequisite: 15.002 or 15.012.*
*Arts Prerequisite: Credit in 15.012 or consent of the Head of the Department plus 15.402 or 15.421 or 15.412.*
*Excluded: 15.103.*

15.103 International Economics at greater depth.

### 15.143 Microeconomics III — S2 L2T2

*Commerce/Applied Science/Sciences Prerequisite: 15.002 or 15.012.*

Characteristics approach to demand theory, uncertainty, portfolio choice. Linear programming approach to the theory of the firm. Managerial and growth models of the firm. Multinational firms. Technological change. Market dynamics, expectations, speculation and futures markets. Input-output analysis, general equilibrium and welfare. Classical and neo-classical theories of income distribution. Income distribution in Australia.

### 15.153 Microeconomics III (Honours) — S2 L2T2

*Commerce/Sciences Prerequisite: 15.002 or 15.012.*
*Arts Prerequisite: Credit in 15.012 or consent of the Head of the Department.*
*Excluded: 15.062.*

15.143 Microeconomics III at greater depth.

### 15.183 The Less Developed Countries in the World Economy — S2 L2T1

*Commerce/Arts/Sciences Prerequisites: 15.103 or 15.113 or 15.062 and 15.072.*

The role of the less developed countries in the world economy, with special reference to the effects of the energy situation, the emergence of OPEC, the influence of multinational corporations and the role of the newly industrialized countries of the Asian-Pacific area and ASEAN. The effects of policies towards trade and investment, the role of trade preferences and international aid and the debt problems of less developed countries. The application of project analysis to investment decisions in less developed countries.

### 15.413 Econometrics A — S1 L2T1½

*Commerce/Sciences Prerequisite: 15.422, or with permission of the Head of the Department of Econometrics 10.311B.*

The econometric approach, the objectives of applied econometrics: structural analysis, forecasting and policy evaluation.

Estimation of regression models under classical assumptions, and break down of these assumptions: multicollinearity, autocorrelation, heteroskedasticity. Asymptotic distribution theory, errors in variables, stochastic regressors and instrumental variables, lagged dependent variables, seemingly unrelated regressions.

### 15.423 Econometrics B — S2 L2T1½

*Commerce/Sciences Prerequisite: 15.413, or with permission of the Head of the Department of Econometrics 10.312C.*

Identification, specification and estimation of simultaneous equation models including forecasting, policy analysis and simulation. The estimation techniques include: two-stage least squares, three-stage least squares, limited information maximum likelihood and reduced form estimation.

Students build their own models using standard computer packages.

### 15.440 Operations Research in Economics — S2 L3

*Commerce Prerequisite: 15.442 or 15.421 plus 15.002 or 15.012.*
*Sciences Prerequisite: 15.442 or equivalent, or with permission of the Head of the Department of Econometrics, 10.311B.*

Applications of mathematical programming and statistics to economic problems. Use of computer programming. Inventory models, queueing problems, decision analysis, dynamic programming.

### 15.434 Mathematical Economics A — S1 L3

*Commerce Prerequisite: 15.411 plus one of 15.432 or 15.442 or 15.002 or 15.012.*
*Sciences Prerequisite: Consult with the Head of the Department of Econometrics.*

General optimization problems in economics; individual preference and utility; social utility function and existence of general economic equilibrium.

### 15.444 Mathematical Economics B — S2 L3

*Prerequisite: 15.411 plus one of 15.432 or 15.442 or 15.002 or 15.012.*

Growth theory.

### 15.416 Applied Business Statistics — S2 L3

*Commerce/Sciences Prerequisite: 15.421 or equivalent. (Sciences: also 10.311B.)*
*Arts Prerequisite: 15.421.*

Introduction to applied statistical techniques useful in economics, finance and marketing. Time series analysis involving trend line fitting, forecasting, lead indicators, exponential smoothing, etc. Simple survey design and analysis with emphasis on non-parametric methods.

### 15.666 Australia in the International Economy in the Twentieth Century — S1 or S2 L2T1½

*Commerce/Applied Science/Sciences Prerequisite:*

| | *HSC Exam Percentile Range Required* |
|---|---|
| *2 unit A English or* | *31-100* |
| *2 unit English or* | *21-100* |
| *3 unit English* | *11-100* |

The international economy at the end of the nineteenth century: trade, factor flows, and payment arrangements. Problems of the international economy between the wars. The impact of World War II and the international economy in the post-war era. Australian economic development and its relationship with the international economy; economic fluctuations; problems of the inter-war period; growth of manufacturing; government policy and action; the importance of the mining industry; economic development and the distribution of income and wealth.

### 15.777 Management Strategy and Business Development — S2 L2T1½

*Commerce/Applied Science/Sciences Prerequisite: 15.601 or 15.666.*

The strategy and structure of large scale business enterprise over the past century. An analysis of the process of growth from small family firms and partnerships to corporate enterprises and multinational corporations. The external business environment. Case studies of managerial hierarchies, investment strategy and diversification of firms in transport, mass retailing and mass production.

## Graduate Study

### 15.716G Science, Technology and Economic Development

The several functions of science and technology in development, past, present and possible future. Development economics and sociology; case studies, ranging from nineteenth century Japan to China since 1950. The place of technology in contemporary development and the role of international institutions (eg, multinational corporations) in transferrals of scientific and technical knowledge. The 'appropriateness' of introduced technique and the concept of alternative technology and alternative development patterns.

# Biological Sciences

## Undergraduate Study

### 17.031 Biology A — S1 L2T4

*Prerequisite:*

| | *HSC Exam Percentile Range Required* |
|---|---|
| *2 unit Science (Physics) or* | *31-100* |
| *2 unit Science (Chemistry) or* | *31-100* |
| *2 unit Science (Geology) or* | *31-100* |
| *2 unit Science (Biology) or* | *31-100* |
| *4 unit Science (multistrand)* | *31-100* |

Basic cell structure; membranes, organelles, prokaryotic and eukaryotic cells; cellular locomotion; basic biological molecules; enzymes: structure and metabolic roles, cellular compartmentalization and enzyme function; diffusion, osmosis and active transport; theory of inheritance, linkage, mutation, information transfer and protein synthesis.

*Requirements for Practical Work*
Equipment required for practical work is set out in the *Course Guide*, available during enrolment time at the First Year Registration Centre (Physics Building). Students must purchase this ***prior to*** the first week of session.

### 17.041 Biology B — S2 L2T4

*Prerequisite: 17.031. Excluded: 17.021.*

The evolution, diversity and behaviour of living things and the ways in which they have adapted to varying environments. Emphasis on the structure and function of flowering plants and vertebrate animals, and their roles in Australian ecosystems. The theory covered in lectures and tutorials is illustrated by observation and experiment in laboratory classes.

### 17.012 General Ecology — S2 L2T4

*Prerequisites: 17.031 & 17.041.*

Evolution and environmental selection in the Australian continent; geological, palaeoclimatological, biogeographical and historical background. Functional organization of ecosystems: energy budgets, hydrological and biogeochemical cycles. Integrated structure and function of ecosystems, including cropping and management of natural resources. Aspects of microbial ecology. Students are required to attend a field camp as an integral part of the course.

# Applied Geology

## Undergraduate Study

### 25.110 Earth Materials and Processes — S1 L2T4

*Constitution of the Earth.* The Earth and the Solar System. The interior of the Earth: the crust and its chemical composition, gravity and isostasy. Minerals and rocks, economic mineral deposits. *Earth Processes.* The origin of igneous rocks; plutonism and volcanism. The geological cycle. Weathering processes, soil formation and landforms. The origin of sedimentary rocks; transportation, deposition, lithification. Arid, glacial and periglacial processes. Geological time. Metamorphism and metamorphic rocks. Structural geology, classification and origin of faults and folds. Quaternary stratigraphic sequences, neotectonics. *Field Work* of up to two days is a compulsory part of the subject.

### 25.120 Earth Environments and Dynamics — S2 L2T4

*Prerequisites:*

| | *HSC Exam Percentile Range Required* |
|---|---|
| *2 unit Mathematics* or* | *71-100* |
| *3 unit Mathematics or* | *21-100* |
| *4 unit Mathematics* | *1-100* |
| *and* | |
| *2 unit Science (Physics) or* | *31-100* |
| *2 unit Science (Chemistry) or* | *31-100* |
| *4 unit Science (multistrand)* | *31-100* |
| *and* | |
| *25.110.* | |

*This refers to the 2 Unit Mathematics subject which is related to the 3 Unit Mathematics subject. It does not refer to the subject 2 Unit Mathematics (Mathematics in Society).

*Earth Environments:* Introductory palaeontology, including the evolution of life, invertebrates and vertebrates. Principles of stratigraphy. The stratigraphy of New South Wales: Broken Hill, Lachlan Orogen, New England Fold Belt and Sydney Basin. Introductory stratigraphy of Australia from the Precambrian to the Recent. The mineralogical study of rocks; techniques and significance of mineralogy. Structural geology; stereographic and statistical treatment of structural data. *Earth Dynamics:* The evolution of ocean basins; sea-floor spreading and sea-level changes. Climates of the past. Geophysical methods of exploration; seismology and earthquake prediction. Plate tectonics and continental drift. *Field Work* of up to four days is a compulsory part of the subject.

### 25.211 Earth Materials I — S1 L2T4

*Prerequisite: 25.120.*

*Mineralogy:* Principles of optical crystallography and the use of the polarizing microscope. Chemical and physical properties of rock forming minerals. Mineral identification. *Igneous Petrology:* Occurrence, classification and origin of igneous rocks. Fractional crystallisation and differentiation. Partial melting. Simple binary melting diagrams. Igneous petrology relating to place tectonics. *Practical:* Macroscopic and microscopic examination of rock forming and ore minerals and igneous rocks in the field and the laboratory. *Field Work* of one day is a compulsory part of the subject.

### 25.212 Earth Environments I — S1 L3T3

*Prerequisite: 25.120.*

*Sedimentology:* Flow regimes and bedding forms, sedimentary structures. Modern and ancient sedimentary environments of deposition: alluvial, nearshore, shelf and deep sea, in both terrigenous clastic and carbonate/evaporite domains. The facies concept: lateral and vertical relationships between depositional environments and associated lithofacies within developing sediment wedges. *Palaeontology:* Morphology and stratigraphic distribution of invertebrates, including Foraminifera, Brachiopoda, Mollusca, Arthropoda, Protochordata and Echinodermata. Introductory palaeobotany. Palaeoecology. Biogeography. Trace fossils. Reef building organisms and the evolution of reefs. *Field Work* of up to five days is a compulsory part of the subject.

### 25.221 Earth Materials II — S2 L3T3

*Prerequisite: 25.211.*

*Sedimentary Petrology:* The influence of transportation, deposition and diagenesis on the composition, texture and structure of detrital sedimentary rocks. The chemically formed sedimentary rocks including the phosphates, zeolites, evaporites, ferruginous and silceous deposits. *Metamorphic Petrology:* Origin and classification of metamorphic rocks as an aid in understanding common mineral assemblages. Petrographic studies of common metamorphic rocks. Field studies. *Structural Geology:* Origin, classification and description of structures in rocks. Techniques of stereographic projection of structural elements and analysis of simple fracture systems. Tectonics and tectonic analysis. *Field Work* of up to eight days is a compulsory part of the subject.

### 25.223 Earth Physics — S2 L2T4

*Prerequisite: 25.110*

*Global Geophysics:* Principles of gravity, geomagnetism, palaeomagnetism, geothermy and seismology and their relation to shape, internal constitution, dynamic processes and major tectonic features of the earth. *Photogeology:* The use of air photos for geological mapping and geomorphological evaluation of land. Techniques and principles of photo-interpretation and multi-band photography. Photo-interpretation of folds, faults, joints, bedding, limestone, intrusive igneous volcanic rocks, alluvial fans, terraces, slopes, landslides, coastal and tropical landforms. Relationships between geology, drainage, soil and vegetation, orebody expression gossans, colouration halos. An introduction to remote sensing. *Geological Surveying:* Levels, tachometers and theodolites. Field techniques. Precision of angular measurements. Stadia surveying. Levelling. Field computations. Closed and open traverses. Coordinates and their computation. *Field Work* of two days is a compulsory part of the subject.

### 25.2261 Mathematical Geology I — S2 L2T1

*Prerequisite: 25.120.*

*Geological Statistics:* Measurement scales in geology. Probability distributions and their properties; sampling and test of significance. Application of these techniques using geological data. *Geological Computing:* FORTRAN programming; text editing; control language for VAX and CYBER.

### 25.311 Earth Materials III — S1 L2T4

*Prerequisite: 25.221.*

*Mineralogy:* Principles of X-ray powder diffractometry and the use of X-ray powder cameras and diffractometers. Elementary stereology. Laboratory methods of mineral separation. Mineral characterization.*Geochemistry:* Some modern methods of rock and mineral analysis. Accuracy, precision and quality of geochemical data. The distribution of elements in terrestrial rocks. Norms. *Aqueous Geochemistry:* Redox potentials in nature. Oxidation/reduction and sediment formation. Solubilities, metal transport and ore deposition. The growth of minerals from solution and the development of mineral textures. Particular aqueous geochemical systems.

### 25.321 Earth Materials IV — S2 L3T3

*Prerequisite: 25.221.*

*Clay Mineralogy:* The structure and properties of the clay mineral groups including the kaolinites, illites, smectites, chlorites, mixed layered and fibrous clay minerals. Techniques for the identification of the clay minerals. Clay-water systems and ion exchange. Chemical weathering and the origin of the clay minerals. *Advanced Igneous Petrology:* Origin of silicate liquids. High pressure and low pressure fractionation. Liquids and fluids. Nature of the Upper Mantle. The use of trace elements and isotopes are petrogenetic indicators. Practical petrography and literature studies of igneous suites. Field study. *Advanced Metamorphic Petrology:* Facies series. Metamorphic reactions. Isograds. Mineral assemblages as geobarometers and geothermometers. Fluids in metamorphism. Fabric. Relationships of deformation and recrystallization. Metamorphic petrology of Australia. Practical macroscopic and microscopic study of metamorphic rocks. *Field Work* of up to six days is a compulsory part of the subject.

### 25.312 Earth Environments II — S1 L3T3

*Prerequisite: 25.212 (note: it is desirable that students taking this unit have also taken 25.223).*

*Stratigraphy:* Stratigraphic classification. Biological and physical methods of correlation. Introduction to radiogenic methods of age determination: 14C, K/Ar, Rb/Sr and fission track methods. Definition of international stratigraphic boundaries, stratotypes and reference points. Types of sedimentary basins and continental margins. The development of the Precambrian craton of Australia. The geological evolution of eastern Australia, particularly the late Palaeozoic and Mesozoic history of the Tasman Mobile Belt. Intracratonic basins of western and southern Australia and the effects of the dispersal of Gondwanaland. Geological evolution of the northern margin of the Australian plate, particularly the Mesozoic to Recent of Papua-New Guinea. *Palaeontology:* Theories of biological classification. Processes and theories of evolution. The origin and early history of life. Functional morphology. Practical application of palaeontology. *Field Mapping:* Geological mapping in a complicated geological terrain. Geological report writing and cartography. *Field Work* of up to eight days is a compulsory part of the subject.

### 25.314 Mineral and Energy Resources I — S1 L3T3

*Prerequisite: 25.221.*

*Metallic Resources:* Classification and origin of the ore deposits, geochemical processes, research methods. Orthomagmatic, hydrothermal, porphyry, volcanic-sedimentary, Mississippi Valley type, chromium, iron, manganese ores, residual and mechanical ores. Introduction to mineral exploration. Laboratory study of hand speci-

mens, thin sections and polished sections of various ore types; study of selected mining areas representing various genetic types of ore. *Economic Mineralogy:* Nature of reflected light. Ore textures and their interpretation. Phase relations and paragenesis of ore minerals. Practical work in optical properties of ore minerals, hardness and reflectivity measurements: study of selected ores and ore minerals under the microscope including textural studies. *Field Work* of up to four days is a compulsory part of the subject.

### 25.3162 Mathematical Geology II — S1 L2T1

*Prerequisite: 25.2261.*

Application of the mathematical techniques listed below to geological data processing and analysis. Analysis of variance. Introduction to matrix algebra. Regression analysis; trend surface analysis; time series analysis; Markov chain analysis. Introduction to nonparametric statistics. Introduction to multivariate statistics. *Practical work* based on the use of SPSS, BMDP and other library programs.

### 25.324 Mineral and Energy Resources II — S2 L3T3

*Prerequisite: 25.212.*

*Non-metallic Resources:* Geological factors critical to the occurrence of oil, natural gas, oil shale and coal. Geochemistry of hydrocarbons and formation fluids. Typical Australian and overseas occurrences of petroleum. Techniques of petroleum exploration, assessment and development of reserves. Introduction to coal petrology. Geological controls on the formation and distribution of coal. Occurrence and economic use of non-metallic products including phosphates, bauxites, beach sands and industrial minerals. *Sedimentary Basin Analysis:* Techniques of analysis and data presentation using information from outcrops, boreholes (including wireline logs) and seismic sections. Construction and interpretation of structural, isopachous and lithofacies maps. Seismic stratigraphy. Styles of sedimentation within and structuring of basins in tensional, compressive and strike-slip tectonic regimes. Basin evolution. *Field Work* of one day is a compulsory part of the subject.

### 25.325 Engineering and Environmental Geology — S2 L4T2

*Environmental Geology:* Hydrodynamics of pollutants and water quality principles. Domestic, industrial and radioactive waste disposal, deep well injections. Geological hazards and urban planning. Environmental impacts of dams, mineral exploration, mining and impact statement techniques. Water resources law and pollution. Land use conflicts. *Hydrogeology:* The hydrological cycle; confined and unconfined groundwater. Hydrological characteristics of rocks and their measurement. Pump tests. Aquifer boundaries. Exploration for groundwater development and monitoring of groundwater resources. Groundwater flow tests. Case studies from the Great Artesian Basin and the Murrumbidgee area. *Geomechanics:* Rock and soil masses and their engineering behaviour influence of composition and fabric. Discontinuities in rocks and soils and their analysis for engineering purposes. Mechanical properties and their measurement. Stress-strain theory. *Coastal Geology:* Properties of sedimentary populations. Sampling practices. Measurements of grain size, grain shape and packing; analyses of measured data. Geological significance of sediment parameters. The shoreline processes Littoral and longshore drifts and net sand movement. Coastal engineering works. The estuarine environment. *Field Work* of up to three days is a compulsory part of the subject.

### 25.3261 Geochemical Analytical Techniques — S1 L1T1

*Prerequisite: 25.311.*

Modern destructive methods of rock and mineral analysis. Non-destructive methods; X-ray fluorescence spectroscopy and electron probe microanalysers.

### 25.3271 Advanced Structural Geology — S2 L1T1

*Prerequisite: 25.221.*

*Advanced Structural Geology:* Analysis of structural elements at the microscopic, mesoscopic and macroscopic scales. Detailed studies of the analysis of metamorphic terrains, eg Cooma Complex, Broken Hill. *Field Work* of up to three days is a compulsory part of the subject.

### 25.333 Exploration Geophysics — S1 L3 and S2 L1T1

*Prerequisite: 25.120.*

Physical properties of rocks and soils. Introduction to seismic, gravity, magnetic, electrical, electromagnetic and radiometric methods of geophysical exploration. Application of these methods in the search for mineral deposits, petroleum, coal and groundwater and in civil and mining engineering projects. Interpretation of geophysical data. *Field Work* of up to three days is a compulsory part of the subject.

### 25.410 Resource Geology — S1 L3T6

*Exploration Geochemistry:* Principles and techniques of soil, drainage and rock geochemistry as applied to mineral exploration. *Mathematical Geology:* Application of probability graphs to exploration data. Processing and interpretation of geological data using selected univariate and multivariate statistics; typical case studies in mathematical geology exemplifying these techniques. *Remote Sensing:* Principles of various remote sensing techniques including landsat and side-looking airborne radar. The techniques of image enhancement and digital processing. Applications of remote sensing in lithological mapping and tectonic analysis. Integration of remotely sensed data with conventional data sources. Practical work with the interactive computer on image analysis with particular reference to student field study areas. *Precambrian Geology:* Distribution, terminology, concepts, general features of the Archaean and Proterozoic. Archaean of Australia: Pilbara, Yilgarn. Proterozoic of Australia: Kimberleys, Broken Hill. Precambrian syntheses: tectonic, plate tectonics. Aspects of Precambrian mineralization. *Resource Economics:* Introduction to the role of earth resources in industrial society; availability of resources and consideration of grade, price, economic, technical and political factors. Distribution, production, consumption and trade in minerals. Supply adequacy and resource assessment. Review of Australian and New South Wales mineral industry. Economics of engineering geological works. *Report Writing:* Techniques of scientific report writing, especially preparation of theses and research articles. Methods of illustrating verbal and written presentations. Guidelines to verbal presentations. *Field Work* of up to seven days is a compulsory part of the subject.

### 25.412 Sedimentary Basin Resources

See Sedimentary Basin Resources strand in Applied Science Course 3000 Applied Geology Year 4. Available only to programs 2501, 5831.

### 25.414 Mineral Resources

See Mineral Resources strand in Applied Science Course 3000 Applied Geology Year 4. Available only to programs 2501, 5831.

### 25.415 Engineering and Environmental Geology

See Engineering and Environmental Geology strand in Applied Science Course **3000** Applied Geology Year 4. Available only to programs 2501, 5831.

### 25.420 Field Project — S2

A major field-laboratory project, which generally includes geological mapping, on some aspect of mineral or sedimentary basin resources, engineering or environmental geology or resource geophysics.

### 25.4101 Topics in Advanced Geology — S1 L3

Topics in geology selected from a list of subjects available from the Head of School.

### 25.434 Geology Honours (Single Major)

### 25.5212 Sedimentology — S1 L1T1

*Prerequisite: 25.120. Excluded: 25.212.*

*Sedimentology,* as in 25.212 Earth Environments I. Available only to Course **3145.**

### 25.523 Mineralogy

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

### 25.5312 Geological Field Mapping — S1 L2

*Prerequisite: 25.5212. Excluded: 25.312.*

*Field Mapping,* as in 25.312 Earth Environments II. Available only to Course **3145.**

### 25.5313 Stratigraphy

*Prerequisite: 25.5212. Excluded: 25.312*

*Stratigraphy,* as in 25.312 Earth Environments II.

### 25.621 Marine Geology I — F L1T2

*Prerequisites: 25.601 or both 25.110 & 25.120.*

The form and nature of ocean basins; the origin, transport, distribution and deposition of suspended matter in ocean water. Principal groups of oceanic index fossils. Igneous and sedimentary rock types of the ocean floor and their significance. Tectonics of ocean basins. *Field Work* of two days is a compulsory part of the subject.

### 25.622 Hydrological and Coastal Surveying — F L1T2

*Prerequisites: None.*

General principles of surveying, with particular reference to coastlines and off-shore techniques. Optical and electronic methods of distance measuring and position fixing. Methodology for short-term and long-term measurement of tides and flow currents. Bathymetric surveys in shallow and deep water conditions. Coastline morphologies and their relationship to the behaviour of water masses. Analysis of sedimentary systems in deltaic, estuarine and near-shore environments. Data collecting, processing and storage. Shallow-water investigations for bedrock morphologies. *Field Work* of five days is a compulsory part of the subject.

### 25.631 Marine Geology II — F L1T2

*Prerequisite: 25.621.*

Sedimentary and tectonic processes of the ocean basins and continental margins; ocean basin stratigraphy and the environmental and chronological utility of the principal groups of index fossils. Stratigraphical history and correlation of sedimenty rocks in the deep ocean basins and on continental shelves. Changes of sea level. The Quaternary history of the oceans. Reefs and carbonate sedimentation. Deep sea consolidated sediments. Magnetism and palaeomagnetism. *Field Work* not exceeding two days is a compulsory part of the subject.

### 25.632 Estuarine Geology — S1 L1T2

*Prerequisite: None.*

The physical nature of the estuarine environment; its characteristic topography, chemistry and layering of water masses; tidal behaviour. Characteristic sediments, stratigraphy of sediment bodies and distribution patterns of sediments and microfossils in estuaries. Inorganic and microbial diagenesis of estuarine sediments. Procedures for mapping, sampling and sample analysis. Mineral morphology. Statistical treatment of results. *Field Work* of four days is a compulsory part of the subject.

### 25.6341 Marine Mineral Deposits and Oceanic Minerals — S1 L1T1

Oceanic minerals and mineral deposits: detrital, authigenic and epigenetic. Methods of exploration, assessment and exploitation, international law relating to the sea floor. Methods of subsurface analysis.

### 25.6342 Exploration and Seismic Methods S2 L2T1

Geophysics of ocean basins and off-shore areas and the techniques of their study. Seismic refraction, reflection and computational methods, instrumentation of seismic and acoustic sources, recording systems and signal processing. Geological and physical interpretation of results. Practical work on instrumentation, recording and interpretation of field data.

### 25.635 Marine Resources F L1T2

*Prerequisite: 25.621. Co-requisite: 25.631.*

Resources important to human civilization of a biological, fluid and mineral nature. Mining of ocean resources. Geological aspects of waste disposal and engineering works in the ocean. Tidal energy. Off-shore drilling.

### 25.931 Geophysics

See Geophysics strand of Applied Science Course 3000 Applied Geology Year 4. Available only to programs 2501, 5831.

### 25.9311 Gravity and Magnetic Methods S1 L2T1

*Prerequisites: 1.001 and 10.001.*

Fundamental principles. Field procedures and instruments. Reduction of field data. Regionals and residuals. Effects of sources of simple geometrical shapes and generalized two and three-dimensional distributions. Applications. *Field Work* of one day is a compulsory part of the subject.

### 25.9312 Seismic Methods S1 L2T1

*Prerequisites: 1.001 and 10.001. It is desirable that students taking this unit have a background in geology.*

Seismic waves. Physiclal/engineering properties of geological materials. Ray theory in seismic refraction and reflection methods. Instrumentation. Data acquisition and processing. Depth and velocity analysis. Geophysical and geological interpretation. Case history studies. *Field Work* of one day is a compulsory part of the subject.

### 25.9313 Electrical Methods S1 L2T1

*Prerequisites: 1.001 and 10.001. It is desirable that students taking this unit have a background in geology.*

Introductory theory and field practice of resistivity, self-potential, induced polarization and airborne and ground electromagnetic methods. Geological interpretation of field data. Geophysical logging. *Field Work* of one day is a compulsory part of the subject.

### 25.9314 Geological Applications S1 L1T1

*Prerequisite: 25.120.*

A subject of ten weeks' duration. *Structural Geology:* Elements of structural geology, stereographic projection and fracture analysis. *Geology of Fuels:* Origin of coal, oil and natural gas; stratigraphic and structural consideration of oil and coalfields. *Hydrogeology:* Principles of hydrogeology; transmission of groundwater in rocks and soils. *Field Work* of one day is a compulsory part of the subject.

### 25.9321 Geophysical and Geological Applications S2 L1T2

*Prerequisite: 25.120. Excluded: 25.6342.*

*Geological Interpretation of Geophysical data:* Seismic stratigraphy. Coal-seam geometry from high resolution seismic and in-seam data. *Geology of Ore Deposits:* Mineralogy of industrially important metallic and non-metallic minerals. Theories of ore formation including secondary enrichment processes. Available only in program 2503.

# General Studies

## Graduate Study

### 26.568G Technology for Alternative Development S1L2

The need for alternative theories and models of development. Trends in economic development theory and development in practice. Current choice of science and technology in developing countries. The results of contemporary strategies of development and their relation to the policies of industrialized nations. The professed goals of development plans. Preferred models of development and the technology appropriate to them. The social, political and economic implications of choosing alternative goals and technologies in developing countries.

# Geography

## Undergraduate Study

### 27.111 Applied Physical Geography I F L2T3

*Prerequisite:*

| | *HSC Exam Percentile Range Required* |
|---|---|
| *2 unit Science (Physics) or* | *31-100* |
| *2 unit Science (Chemistry) or* | *31-100* |
| *2 unit Science (Geology) or* | *31-100* |
| *2 unit Science (Biology) or* | *31-100* |
| *4 unit Science (multistrand)* | *31-100* |

*Excluded: 27.301, 27.311, 27.801, 27.811.*

A systematic introduction to physical geography as a basis for applied studies. Principles of meteorology and climatology with particular emphasis on climatic controls at global and regional scales. Weather systems and forecasting methods. Climatic classification and the regional pattern of climates in Australia. Geologic and climatic factors in landforms and soils, and in the physiographic build and major landforms of Australia. Mass movement and hillslope form. River action and associated valley and channel forms. Coastal environments, processes and forms. Properties and types of soil, with emphasis on factors and processes controlling global and regional distribution. Soil profiles and laboratory measurement of soil properties. Principles of soil classification and mapping. Spatial organization of plants and animals, and factors and processes relating to that organisation. Composition, structure, population dynamics and classification of vegetation. *Laboratory classes* concerned with the interpretation of various forms of data in physical geography and their representation quantitatively and graphically. *Field work* of up to three days is an integral part of the subject.

### 27.301 Introduction to Physical Geography S1 L2T2½

*Prerequisite: Nil. Excluded: 27.111.*

Themes selected from the mechanisms of the physical environment, with particular reference to Australia and to the Sydney Region; landscape as an expression of dynamic response. *Energy and Atmospheric Circulation over Australia:* local climate and weather patterns. *Climate-related Problems:* the hazards of fire and flood. *Geological Control of Landform Character:* the development and stability of hillslopes. *Soil, Vegetation and Drainage Relationships:* soil erosion. *The Coastal Ecosystem:* problems of risk and management in the coastal zone. *Lectures* are supplemented with tutorials, laboratories and a field tutorial. Students are required to provide some materials for practical work and to contribute towards the cost of the field tutorial.

### 27.302 Introduction to Human Geography S2 L2T2½

*Prerequisite: Nil.*

Human geography as a problem-oriented and policy-relevant endeavour. Themes from the development and current state of human landscapes in Australia including aspects of growth and decline in the settlement system, utilization of agricultural and mineral resources and associated impacts, human aspects of environmental management and the spatial impacts of economic, social and technological change. *Lectures* are supplemented by tutorials, laboratories and a field excursion.

### 27.311 Physical Geography S2 L2T2½

*Prerequisites: 27.301/801, 27.2813 (in special circumstances a student may apply to the Head of School for permission to take 27.2813 as a co-requisite). Excluded: 27.111.*

Emphasising inter-dependence of climate, hydrology, landforms, soils and vegetation in major zones. Classification of climates and world climatic patterns. Soil zonality and world soil patterns. World vegetation types and distribution, and their controls. Studies of selected zones with particular reference to the Australasian region. *Laboratory classes:* climatic analysis and mapping, and analysis of natural landscapes, including airphoto interpretation, together with appropriate statistical exercises.

### 27.312 Human Geography S1 L2T2½

*Prerequisites: 27.302/802, 27.2813 (in special circumstances a student may apply to the Head of School for permission to take 27.2813 as a co-requisite).*

The urbanization process in underdeveloped and industrialized societies. Theories, concepts and principles relating to the location, size and spacing of settlements; the economic and social structure of urban areas; city-region relationships. Geographical perspectives on contemporary urban problems are offered, particularly those associated with the concentration of people and activities between regions and within cities; emphasis on spatial variations in housing, employment and service provision. *Laboratory classes:* case studies, methods of analysis and practical applications in the local region including a compulsory field excursion equivalent to sixteen tutorial hours.

### 27.2813 Geographic Methods SS L1T2

*Prerequisites: 27.111 or 27.301 or 27.801 (in special circumstances a student may apply to the Head of School for permission to take 27.2813 as a co-requisite) and 27.302 or 27.802.*

Statistical procedures used in both human and physical geography. Includes: measures of dispersion; samples and estimates; hypothesis testing; association; correlation and regression; tests for distribution in space; data collection and analysis.

### 27.2814 Geographic Field Methods S2 T2

*Prerequisites: 27.111 or 27.301 or 27.801 & 27.301/801, 27.2813.*

Field methods as used in both human and physical geography. The subject involves a three-day field tutorial and associated laboratory work.

### 27.133 Pedology S1 L2T3

*Prerequisites: 27.111 or any two units from 2.111, 2.121, 2.131, 2.141, and 27.811 or 27.111 or 25.012 or 25.022.*

Methodology of pedogenic studies and the application of these studies to the understanding of soil-landform relationships. Soil physical and chemical properties and their interrelationships, emphasizing clay-mineral structure and behaviour, soil solution chemistry, soil water movement and the application of these properties to elements of soil mechanics. Soil properties in natural, rural and urban landscapes, including assessment of soil fertility, swelling characteristics, dispersibility, erodibility and aggregate stability. Laboratory analysis of soil physical and chemical characteristics with emphasis on properties associated with land capability assessment. Statistical analysis of soil data and its application to mapping. The use of soil micromorphological and mineralogical studies in pedology.

### 27.143 Biogeography S2 L2T3

*Prerequisites: 27.311/811 or 17.031 & 17.041 or 27.111.*

Distribution of taxa. Floras of the Southern Hemisphere with particular reference to Australia. Endemic, discontinuous and relict taxa. Dispersal and migration of species. Origin, evolution and geological history of Angiosperms. The development of the Australian biogeographic element. Study of the recent past to understand present

distributions of taxa. The role of man and climatic change on Australian vegetation. Detection of pattern and association and their causes. Classification, ordination and mapping of vegetation. Ecology of selected Australian vegetation types. Composition, structure, productivity and environmental controls of heathland, woodland, grassland and rainforest communities. Management of vegetation in different climate regimes. *Field work* of up to five days is a compulsory part of the subject.

### 27.153 Climatology — S1 L2T3

*Prerequisites: 1.001, 27.311/811 or 25.110 & 25.120 or 17.031 & 17.041 or 27.111.*

Physical bases understanding microclimate. Processes of energy exchange at the earth's surface, and the atmospheric and terrestrial surface controls of the heat and mass budgets. Atmospheric diffusion. Wind profiles and atmospheric turbulence as affected by stability and surface properties. Determinants of the local and site-specific climatic environment, particularly topographic, surface cover and substrate conditions. Urban climate and climate in relation to human comfort and health. Building and constructional design aspects of climate and applications of climatology in urban and regional planning. Climatic aspects of the development and regional planning. Climatic aspects of the development and utilization of solar and wind energy sources.

### 27.183 Geomorphology — S1 L2T3

*Prerequisites: 25.110 & 25.120 or 27.311/811 or 27.111. Excluded: 27.860.*

Beaches and their response to waves, currents and sediment movement. Barrier systems, lagoons and estuaries. Rock platforms. Quaternary sea level changes. Hydraulic geometry of stream channels, including effects of sediment transport and man's activities. Hillslope form, process and associated slope materials. Methods of slope measurement, analysis and survey. Hillslope models. Systems approach, equilibrium concepts and modelling in landform studies. Field projects in coastal and fluvial geomorphology, and laboratory time is devoted to statistical exercises using data collected from maps, airphotographs and in the field.

### 27.1711 Introduction to Remote Sensing — S1 L2T1

*Prerequisite: Successful completion of a Year 1 program in Applied Science, Science or Arts (or equivalent) as approved by the Head of School.*

Principles and technical aspects of remote sensing. Forms of available imagery, their utility and facilities for interpretation. Basic airphoto interpretation techniques relevant to environmental assessment. Introduction to principles of the electromagnetic spectrum, photometry and radiometry. Sensor types, image formation and end products associated with selected satellite programs, including LANDSAT. Land-cover and land-use interpretation procedures in visual image analysis. Basic procedures in machine-assisted image enhancement.

### 27.1712 Remote Sensing Applications — S2 L2T1

*Prerequisite: 27.1711.*

Spectral characteristics of natural phenomena and image formation. Ground truthing, collection and calibration. Introduction to computer classification procedures. Multitemporal sampling procedures, image to image registration and map to image registration. Major applications of remote sensing in the investigation of renewable and non-renewable resources to include: soils, geology, hydrology, vegetation, agriculture, rangelands, urban analysis, regional planning, transportation and route location and hazard monitoring.

### 27.172 Environmental Measurements — F L2T4

*Prerequisite: 27.111.*

Sampling strategies and survey methods for the collection of environmental data. Data analyses using laboratory and statistical methods. The collection and analyses of weather and climatic data, and the maintenance of meteorological stations. Methods of field surveying and instrumentation for the study of geomorphologic and hydrologic processes. Drainage basin morphometry, dynamics and function, including controls on run-off and sediment transport. The measurement of soil physical and chemical properties in the field and laboratory with special reference to plant growth and soil water and geomorphological processes. The relationships between weathering processes and soil properties. Methods of surveying, classifying and mapping soils. Measurement and description of vegetation. Vegetation survey, sampling and species abundance measure. Monitoring energy and nutrient flow and the effects of man on ecosystems.

### 27.324 Spatial Population Analysis — S2 L2T2

*Prerequisite: 27.312/812, or (for non-majoring Arts students) completion of Arts or other subjects approved by the Head of School, carrying at least 24 credit points.*

Population growth and structure in an urban and regional context. The components and processes of population change; fertility, mortality and migration set within the framework of demographic transition theory. Theories of migration and mobility and of optimal populations. Demographic and social indicators for urban and regional analysis and their implications for disparities in living conditions, residential differentiation and regional growth. The adjustment of immigrant and migrant populations to the urban environment.

### 27.325 Urban Activity Systems — S1 L2T2

*Prerequisite: 27.312/812, or (for non-majoring Arts students) completion of Arts or other subjects approved by the Head of School, carrying at least 24 credit points. Excluded: 27.835.*

The understanding of problems arising from processes of change in non-metropolitan areas, with particular reference to their effects on the functional structure of country towns in NSW. Topics include: functional classification, service provision, economic base, rural mobility decentralization and settlement policies, and urban systems.

### 27.326 Urban and Regional Development — S2 L2T2

*Prerequisite: 27.312/812, or (for non-majoring Arts students) completion of Arts or other subjects approved by the Head of School, carrying at least 24 credit points. Excluded: 27.836.*

Theories of urban and regional change leading to assessment of the role of planning. Emphasis on resource allocation, conflict resolution jand evaluation techniques including cost-benefit analysis and environmental impact assessment. *Lectures* accompanied by seminars and workshop sessions which concentrate on methodology.

### 27.327 Environment and Behaviour S1 L2T2

*Prerequisite: 27.312/812, or (for non-majoring Arts students) completion of Arts or other subjects approved by the Head of School, carrying at least 24 credit points. Excluded: 27.837.*

Socio-economic and behavioural issues relating to urban development, with special reference to social impact studies and the external effects of service provision. Examples selected from inner city and suburban districts, in metropolitan areas and new towns.

### 27.860 Landform Studies S1 L2T2½

*Prerequisite: 27.301/801 or 27.111. Co-requisite: 27.311/811. Excluded: 27.183, 27.870.*

The study of landforms, with particular reference to Australian examples. Geomorphic regions. Planation surfaces and processes and associated weathering features. The evolutionary and dynamic approaches to landforms, with particular reference to fluvial landforms. Coastal processes and forms. Desert landforms. Landforms as evidence of climatic change.

### 27.862 Australian Environment and Natural Resources S2 L2T2½

*Prerequisite: 27.111 or 27.311/811 or 27.312/812. Excluded: 27.872.*

Not offered in 1984.

Continental and regional patterns of land, water and energy resources in Australia and its territorial waters, and natural factors affecting their development, including climate, soils and terrain; problems of limited surface and underground water resources and of conflicting demands, exemplified through particular basin studies; comparable reviews of energy, minerals and forest resources, human resources and development.

### 27.363 Ecosystems and Man S2 L2T2½

*Prerequisite: 27.111 or 27.311/811 or 27.312/812. Excluded: 27.873.*

The structure and functioning of ecosystems, man's interaction with ecosystems; Australian case studies of ecosystem management, including pastoral, cropping, forestry, coastal and urban ecosystems.

### 27.834 Spatial Population Analysis (Advanced) S2 L3T2

*Prerequisites: Graded passes in 27.312/812, 27.2813. Excluded: 27.324/824.*

Additional and more advanced work relating to the content of 27.324/824 Spatial Population Analysis.

### 27.835 Urban Activity Systems (Advanced) S1 L3T2

*Prerequisites: Graded passes in 27.312/812, 27.2813. Excluded: 27.325/825.*

Additional and more advanced work relating to the content of 27.325/825 Urban Activity Systems.

### 27.836 Urban and Regional Development (Advanced) S2 L3T2

*Prerequisites: Graded passes in 27.312/812, 27.2813. Excluded: 27.326/826.*

Additional and more advanced work relating to the content of 27.326/826 Urban and Regional Development.

### 27.837 Environment and Behaviour (Advanced) S1 L3T2

*Prerequisites: Graded passes in 27.312/812, 27.2813. Excluded: 27.327/827.*

Additional and more advanced work relating to the content of 27.327/827 Environment and Behaviour.

### 27.870 Landform Studies (Advanced) S1 L3T3

*Prerequisites: Graded passes in 27.111 or 27.311/811, 27.2813. Excluded: 27.860.*

As for 27.860 Landform Studies with additional and more advanced work, including selected studies of geomorphic processes and of man's influence on those proceses.

### 27.872 Australian Environment and Natural Resources (Advanced) S2 L3T3

*Prerequisites: Graded passes in 27.111 or 27.311/811 or 27.312/812. Excluded: 27.862.*

Not offered in 1984.

As for 27.862 Australian Environment and Natural Resources, with additional and more advanced work.

### 27.873 Ecosystems and Man (Advanced) S2 L3T2

*Prerequisites: Graded passes in 27.111 (CR) or 27.311/811 (CR) or 27.2813 (CR). Excluded: 27.363/863.*

Offered subject to availability of staff.

As for 27.363/863 Ecosystems and Man, with additional and more advanced work.

### 27.880 Advanced Geographic Methods F L1T2

*Prerequisites: Graded passes in 27.111 or 27.311/811 or 27.312/812 and 27.2813.*

Additional quantitative research techniques normally taken by Honours students in their third year. Research organization; computer analysis; collection and organization of data; statistical description; hypothesis testing and sampling; simple and multiple association analysis; nonparametric methods.

### 27.604 Geography IV (Honours) F

*Prerequisite: 27.880.*

Honours students in their final year are required to prepare a thesis of not more than 20,000 words and to attend a series of seminars on their thesis and supporting topics. The thesis topic must be approved by the Head of the School during second half of the year *preceding* entry into the final year, while the thesis must be submitted before the examination period in November of the final year. It is expected that research work for the thesis is undertaken during the summer vacation preceding the final year. In addition, students are required to undertake advanced studies in a branch of geography appropriate to the area of research chosen for the thesis.

# Surveying

## Undergraduate Study

### 29.001 Surveying I — S1 L3T1½

Introduction to computations: principles, use of calculation aids, solutions of triangles, areas of plane figures, co-ordinate systems, units of measurement. Introduction to surveying: principles, types of errors, computation of mean and standard deviation. Minor instruments: prismatic compass, clinometers, plane table alidades. Methods of distance measurement: tape measurement, correction to tape measurements. Angular measurements: construction of theodolite, observation methods for direction and zenith distance measurement.

### 29.002 Surveying II — S2 L2T3

Traversing: fieldwork, computation and adjustment. Principles of levelling, levels and associated equipment, field and reduction procedures, testing and adjustment of levels. Vertical staff techeometry: principles, field and reduction procedures for stadia, self-reducing tacheometers. Survey methods for detail and contour surveys.

### 29.191 Survey Camp I

*Co-requisites: 29.001, 29.002.*

A one-week field camp equivalent to 42 contact hours. A series of field surveying tasks designed to consolidate the current year's work and serve as an introduction to the following year's work. Tasks include traversing, levelling, stadia and detail survey measurements for the production of a large-scale plan. Calculations, preparation of plans and reports.

# Organizational Behaviour

## Graduate Study

### 30.960G Technology and Organizations — S1 L3

*Prerequisite: 30.935G or other approved subject.*

The complex relationships between technological change and organizations, workforces and skills in societies using advanced technology such as, Australia, California, Japan, Germany and Scandinavia. Students carry out projects analyzing the relationship between technological change and organizational variables; such as control and power; employment and skill formation in an industry, organization or group (eg engineers, women, immigrants); working environment, socio-technical systems, quality of working life, occupational health and safety, recurrent education, new patterns of work, industrial relations and industrial democracy.

# Optometry

## Undergraduate Study

### 31.811 Optometry I — F L5T5

*Prerequisites: 1.001 or 1.031, 10.001 or 10.021B & 10.021C or 10.011. Co-requisites: 31.821.*

*Geometrical and Physical Optics:* The nature of light. Interference, diffraction, polarization. Dispersion, colour. Reflection, refraction, curved surfaces. Thin lenses. Lens systems and thick lenses. Optical instruments. Limitation of beams. Photometry, colorimetry. *Mechanical Optics and Optical Dispensing:* The manufacture and properties of spectacle lens materials. The optical properties of spherical, cylindrical and spherocylindrical; prismatic effects in spectacle lenses. Bifocal and multifocal lenses. Protective lenses. Frame measurements. Optical dispensing. Spectacles, magnifiers and magnifying glasses. Lens aberrations. Lens measuring and lens testing instruments. The optics of contact lenses. *Visual Optics:* Optical system of the eye, schematic eyes, the retinal image, visual acuity. Refraction of the eye, hypermetropia, myopia, astigmatism, aphakia. Presbyopia. Anisometropia. Spectacle magnification. Theory of subjective refraction. Entoptic phenomena. Accommodation and convergence. Binocular vision, stereoscopy.

### 31.812 Optometry II — F L8T7

*Prerequisites: 31.811, 31.821. Co-requisite: 31.831.*

*External and Internal Examination of the Eye:* Case history and symptoms. Signs of local and/or general disease. Examination methods and instruments. Optometrical photography. Facial measurements and frame fitting. *Examination of Visual Functions:* Theory and practice of perimetry. Criteria of norms. Interpretation of field defects. Evaluation of light and colour sense. *Refraction:* Theory and practice of keratometry, objective and subjective refraction, prescribing special visual aids. Theory of design and construction apparatus. *Orthoptics and Pleoptics:* Assessment of binocular sensory and motor functions. Diagnosis and treatment of anomalies. Instrumentation. *Theory of Spectacle Lenses and Optical Instruments:* Advanced geometrical optics and spectacle lens design. Aberrations and their control. The elements of macroscopic and microscopic systems.

### 31.813 Optometry III — F L6T0

*Prerequisites: 31.812, 31.831.*

*Industrial Optometry:* Job analysis and standardization of visual requirements. Occupational visual aids. Vision screening. Industrial hazards and industrial eye protection. *Contact Lenses:* Theory and practice of prescribing haptic and corneal lenses. Instruments. *Reading Deficiency:* The reading process and its anomalies. Remedial training. Instrumentation. *Lighting:* Elements of illumination engineering. Assessment of visibility. Sight conservation. *Advanced Visual Physiology and Physiological Optics:* Recent advances in anatomy and physiology. An introduction to electrophysiology. Aetiology of refractive errors. Theories of colour perception and its anomalies. Evaluation of diagnostic tests. Theories of space perception. Distortion of stereoscopic space. Stereoptics. *Comparative Ophthalmology and Ocular Evolution:* The anatomy and physiology of invertebrate and vertebrate visual organs. Evolution of binocular vision. *History of Optics:* Discussion of the development of optics, ophthalmology and optometry against the background of a short history of science. Optometrical and interprofessional ethics.

### 31.821 Anatomy and Physiology of the Eye and Visual System — F L4T2

*Prerequisites: 17.031, 17.041. Co-requisites: 73.011A and 31.811.*

*Histology, Anatomy and Embryology of the Eye and Associated Structures:* Anatomy and histology of the eye and associated tissues. The fibrous, vascular and neural tunics of the eye. The blood supply and innervation of these tissues. Visual pathways and gross anatomy of the brain. Functional architecture of the visual pathways. Motor pathways involved in ocular motility. Elementary embryology of the eye and associated structures. Developmental abnormalities of the eye. Internal and external examination of the eye using clinical techniques. Facial anatomy and frame fitting. *Vegetative Physiology of the Eye:* Corneal function: Transparency and thickness related to hydration. Ionic basis of corneal hydration. Control of intraocular pressure: Mechanisms of production and drainage of aqueous humour. Autonomic reflexes: Relation between pupil size and retinal illumination. Accommodation and the synkinetic near response. Introduction to clinical techniques for evaluation of ocular function. *Physiology of Vision:* Photochemistry of vision. Kinetics of pigment bleaching and regeneration in rods and cones. Measurement of pigment density in the living eye. Bleaching and background adaptation — psychophysics and physiology. Colour vision. Responses to neurones in the visual cells in the pretectum. Theories of parallel and hierarchical processing of visual information. Perception of spatial and temporal modulation of retinal illuminance. Ocular motility. Binocular vision, fusion and stereopsis. Introduction of issues of interest in current visual science.

### 31.831 Diseases of the Eye — F L3

*Prerequisites: 31.811, 31.821, 73.011A. Co-requisite: 31.812.*

*Microbiology:* Cell structure, genetics and metabolism of microbes. Classification of microbes. Growth and death of microbes. Special environments. Host-parasite relations. Introductory chemo-therapy and immunology. Pathogenic micro-organisms and parasites. Viruses. *Pathology:* Acute inflammation, chronic inflammation, repair, regeneration, haemorrhage, thrombosis, embolism, ischaemia, infarction, hyperplasia, hypertrophy, atrophy, metaplasia, neoplasia, carcinogenesis. *Diseases of the Eye:* Aetiology, pathology diagnosis and prognosis of disease of the eyelids, cornea, conjunctiva, iris, ciliary body, choroid, retina, optic nerves, lacrimal apparatus, sclera, orbit, lens, and vitreous. Glaucoma. Lesions of the visual pathways. Ocular manifestations of systemic disease.

### 31.841 Clinical Optometry — F L1T15½

*Prerequisites: 31.812, 31.831*

Students are required to examine patients in the Optometry Clinic, to diagnose their problems and to prescribe optical aids, orthoptic treatment or other management or referral as required. They also work in special clinics, including orthoptics, colour vision, low vision, children's vision and contact lenses, and participate in patient review clinics.

## Graduate Study

### 31.701G Advanced Clinical Optometry — F T4

Clinical work on selected patients, with special emphasis on advanced techniques and new developments. All areas of optometric examination procedures are covered, including: external and internal examination of the eyes; visual functions; tonometry; objective optometry; evaluation of binocular functions; aniseikonia; sub-normal vision; geriatric and pediatric optometry; the clinical application of electrophysiological techniques. The assessment of new instruments, methods and treatment.

### 31.702G Advanced Physiological Optics — F L2T2

Advanced studies in a number of areas of physiological optics. *Refractive State of the Eye:* Physiological basis of ocular refraction, advanced study of the schematic eye, modern concepts of ocular image formation, resolution of the ocular image. Scatter, absorption and reflection of light within the eye, illumination of the retina, receptor density and the retina image, image-forming properties of the rods and cones. Ultrasonic, X-ray and optical techniques for defining the parameters of the refractive state. Aetiology of the refractive state. *Perceptual Organization of the Retinal Image:* Neural networks in the retina and their mathematical analogs, visual transfer functions. Mach bands, retinal inhibition, spatial and temporal resolution of the retina, static and dynamic visual acuity. Stabilization of the retinal image. Periodic stimulation processes. *Electrophysiology of Vision:* Electrical fields of the eye, monitoring the ocular potential. Electro-oculography, electro-retinogram, electro-myogram, electro-encephalogram. Electro-pathology of vision. *Autonomic Servo-mechanisms of the Eyes:* Pupillometry. Accommodation. *Colour Vision:* Basic mechanics of colour vision; visual pigments, fundus reflectometry, Stiles' increment threshold technique. Derivation of fundamental response curves. Differential and incremental colour thresholds. Temporal and spatial effects. Defective colour vision. Parafoveal colorimetry. Colour scales and colour spaces.

### 31.703G Pleorthoptics and Binocular Vision — F L2T2

An integrated subject, in which binocular vision and pleorthoptics are studied from theoretical and clinical viewpoints. Clinical experience is provided by selected patients. Includes: The nature and control of eye movements and their role in maintaining the perception of a stable visual world. Binocular and monocular subjective visual directions. The neurophysiological substrate of binocular vision and its phenomena. Stereopsis and its measurement. Accommodation, convergence, and oculo-motor imbalance. Laboratory and clinical methods of measuring eye position and visual directions. The aetiologies, measurement, and treatment of strabismus, anomalous correspondence, eccentric fixation and amblyopia.

### 31.704G Advanced Contact Lens Studies — F L1T3

*Contact Lens Materials:* polymer chemistry, physical and chemical properties of soft and hard lens materials. *Contact Lens Design:* the relationship of theoretical contact lens design and corneal topography. Clinical evaluation of current and new soft and hard lens designs. *Contact Lens Care and Maintenance:* Theory and performance of various soft and hard lens care and maintenance systems. Soft and hard lens parametric variations. *Contact Lens Patient:* Systems and techniques for evaluating contact lens patients; new techniques for patient instruction and management. Evaluation of patient responses to lenses.

### 31.705G Advanced Contact Lens Practice — F L1T3

The examination, evaluation and aftercare of contact lens patients.

### 31.706G Occupational Optometry F L2T2

Visual job analysis, human aspects of man-machine systems. Information theory, channel capacity. Visual aspects of man-machine relationships. Visual presentation of information, visual detection, identification and estimations, visual coding. Layout of workplaces, illumination, effects of environment on human performance. Relevant aspects of anthropometry. Visual screening techniques. Industrial eye protection and elements of Safety Engineering. Research techniques in Human Engineering. Visual factors in driving and road safety. Visual factors in aviation.

### 31.707G Clinical Photography F L2T2

Introduction to clinical photography, cameras and lens systems, colour films, black-and-white films and filters, apparatus and accessories. Patient preparation and positioning, backgrounds and foregrounds, lighting, the 'safe-set' method. Copying, slide making, macrophotography, microphotography. 'Invisible light' photography (ultra-violet and infra-red), photofluorography, speedlight techniques, fundus photography. Dark-room techniques, portable dark-rooms. Quantitative photographic data analysis.

### 31.799G Project

# Biochemistry

## Undergraduate Study

### 41.101 Biochemistry S1 L4T8

*Prerequisites: 17.041, and 2.121 & 2.131, or 2.141. Excluded: 2.003J.*

The chemical properties of amino acids, peptides and proteins, carbohydrates, nucleic acids and lipids and the biological roles of these compounds. The nature and function of enzymes. The intermediary metabolism of carbohydrates, lipids and nitrogenous compounds. The molecular mechanism of gene expression and protein synthesis. Photosynthesis. *Practical work* to amplify the lectures.

### 41.111 Biochemical Control S2 L2T4

*Prerequisite: 41.101.*

The relationship between structure and function of enzymes, selected protein systems and hormones. Metabolic networks and control mechanisms. *Practical work* to amplify the lectures.

### 41.102A Biochemistry of Macromolecules S1 L3T9

*Prerequisites: 41.101 or 41.111 (students must obtain a clear pass (PS) in either of these subjects), 2.002B.*

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

### 41.102B Physiological Biochemistry S2 L3T9

*Prerequisites: 41.101 or 41.111 (students must obtain a clear pass (PS) in either of these subjects), 2.002B*

Electron transport and oxidative phosphorylation. Mitochondrial transport and function. Interrelationships in mammalian intermediary metabolism. Biochemical control mechanisms including hormones and allosteric interactions. Biochemistry of genetic diseases. Selected aspects of differentiation and development in higher organisms. *Practical work* to illustrate the lectures and to provide experience in modern biochemical techniques.

### 41.102C Plant Biochemistry S2 L2T4

*Prerequisites: 41.101 or 41.111 (students must obtain a clear pass (PS) in either of these subjects), 2.002B.*

The biochemistry of the major pathways characteristic of plants will be studied; topics include the energetics and carbon path of photosynthesis, glyoxalate cycle, growth hormones and regulatory phenomena, nitrogen fixation and assimilation. *Experimental work* to illustrate and amplify the lectures utilizes radioactive isotopes and a number of newer techniques.

### 41.102E Molecular Biology of Higher Organisms S2 L2T4

*Prerequisite: 41.102A.*

The organization of the genomes of higher organisms derived mainly from the application of recombinant DNA technology and related techniques. Methods used for the isolation, identification and characterization of eukaryotic genomes in terms of the organization of single-copy and repeated sequences and of coding and non-coding sequences and of several gene clusters, eg the α- and β-globin gene cluster. Mechanisms known to operate in the control of eukaryotic gene expression, both at the DNA level and at the level of RNA processing. Review of several specialized genetic systems in plants and animals such as mitochondria, chloroplasts and RNA and DNA tumour viruses. *Practical work* provides training in the use of sterile techniques and in working with polynucleotides under nuclease-free conditions, using basic techniques such as hybridization and DNA sequencing.

### 41.103 Biochemistry Honours

Advanced training in selected areas of biochemistry including a supervised research program of 500 hours minimum duration that places emphasis on the use of specialized techniques relevant to the research area. *A written thesis* on the research is required.

## Servicing Subjects

These are subjects taught within courses offered by other schools or departments in a different faculty.

For further information regarding the following subjects see the Faculty of Medicine Handbook.

### 80.112 Human Structure and Function II

In conjunction with School of Anatomy and School of Physiology and Pharmacology.

### 81.002 Chemistry and Biochemistry for Medical Students

# Biotechnology

## Undergraduate Study

### 42.101 Introduction to Biotechnology S2 L2T4

*Prerequisites: 2.121 & 2.131, or 2.141, 17.041, 10.011 or 10.001 or 10.021B & 10.021C.*

An introduction to biotechnology as a multidisciplinary subject, dealing with the application of biochemical systems or their products in industry. Industrial uses include: production of single products (such as amino acids, vitamins, antibiotics etc), single cell protein, alternate fuels from renewable resources and fermented foods and beverages; biological waste treatment; aspects of pollution control; biodeterioration and biodegradation; and principles of enzyme technology. Concepts relevant to productivity in these systems, including: thermodynamic feasibility, techniques of environmental and genetic manipulation, choice of the appropriate biological catalyst(s) for a particular process, regulation of gene activity. The laboratory component emphasizes the manipulation of different classes of microorganisms and the use of biochemical products involved in a variety of biotechnological areas.

### 42.102A Biotechnology A S1 L2T4

*Prerequisites: 41.101 and 42.101 or 44.101 (Pass Conceded (PC) or Terminating Pass (TP) awarded prior to Session 2, 1983, is not acceptable).*

The basic principles involved in the operation of microbial processes on an industrial scale. Includes: the selection, maintenance and improvement of microorganisms; the influence of physical and chemical factors on the microbial environment; the control of environmental factors; the effects of operational patterns on batch and continuous flow cultivation; aeration and agitation; scale-up of microbial processes; air and media sterilization; the harvesting, purification and standardization of products; the principles involved in microbial processes for chemical, pharmaceutical and food production, microbial waste treatment and environmental control. The laboratory component includes manipulation of micro-organisms, laboratory-scale fermenter operation, microbial enzyme isolation, visits to industrial fermentation plants and industrial seminars.

### 42.102B Biotechnology B S2 L2T4

*Prerequisite: 42.102A (Pass Conceded (PC) or Terminating Pass (TP) awarded prior to Session 2, 1983, is not acceptable).*

Application of principles of biotechnology to the analysis and design of microbial processes of industrial relevance (antibiotics, microbial enzymes, single cell protein from carbohydrates and hydrocarbons, fermented foods and beverages, amino acids and vitamins, microbial polysaccharides, activated sludge and photosynthetic processes for waste treatment, microbial leaching of low-grade minerals). Emphasis on quantitative approach: mass and heat balance calculations, kinetic and thermodynamic analysis, detailed equipment design and specification, process design and layout, process simulation, plant location, application of optimization techniques. The economics of microbial processes are considered and comparison made with alternative modes of production or treatment. The economics of agro-industry in Australia using microbial processes. Marketing of fermentation products, clinical trials required, legal constraints, patent rights. Technical and economic feasibility studies, and a design project.

### 42.103 Biotechnology (Honours)

Advanced formal training in selected areas of biotechnology and participation in one of the school's research projects.

### 42.114 Fermentation Processes

Factors governing the use of micro-organisms in industrial processes, including the selection, maintenance and improvement of micro-organisms, the control of environmental factors, batch and continuous flow operational patterns, product recovery, process optimization and waste disposal. Demonstrations of the operation and control of fermenter systems and of microbial process simulation.

## Graduate Study

### 42.104G Graduate Seminars

### 42.111G Reading List in Biotechnology (Microbiology)

### 42.112G Reading List in Biotechnology (Biochemistry)

### 42.211G Principles of Biology SS L3

A study of the characteristics of living systems, including a functional treatment of cytology, metabolism, bioenergetics; structure, function and characteristics of single and multicellular systems; growth; cell division; reproduction; heredity and evolution.

### 42.212G Principles of Biochemistry — SS L3

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.

### 42.213G Biochemical Methods — SS T3

A laboratory program in practical biochemistry. The basic instrumentation and methodology of the biochemist will be introduced by practical exercises and demonstrations. A comprehensive treatment of the relevance and applicability of biochemical techniques is covered in tutorials.

### 42.214G Biotechnology — SS L2T1

The selection, maintenance and genetics of industrial organisms; metabolic control of microbial synthesis; fermentation kinetics and models of growth; batch and continuous culture; problems of scale-up and fermenter design; control of the microbial environment; computer/fermentor interactions. Industrial examples will be selected from: antibiotic and enzyme production, alcoholic beverages, single cell protein (SCP), microbial waste disposal and bacterial leaching. *Tutorial/practical sessions* include: problem solving, instrumentation, continuous culture techniques, and mathematical modelling and simulation of industrial processes.

### 42.215G Practical Biotechnology — F T7

Illustration, demonstration and operation of laboratory-scale and pilot-scale equipment. Visits to appropriate industries. Experimental project or critical review.

### 42.301G Microorganism Productivity — SS L2T3

Mechanisms of metabolic control: induction, repression and forms of activation and inhibition; microbial genetics; mutation, selection, genetic transfer and manipulation; environmental parameters; oxygen tension, pH, temperature, energy source etc. as are relevant to productivity in industrially important microorganisms.

Detailed studies: choice of substrate, screening and isolation of microorganisms, systematic application of techniques of genetic and physiological manipulation required to optimize product formation (products include for example, amino acids, nucleotides, enzymes and other macromolecules, antibiotics and other physiologically active compounds), potential strain improvement of micro-organisms involved in other industrial processes (for example, mineral leaching, single cell protein production, detoxification and waste disposal).

Laboratory component includes current techniques of micro-organism isolation and maintenance, genetic manipulation and physiological manipulation.

### 42.302G Enzyme Technology — SS L2T3

Enzymes in vivo; properties; roles; sources; optimization of enzyme concentration, for example by nutritional control, environmental control and by genetic manipulation. Isolation of enzymes: methods of extraction and purification; stabilizing safeguards; assay procedures; kinetics of isolated enzymes. Immobilization of enzymes: entrapment in insoluble matrices; adsorption on high molecular weight inert carriers; ionic binding to ion-exchange materials; covalent enzyme-enzyme linkage via a low molecular weight bifunctional reagent; covalent linkage to a high molecular weight support; changes in kinetic parameters and stability after immobilization; advantages and disadvantages of immobilization. Enzyme Reactor Engineering: design of batch and continuous systems, including open and closed plug flow and stirred reactors; comparison of kinetics in various designs; scale-up. Enzyme application: analysis; fabric, food and biochemical industries; medical treatment; medical diagnosis. Occupational hazards: allergic responses to enzymes; infection from pathological samples.

Methods of isolation, immobilization and application of enzymes for analytical, industrial and medical purposes will be illustrated by laboratory exercises and short projects. Practical comparison of various reactor designs will also be made.

### 42.303G Biochemical Process Control — SS L2T3

Biochemical reactors: range of basic designs; range of biocatalysts, from microbial conglomerates to free enzymes; heat and mass transfer; design; scale-up; sterility; kinetics; economic considerations. Techniques for efficient operation and control of batch, single-stage continuous and multi-stage continuous processes.

Use of computers: aids to understanding the effects of operating variables for process optimization and control. Detailed examples: microbial processes such as production of antibiotics, organic acids, amino acids and enzymes; enzymic processes.

Practical illustration of: sample processes such as yeast and antibiotic production; mathematical simulation by analog computation; computer control of biochemical processes.

### 42.304G Biodeterioration and Biodegradation — SS L2T3

Basic mechanisms of biodeterioration and biodegradation; direct and indirect attack mechanisms; co-metabolism and mixed population phenomena; factors controlling rates of degradation and recalcitrance of materials to biological attack; biological accelerators.

Detailed treatment of: biological corrosion of metals and alloys: biodeterioration of fuels, petrochemical products, synthetic materials, timber and cellulosic products, building materials etc.; degradation of rocks and minerals; biological leaching of ores and mineral processing residues.

The laboratory component includes assessment of biodegradability of common industrial materials (detergents, surface coatings, fuels, biocides etc); evaluation of protective methods; determination of biological leachability of minerals and mineral processing residues.

### 42.305G Case Studies — SS L0T2

Critical evaluation of industrial processes and research and development procedures. Includes: study of isolated and selected areas of biotechnology, detailed study and evaluation of all aspects of an industrial process from the isolation of the appropriate organism or other biological starting material to the production and use of the final products, critical evaluation of techniques arising from current research and development programs.

### 42.306G Project — F L0T7

An experimental or technical investigation or design project in the general field of biotechnology.

### 42.999G Alternative Higher Degree Qualifying Program

Training similar in content and standard to 42.103 Biotechnology (Honours), but designed specifically for students who cannot regularly attend the University.

# Botany

## Undergraduate Study

### 43.101 Introductory Genetics — S2 L2T4

*Prerequisites: 17.031 and 17.041 (see Note).*

*Note: Students with percentile range 61-100 in HSC Examination 4 unit Science with Biology, or 2 unit Biology may apply to enrol in 43.101, 45.201 or 45.301 in lieu of 17.041 after completion of 17.031. Students are selected by the Head of School for enrolment in these units. If successful, students will have met the prerequisite requirement of 17.041 Biology B for all units.*

*Students should consult lecturers before purchasing textbooks.*

Various aspects of molecular, organismal and population genetics, including: mechanisms of recombination and mapping in higher organisms; recombination and mapping in microorganisms; mutagens, structural and gene mutations, molecular structure of the gene, biochemical genetics, control of gene expression, genetic interaction, gene pools and gene frequencies, genetics and disease, genetic engineering.

### 43.102 Microbial Genetics — S1 L2T4

*Prerequisite: 43.101.*

A detailed study of the mutational basis of microbial variation. Mutagens; mechanisms of mutagenesis; induction, enrichment, isolation and characterization of mutants; mechanisms of repair of mutational damage. Systems of gene transfer and recombination in fungi, bacteria and bacterial viruses; the use of these systems in constructing genetic maps, and as tools for probing aspects of microbial physiology and biochemistry. Genetic control of gene expression; the operon concept and its application to specific regulatory systems. Genetic code, collinearity between a gene and its product, genes within genes, suppression of mutations. Restriction and modification of DNA; genetic engineering — its implications and prospects. Genetics of nitrogen fixation.

### 43.111 Flowering Plants — S1 L2T4

*Prerequisites: 17.031 & 17.041.*

Plant cell structure, structure and functions of the major organs in Angiosperms (flowers, roots, stems and leaves), secondary thickening and arborescence, transport systems in plants, seeds and germination. Variation in structure and function in relation to environment. Introduction to taxonomy and identification of major Australian plant families. A weekend field excursion is part of the subject.

### 43.131 Fungi and Man — S1 L2T4

*Prerequisites: 17.031 & 17.041.*

An introduction to the biology and taxonomy of fungi followed by a study of their economic importance to man. Includes: fungi as pathogens of plants and animals; use of fungi as food and in the production of useful chemical products; medical uses of fungi, including drugs and hallucinogens; degradation of organic matter, particularly in soils and of timber; interaction of fungi with other organisms; chemical control of fungi.

### 43.112 Taxonomy and Systematics — S2 L2T4

*Prerequisite: 43.111. Co-requisite: 43.101.*

This unit alternates each year with 43.162 The Plant Kingdom. 43.112 is given in 1984. If both units are to be included in three-year pass degree program, one should be completed in Year 2.

This unit may be taken in either Year 2 or Year 3 of the Science and Mathematics Course provided that prerequisites have been completed.

The assessment, analysis and presentation of data for classifying organisms both at the specific and supra-specific level.

### 43.122 Plant Physiology — S2 L2T4

*Prerequisites: 17.041, 12.031, 2.121 and 2.131, or 2.141.*

This unit may be taken in either Year 2 or Year 3 of the Science and Mathematics Course provided that prerequisites have been completed.

The study of how plants work at all levels from the cell to the whole plant. Includes: photosynthesis, respiration, transport, inorganic nutrition, plant growth substances, germination, growth, development, and flowering. Important practical applications of plant physiology are also considered.

### 43.132 Mycology and Plant Pathology — S2 L2T4

*Prerequisite: 43.131.*

This unit may be taken in either Year 2 or Year 3 of the Science and Mathematics Course provided that prerequisites have been completed.

A detailed study of the fungi, including both saprophytic and plant pathogenic species. Includes: hyphal structure and ultrastructure; morphology and taxonomy of members of major taxonomic groups; spore liberation, dispersal, deposition, germination, infection and the establishment of a host-pathogen relationship; morphogenesis of vegetative and fruiting structures; cytology, genetics; ecological considerations of fungi in specialized habitats, survival mechanisms and methods of control of plant pathogens.

### 43.142 Environmental Botany — S1 L2T4

*Prerequisites: 17.031 & 17.041.*

This unit may be taken in either Year 2 or Year 3 of the Science and Mathematics Course provided that prerequisites have been completed.

The soil and atmospheric environments in which plants live and a study of the interaction of plants with their environment. Energy and mass transfer. Emphasis is placed on the role of environmental science in food production. Students are required to attend one week-day field excursion as part of the practical course.

### 43.152 Plant Community Ecology S2 L2T4

*Prerequisites: 43.111 and 17.041 or 27.111.*

This unit may be taken in either Year 2 or Year 3 of the Science and Mathematics Course provided that prerequisites have been completed.

Recognition and delimitation of plant communities. Ecology of selected Australian vegetation types. Use of numerical methods and application of community concepts to palaeoecology. Field work an integral part of this course.

### 43.162 The Plant Kingdom S2 L2T4

*Prerequisite: 43.111.*

This unit alternates each year with 43.112 Taxonomy and Systematics. 43.112 is given in 1984. If both units are to be included in three-year pass degree program, one should be completed in Year 2.

This unit may be taken in either Year 2 or Year 3 of the Science and Mathematics Course provided that prerequisites have been completed.

The major taxa of the Plant Kingdom with emphasis on the green plants. The evolution of basic vegetative structures, reproductive structures and genetic systems are studied. Field work part of the course.

### 43.172 Phycology and Marine Botany S2 L2T4

*Prerequisite: 43.111.*

This unit may be taken in either Year 2 or Year 3 of the Science and Mathematics Course provided that prerequisites have been completed.

The biology of freshwater, marine and soil algae with particular emphasis on the marine flora of SE Australia. Field work is part of the course.

### 43.192 Ultrastructure S2 L2T4

*Prerequisites: 17.031, 17.041. Excluded: 43.182.*

This unit may be taken in either Year 2 or Year 3 of the Science and Mathematics Course provided that prerequisites have been completed.

The impact of the study of ultrastructure in biological research and teaches techniques currently used in ultrastructural research. While covering the ultrastructure of prokaryotes and of eukaryote cells and organelles, emphasis also on areas where ultrastructural research is at present making an important contribution to understanding how cells work: for example, motility, secretion, control of cell wall deposition, transport and cell communication. *Practical work:* students use transmission and scanning electron microscopes to investigate material they themselves prepare, using negative staining, ultramicrotomy and freeze-fracture; also includes optical systems in light microscopy, principles and practice of fixation and embedding tissues for light and electron microscopy; histochemistry and techniques of enzyme localization.

## Servicing Subjects

### 43.202 Plant Structure and Function S1 L2T3

How green plants function. What is known about how plants grow. Specific topics include: what happens in a plant meristem, hormone interactions and growth, transport systems in plants, water uptake and use, mineral nutrition, the role of light and leaves in photosynthesis, control of flowering process, germination and senescence. Emphasis is on the interaction between plant structure and function.

## Graduate Study

## Servicing Subject

This is a subject taught within courses offered by other schools or departments in a different faculty.

**For further information regarding the following subject see the Faculty of Architecture Handbook.**

### 43.211G Botany and Ecology

Plant anatomy and cytology — growth and reproduction — photosynthesis, transpiration and water relations. Principles of plant classification and the use of a flora. Principal soil types, chemical and physical properties, soil profiles. Composition of selected plant communities in relation to their environment. Plant succession and climax communities with special reference to Australian conditions.

# Microbiology

## Undergraduate Study

## Level II Units

### 44.101 Introductory Microbiology S1 L2T4

*Prerequisites: 17.031 & 17.041.*

The general nature, occurrence and importance of microorganisms. A systematic review of the major groups of microorganisms; the eucaryotic protista (micro-algae, protozoa and fungi); procaryotic protista (blue-green alfae, "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.

### 44.121 Microbiology I — S2 L2T4

*Prerequisites: 44.101 & 41.101 or 2.003J.*

The balanced structure of this unit makes it suitable for students majoring in microbiology and also for students who wish to enlarge their knowledge and skills in microbiology beyond those obtained in 44.101 Introductory Microbiology or equivalent units at other institutions.

The classification and function of bacteria. Differentiation of major families and genera of bacteria. Measurement models and theory of microbial growth. Comparative aspects of microbial growth. Bacterial nutrition and biosynthetic pathways. Microbial survival. Theory and practice of sterilization. Introduction to applied aspects of microbiology especially medical microbiology and the role of bacteria in ecosystems.

## Level III Units

### 44.102 General Microbiology — S1 L4T8

*Prerequisites: 44.101, 44.121 (Pass Conceded (PC) awarded prior to Session 2, 1983, is not acceptable), 41.101.*

Systems for the isolation, identification and taxonomic description of microorganisms; fine structure, cyto-chemistry, genetics of bacteria and viruses; metabolic requirements of microorganisms; microorganisms and their environment, growth, inhibition and death; energy-yielding and biosynthesizing systems; geotypic and phenotypic control systems.

### 44.112 Applied Microbiology — S2 L4T8

*Prerequisite: 44.102.*

Endeavours to relate the basic facts about microorganisms to a variety of practical conditions. The occurrence, importance, activity and control of microorganisms in soil, air, water and in their relationship with higher organisms (other than man), their industrial applications including manufacture, preservation and spoilage of food and dairy products. The nature of bacterial and fungal diseases of man, their cultural and serological diagnosis, epidemiology, treatment and prevention will be discussed in some detail.

### 44.122 Immunology — S2 L2T4

*Prerequisites: 17.031 & 17.041, 41.101.*

Basic immunology and immunological techniques. The interdisciplinary nature of the subject makes this unit suitable for students taking any major sequence in biological science and also for higher degree students who require a background training in immunology. The course includes phylogeny and ontogeny of the immune response; antigen and antibody structure, antigen-antibody reaction, immunochemistry; immunogenetics, clinical immunology; transplantation.

### 44.132 Virology — S2 L2T4

*Prerequisite: 44.102.*

The structure, replication and behaviour of animal, plant and bacterial viruses; applications of virological techniques; virus diseases of animals and plants, their epidemiology and control.

## Level IV Units

### 44.103 Microbiology Honours — F

Advanced training in selected ares of microbiology, **1.** a formal component consisting of seminars, tutorials, introductory electron microscopy and written assignments, **2.** a supervised research program in a specific area of microbiology or immunology.

## Servicing Subjects

These are subjects taught within courses offered by other schools or departments in a different faculty.

**For further information regarding the following subject see the Faculty of Applied Science Handbook.**

### 44.143 Microbiology AS — S1 L4T6

*Prerequisites: 17.031 and 17.041.*

The history, general nature, occurrence and importance of microorganisms. General features of procaryotic and eucaryotic protista. Basic microbiological methodology; bacterial anatomy and cytology; cell walls, flagella pili, nucleus, inclusions, capsules, endospores. Microbial growth; methods of measuring; growth curves; batch, continuous and synchronous cultures. Microbial nutrition and metabolism; autotrophs and heterotrophs; photosynthesis, fermentation and respiration; biosynthesis. Bacterial genetics: adaptation, mutation and mutagens; conjugation; plasmids and drug resistance factors; genetic engineering concepts. Bacterial virology; lytic phages, lysogeny, transduction, phage typing. Bacterial taxonomy, ecology and diversity, basic principles and review of the major bacterial genera and groups. Yeasts and fungi; general ecology, morphology and modes of reproduction; mycotoxins. Immunology and serology: antigens, antibodies and their interactions; applications to identification. Medical microbiology; microbes as pathogens. Applied microbiology. Microbiology of soils and waters, nitrogen fixation, industrial fermentations, alcoholic beverages, single cell protein, food microbiology.

**For further information regarding the following subject see the Faculty of Medicine Handbook.**

### 80.311 Paraclinical Science

In conjunction with School of Pathology and School of Physiology and Pharmacology.

## Graduate Study

### 44.999G Alternative Higher Degree Qualifying Program

Similar in standard to 44.103 Microbiology Honours, but designed for students who cannot regularly attend the University.

# Zoology

Students are not admitted to Level III Zoology units, without special permission of the Head of School, unless Chemisty 2.001 or 2.121 and 2.131, or 2.141, has been completed.

## Undergraduate Study

### 45.101 Biometry — S2 L2T4

*Prerequisites: 17.031 & 17.041. Excluded: 10.311A, 10.321A, 10.331.*

Statistical methods and their application to biological data, including introduction to probability; the binomial, poisson, normal distributions; student's t, $\chi^2$ and variance ratio tests of significance based on the above distributions, the analysis of variance of orthogonal and some non-orthogonal designs; linear regression and correlation. Non-linear and multiple regression. Introductory factorial analysis. Introduction to experimental design. Non-parametric statistics, including tests based on $\chi^2$, the Kruskal-Wallis test, Fisher's exact probability test and rank correlation methods. Introduction to programming in BASIC.

### 45.112 Marine Ecology — S1 L2T4

*Prerequisites: 17.031 & 17.041, 45.201 or 25.022 or 2.002D.*

A study of the ecology of marine organisms with particular reference to the physical, chemical and biological environment in which they occur. Both field and laboratory practical work are included.

Students intending to enrol in this unit should register with the School of Zoology by 14 January for the February field trip.

### 45.121 Evolutionary Theory — S1 L3T3

*Prerequisites: 17.031 & 17.041.*

Current evolutionary theory, emphasizing the population level. Ecological genetics, evolutionary aspects of ecological niche theory, speciation, evolution of social behaviour, molecular evolution and general evolutionary genetics. Some background in genetics is desirable.

### 45.122 Animal Behaviour — S2 L2T4

*Prerequisites: 45.101 and (45.201 or 45.301).*

An introduction to Ethology, the biological study of behaviour. Physiological, ecological, developmental and evolutionary aspects of behaviour are examined as important elements in the analysis of behaviour, particularly social behaviour. Both field and laboratory work are included.

### 45.132 Ecological Physiology — S2 L2T4

*Prerequisites: 45.201 or 45.301.*

A study of physiological adaptation to habitat in animals. The problems imposed by the basic physiological characteristics of major animal groups under different environmental conditions are examined, especially osmotic and ionic regulation, oxygen availability, metabolism and temperature regulation/acclimation. Particular attention is given to Australian fauna and conditions.

### 45.142 Comparative Physiology — S2 L2T4

*Prerequisite: 45.201 or 45.301.*

Basic physiology of nerves, muscles, sensory perception, blood circulation, respiration, gastrointestinal tract, kidneys and hormones. Physiology of reproduction. The control of organ systems and body functions.

### 45.152 Population and Community Ecology — S1 L2T4

*Prerequisites: 17.041 & 10.001 or 10.011.*

Examination of the dynamics of one, two or more interacting populations. Systems analysis and simulation in ecology. Theoretical and mathematical analysis of the dynamics and stability of ecosystems. Topics in the optimal management of renewable resources. Unifying concepts in ecology.

### 45.201 Invertebrate Zoology — S2 L2T4

*Prerequisites: 17.031 & 17.041.*

A comparative study of the major invertebrate phyla with emphasis on morphology, systematics and phylogeny. Practical work to illustrate the lecture course. Obligatory field camp.

### 45.301 Vertebrate Zoology — S1 L2T4

*Prerequisites: 17.031 & 17.021 (or 17.041).*

A comparative study of the Chordata, with particular reference to the vertebrates, including morphology, systematics, evolution and natural history, with reference to selected aspects of physiology and reproduction. Practical work to supplement the lecture course. Field excursions as arranged.

### 45.302 Vertebrate Zoogeography an Evolution — S2 L2T4

*Prerequisite: 45.301.*

A geographic approach to the current distribution, abundance and types of vertebrate species in the Australian region. Particular emphasis is placed on the basic principles of speciation, the history of the Australian continent, vertebrate adaptations and changes in the distribution and abundance of the Australian vertebrate fauna under the influence of man. Field excursions as arranged.

### 45.402 Insects — S1 L2T4

*Prerequisites: 17.031 & 17.041.*

A comparative study of the internal anatomy and external morphology, physiology and behaviour of insects. A collection of insects is to be made. Practical work to illustrate the lectures. Field excursions as arranged.

Students intending to enrol in this unit should register with the School of Zoology by 14 January for the February field trip.

### 45.422 Economic Zoology — S1 L2T4

*Prerequisite: 45.201 or 45.402.*

A study of the biology, ecology and control of vertebrate and invertebrate animals which harm man and his possessions. Human and domestic animal parasitology, pests on plants, diseases caused or spread by animals, chemical, biological and physical control, and side effects.

### 45.432 Project — S2 L2T4

*Prerequisite: 45.402 or 45.201.*

Not offered in 1984.

Selected aspects of insect physiology, ecology and toxicology. Treatment of topics in depth rather than breadth. Practical work illustrates the lectures and places emphasis on design and planning of experiments.

## Graduate Study

### 45.900G Ecological Studies In Arid Lands Management — S2 L2T4

*Prerequisite: Degree with background in bioscience of equivalent.*

Techniques in ecological studies of animal communities. Adaptations to an arid environment — environmental and social determinants. Behaviour, diet and condition of native and feral animals. Competition between native and introduced herbivores. Strategies in the management of arid zone wildlife. Concurrent studies in relevant units in the School of Botany are prescribed to cover aspects of vegetation description and plant/environment interactions.

# Chemical Engineering and Industrial Chemistry

## Undergraduate Study

### 48.023 Chemical Engineering Science I — S1 L3T2 S2 L2½T2½

*Prerequisites: 1.001, 10.001.*

*Flow of Fluids:* Introduction and units. Definitions and properties. Statics pressure distribution and measurements. Dynamics. Euler and Bernouilli equations. Momentum equations. Laminar and turbulent flow. Steady flow in pipes and equipment. Pressure losses. Flow metering. Elementary boundary layer theory. Boundary layers in pipes and on flat plates. *Dimensions and Dimensional Analysis:* Units and measures. Conversions of units and equations. Dimensions and Dimensional Analysis. Basic principles of modelling. *Heat Transfer I:* Introduction to steady state heat transfer including conduction, convection, radiation, boiling and condensation with an emphasis on problem solving. Resistance concept in heat transfer with series and parallel combinations. *Pumps and Pumping:* Types of piping and fittings. Blow cases. Air lift pumps. Reciprocating pumps, centrifugal pumps and gear pumps. Blowers and compressors. *Material Balances:* A revision and extension of material balance calculations with more complex examples, including those arising from stagewise operation of extraction equipment. Graphical solution of multi-stage calculations. *Computations I:* A review of the fundamentals of FORTRAN, with extension to formating, dimensioned variables and subroutines. Application to the solution of selected problems involving heat and mass balances, fluid flow and pumping.

### 48.024 Chemical Engineering Principles I — S1 L2T1 S2 L1T1

*Prerequisites: 1.001, 10.001.*

The following topics, from 48.023: Flow of Fluids, Heat Transfer I, Dimensions.

### 48.037 Chemical Engineering Science II — F L5T2

*Prerequisites: 2.002A, 48.023.*

*Mass Transfer (Theory):* Molecular diffusion in gases, liquids and solids and the measurement and calculation of diffusion coefficients. Diffusion at an interface — one component unidirectional diffusion and equimole counterdiffusion under steady state conditions. Mass transfer coefficients. Estimation and application of chemical and phase equilibria. Stage calculations applied to liquid/liquid, vapour/liquid and other mass transfer operations. The two film theory and the transfer unit concept in gas/liquid, vapour/liquid, and other operations. *Heat Transfer II (Theory):* An extension of the work covered in Heat Transfer I, with an emphasis on the fundamentals of convection and condensation; unsteady state conduction; introduction to heat exchanger design. *Surface Separation Processes:* Principles of membrane processes, reverse osmosis ultrafiltration dialysis and electrodialysis. Design calculations for batch and continuous operation of reverse osmosis and ultrafiltration equipment. Principles of sorption processes such as adsorption on exchange and molecular sieves. Design of fixed bed sorption equipment. Principles and design of the surface separation processes such as foam and bubble fractionation. *Fluid-particle Systems:* Interaction between particles and fluids; drag, terminal velocity, sedimentation. Flow through porous media; pressure gradient, filtration, fluidization, dispersion; multiphase flow, irrigated packed columns. *Reactor Engineering:* Introduction to reactor design: ideal batch, steady state mixed flow; steady state plug flow, size comparisons of ideal reactors, optimization of operating conditions. Multiple reactor systems: reactors in series and parallel, mixed flow reactors of different sizes in series, recycle reactor, autocatalytic reactions. Multiple reactions: reactor design for reactions in parallel and reactions in series, series-parallel reactions. Temperature effects: heat of reaction, equilibrium constants, optimum temperature progression, adiabatic and non-adiabatic operation, product distribution and temperature. *Kinetics of Rate Processes:* Basic concepts: rate laws, correlation with driving force, linear and non-linear systems, lumped and distributed parameter systems. Experimental measurement and correlation of process rates. *Thermodynamics:* Review of first law of thermodynamics: thermochemistry; second law of thermodynamics. Auxiliary functions and conditions of equilibrium. Thermodynamic properties of fluids; thermodynamic properties of homogenous mixtures. Chemical reaction equilibria: calculation of

equilibrium compositions for single reactions. Phase equilibria: the phase rule, equilibrium. *Computations II: Digital Computation:* Introduction to Cyber control language, use of files, efficient FORTRAN programming methods. Numerical methods for solving algebraic equations, and other computer techniques. Application to the analysis and solution of selected chemical engineering problems. *Analogue computation:* An introduction to the theory and programming of analogue computers, with application to the solution of differential equations and the simulation of dynamic systems.

**48.038 Chemical Engineering Principles II** **S1 L3T1 S2 L1T1**

*Prerequisite: 48.024.*

The following topics, from 48.037; Mass Transfer (Theory), Heat Transfer II (Theory), Fluid-particle Systems, Surface Separation Processes.

# Philosophy

## Undergraduate Study

*First Enrolment in Philosophy*

There are two Level I subjects:
52.103 Introductory Philosophy A (Session 1)
52.104 Introductory Philosophy B (Session 2)

Each of these has 1-unit value. They can be taken separately, but students normally enrol in both. However, a student can gain Upper Level status in Philosophy (qualify to enrol in Upper Level subjects) by passing in only one.

*Level II*

Students may not proceed to Level II work in Philosophy in their first year of study. Students in later years may proceed to Level II work after passing one Level I unit in either session.

At Level II a wide range of *half-units* and *two full units* are offered, some dealing with particular philosophical topics and others capable of being taken in sequence to give more sustained treatments of larger areas. Students may select freely among these, subject to stipulations regarding prerequisites.

In certain circumstances the prerequisites specified for units or half-units may be waived; for example, in the case of students who have already studied similar material, or who wish to take isolated units or half-units relevant to another discipline. Students who feel they have a case for a concession of this kind should consult the School.

A maximum of three units (six half-units) at Level II may be taken as part of the Science course, exclusive of General Studies. Additional units may, with permission, be substituted for a part of the General Studies requirement, in accordance with the provisions laid down in the General Studies Handbook.

*Selection of Units*

Although students at Level II have a wide choice of units, they are advised to plan a sequence of mutually relevant ones, taking into account the prerequisites of those they may wish to take later. Tabulated information and School recommendations are available at the School, and students needing assistance are encouraged to consult the School personally.

**52.103 Introductory Philosophy A** **S1 L3T1**

*Prerequisites: Nil.*

The general topic of Persons, with reference to some at least of the following: Plato's arguments for the immortality of the soul; Freud's theory of mental processes; Sartre's account of human existence; and the problem of personal identity.

*Assessment:* Weekly exercises, tutorial work, and on each section of the work either a one-hour or a take-home examination.

**52.104 Introductory Philosophy B** **S2 L23T1**

*Prerequisites: Nil.*

Topics include: issues in ethics and political philosophy; the nature of religion and religious belief; deduction in modern formal logic and related problems of the ambiguity of natural languages.

*Assessment:* Weekly exercises, tutorial work, and on each section of the work a one-hour examination.

**52.219 Philosophical Foundations of Marx's Thought** **S1 L3T0**

*Prerequisite: Upper Level status in Philosophy. Excluded 52.373.*

A discussion of the basics of Marx's historical materialism and dialectical materialism.

*Assessment:* Exercises and essays.

**52.2010 Reasoning Skills** **S1 or S2 L2T0**

*Prerequisite: Any Level I subject. Excluded: 52.233.*

Reasoning skills in which practical arguments are examined in classroom exercises; lectures on practical argument in the courtroom, politics and everyday life as compared with arguments in mathematics and theoretical science.

*Assessment:* Exercises, essay and class examination.

**52.2020 Descartes** **S1 L2T0**

*Prerequisite: Upper Level status in Philosophy. Excluded: 52.163.*

The main issues raised in the philosophy of Descartes and their importance for the development of modern philosophy. Emphasis is on the *cogito ergo sum* argument, the Cartesian method and the search for rational certainty, his theory of ideas, the body-mind problem.

*Assessment:* Exercises or essay and examination.

**52.2021 Spinoza and Leibniz** **S2 L2T0**

*Prerequisite: 52.163 or 52.2020. Excluded: 52.303.*

The main issues raised in the philosophy of the two great 17th century rationalists, with emphasis upon the development of their metaphysical systems in response to unresolved problems in the philosophy of Descartes and to contemporary scientific thinking. Their ethical views.

*Assessment:* Exercises or essay and examination.

**52.2030 Predicate Logic A** **S1 L2T0**

*Prerequisite: Any Level 1 subject. Excluded: 52.153, 52.162, 52.1531.*

A system of natural deduction is presented for the first order predicate calculus, including identity and definite descriptions. Emphasis is upon construction of formal derivations, methods of showing the invalidity of formal arguments, and the evaluation of informal arguments by symbolization.

*Assessment:* Exercises.

**52.2031 Predicate Logic B** **S2 L2T0**

*Prerequisite: 52.1531 or 52.2030. Excluded: 52.153, 52.1532.*

A continuation of Predicate Logic A, including the theories of identity and of definite descriptions.

*Assessment:* Exercises.

**52.2040 Greek Philosophy: Thales to Plato** **S1 L2T0**

*Prerequisite: Upper Level status in Philosophy. Excluded: 52.183.*

The leading ideas of the Greek philosophers from Thales to Plato with special reference to the Pre-Socratics.

*Assessment:* To be decided in consultation with students.

**52.2050 Classical Political Philosophy** **S1 L2T0**

*Prerequisite: Upper Level status in Philosophy. Excluded: 52.182, 52.203.*

The basis of political society, its various functions and its relation to the individuals in it, investigated primarily through the works of Hobbes, Locke, Rousseau and Mill. Topics include the theory of a social contract, the establishment of political rights and obligations, and the relation of moral and political concerns within a political society.

*Assessment:* Essays and examination.

**52.2060 Sartre** **S1 L2T0**

*Prerequisite: Upper Level status in Philosophy. Excluded: 52.213.*

An examination of Sartre's account of freedom, relations between persons and his social theory.

*Assessment:* Essays and exercises.

**52.2130 British Empiricism** **S2 L2T0**

*Prerequisite: Upper Level status in Philosophy. Excluded 52.173.*

A survey of the empiricist tradition with special concentration on Locke and Berkeley.

*Assessment:* Exercises and essays or examination.

**52.2140 Scientific Method** **S1 L2T0**

*Prerequisite: Upper Level status in Philosophy. Excluded: 52.193.*

The nature of empirical knowledge as exemplified in the physical and social sciences, with emphasis on the concept of explanation, the nature of induction and scientific laws, and controversies over the nature of scientific knowledge.

*Assessment:* Exercises or essay and examination.

**52.2150 Philosophy of Law** **S2 L2T0**

*Prerequisite: Upper level status in Philosophy. Excluded: 52.105.*

Selected conceptual and normative issues in the philosophy of law, centring around the broad areas of law (eg, its nature, validity, bindingness, and relation to morality), liberty, justice, responsibility (including strict and vicarious liability), and punishment.

*Assessment:* Essays.

**52.2170 Hume** **S1 L2T0**

*Prerequisite: Upper Level status in Philosophy. Excluded: 52.152, 52.563.*

A study of Hume's epistemology, his discussion of arguments for the existence of God, free will and the basis of morals.

*Assessment:* Essay and exercises or examination.

**52.2220 Classical Greek Ethics** **S1 L2T0**

*Prerequisite: Upper Level status in Philosophy. Excluded: 52.523, 52.5231.*

A systematic investigation of the moral theories of Plato and Aristotle. Beginning with the immoral and subsequent amoral position of Thrasymachus and his question in Book 1 of *The Republic*, 'Why should I be just?', the subject investigates the ways in which Plato and Aristotle each set out the problems of the nature of morality and why a person should be moral, their approaches to the solutions of these problems, and their positive moral theories.

*Assessment:* Essays and examination.

**52.2230 Theories in Moral Philosophy** **S2 L2T0**

*Prerequisite: Upper Level status in Philosophy. Excluded: 52.523, 52.5232.*

Three moral theories central in the history and development of moral philosophy. Hume, Kant, and Mill offer differing kinds of moral theories, differing approaches to arriving at a moral theory, and specific theories which are markedly different from each other. Each moral theory in itself and in comparison with the other two theories examined.

*Assessment:* Essays and examination.

**52.2240 Philosophical Study of Woman** **S2 L2T0**

*Prerequisite: Upper Level status in Philosophy. Excluded: 52.283.*

A discussion of crucial structures involved in women's situation.

*Assessment:* Exercises and essays.

**52.2250 Plato's Theory of Forms** **S2 L2T0**

*Prerequisite: Upper Level status in Philosophy. Excluded: 52.483.*

A study of some dialogues of Plato, with special attention to Socratic definition and Plato's Theory of Forms.

*Assessment:* To be decided in consultation with students.

**52.2260 Aesthetics** **S2 L2T0**

*Prerequisite: Upper Level status in Philosophy. Excluded: 52.273.*

An examination of the central concepts, types of judgment and theories occurring in the field of aesthetics or theory of art.

*Assessment:* Exercises or essay and examination.

**52.2270 Social and Political Philosophy** **L2T0**

*Prerequisites: Upper Level status in Philosophy. Excluded: 52.513.*

Not offered in 1984.

Largely through contemporary writings, including a number of journal articles, investigation of, eg rights, freedom, law and legislation, responsibility, liability, coercion, punishment and justice.

*Assessment:* Essay.

**52.2330 Psychoanalysis — Freud and Lacan** **S2 L2T0**

*Prerequisite: Upper Level status in Philosophy. Excluded: 52.573.*

A discussion of psychoanalytic theory, particularly for what it shows about the relation between the individual and the social.

*Assessment:* Exercises and essays.

**52.2360 Theories, Values and Education** **S1 L2T0**

*Prerequisite: Upper Level status in Philosophy. Excluded: 52.583.*

The nature of theories of education, and the contributions to them of philosophy, psychology and sociology; values in education and the social sciences; the justification of an ordering of educational goals.

*Assessment:* Essay.

**52.2371 Plato's Later Dialogues** **S2 L2T0**

*Prerequisite: 52.483 or 52.2250 (or, by permission, a course covering similar material). Excluded: 52.293.*

Centred round some of Plato's later dialogues, the *Theaetetus* and *Sophist* in particular.

*Assessment:* To be decided in consultation with students.

**52.2411 History of Logic** **S1 L2T0**

*Prerequisite: 52.1531 or 52.2030. Excluded: 52.353, 52.393, 52.593.*

History of logic, especially the work of Aristotle, William of Sherwood and Frege.

*Assessment:* Exercises and essay.

**52.2980 Seminar A** **S2 L0T2**

*Excluded: 52.423.*

Admission by permission, based on a student's performance in Upper Level subjects. Topics vary and are influenced by student requests. Possible topics include: contemporary ethics; contemporary moral issues; logical atomism; Wittgenstein; theories of the emotions; issues in social and political philosophy.

*Assessment:* Essay.

**52.2990 Reading Option A** **S1 or S2**

*Excluded: 52.413.*

Admission by permission, to suitable students with good Passes in at least two subjects at Upper Level. A course of individually supervised reading and assignments on an approved topic not otherwise offered.

*Assessment:* Essay.

**52.3010 Seminar B** **S1 L0T2**

*Excluded: 52.433.*

As for 52.2980 Seminar A.

**52.3020 Seminar C** **S2 L0T2**

*Excluded: 52.443.*

As for 52.2980 Seminar A.

**52.3030 Reading Option B** **S1 or S2**

*Excluded: 52.453.*

As for 52.2990 Reading Option A.

# Sociology

## Graduate Study

**53.309G Social and Technological Forecasting** **F L2**

The nature of various contemporary approaches to the forecasting of social and technological change, and the use of forecasting in particular sectors of economic, social and technological activity. Examines a number of commonly held views about the future and their connection with theories about relations between science, technology and society.

# Education

## Undergraduate Study

### 58.702 Theory of Education I — S2 L1½

*Educational Psychology:* includes learning, cognition, individual differences and cognitive development; detailed classroom applications; experimental demonstration of phenomena where possible.

### 58.703 Theory of Education II — F L2½

*Prerequisite: 58.702.*

*Educational Psychology:* extension of the introductory studies of learning, cognition, individual differences and cognitive development with concentration upon child development; classroom applications emphasized and phenomena experimentally demonstrated where possible. *Philosophy of Education:* exploration of philosophical questions concerning teaching and learning with particular reference to the various subjects taught in schools; issues concerning the relationships between school subjects, a connection between knowledge and the development of mind, the value of school subjects in relation to other activites which could compose education and the social and ethical context of education. Focus on logical and epistemological questions which are internal to the various teaching subjects. Students are assigned to one of the following Philosophy of Education groups: Philosophical Issues in: Mathematics and Education; Literary Appreciation and Education; History and Education; Science and Education; Curriculum and Education; Language and Education; Social Sciences and Education; Industrial Arts Education. *Sociology of Education:* includes socialization, the family, the role of education in society, inequality of educational opportunity, multi-cultural education.

### 58.704 Theory of Education III — F L3

*Prerequisite: 58.703.*

*Sociology of Education:* Includes sociology of the school and classroom, deviance, knowledge and the curriculum, sexism, in schools, social trends and problems and their implications for education, technology work and lifelong learning. *Selected Studies in Education:* two education theory options to be selected from among a number available; some deal with the separate disciplines of philosophy, psychology, sociology, others may draw from more than one. In any given year the options offered depend on the staff available and on student demand. *Topics may include the following:* Computer assisted instruction, the talented child, learning disabilities, social trends and problems, sociology of the school and classroom, methodology for criticism, ethical theory and moral education, science and religion in education.

### 58.712 Teaching Practice I — F 10 days

A gradual introduction to teaching in the school situation.

### 58.713 Teaching Practice II — F 15 days

*Prerequisites: 58.712, 58.722 or 58.732 or 58.742 or 58.752 or 58.762. Co-requisites: 58.723 or 58.733 or 58.743 or 58.753 or 58.763.*

Extensive opportunities for students to develop teaching competence; each student is placed in a high school for 10 days and works in close association with a teacher.

### 58.714 Teaching Practice III — F 15 days

*Prerequisites: 58.713, 58.723 or 58.733 or 58.743 or 58.753. Co-requisites: 58.724 or 58.734 or 58.744 or 58.754 or 58.764.*

Provision for further opportunities for students to develop teaching competence; each student is placed in a high school for 20 days and works in close association with a teacher.

### 58.732 Science Curriculum and Instruction I — S1 L2T1 S2 L1

*Prerequisites: 1.001 or 1.011; 2.121, 2.131. Co-requisite: 58.702.*

Lesson planning, management in the science classroom, laboratory safety, legal aspects; introduction to audiovisual aids, demonstrations and practical work. *Communication and Microteaching:* techniques and problems of communication, development of teaching skills by peer-group microteaching. *Classroom Issues and Strategies:* topics include mixed ability groups, streaming, individual instruction, children with special needs (eg handicapped, talented, immigrant, Aboriginal children), language in learning, discipline and class control.

### 58.733 Science Curriculum and Instruction II — S1 T4 S2 L1T4

*Prerequisites: 17.031, 17.041, 25.110, 25.120; 58.702, 58.732. Co-requisite: 58.703.*

Methods of teaching and problems in learning science, the roles of teacher demonstrations and pupil practical work, preparation and use of audiovisual aids, the teaching of selected topics in biology, chemistry, geology and physics. Further development of teaching skills by peer-group microteaching may be undertaken. *Classroom Issues and Strategies:* aspects relating to classroom and community including the primary school, the teacher in the school community, teachers and parents, legal responsibilities and rights, transition, unemployment, leisure, support facilities.

### 58.734 Science Curriculum and Instruction III — S1 L1T4 S2 T3

*Prerequisites: 58.703, 58.713, 58.733.*

Examination of NSW secondary school science syllabuses, investigation of curriculum material suitable for use in teaching secondary school science, development of teaching resources, the professional development of the science teacher, the teaching of biology, chemistry, geology and physics. *Classroom Issues and Strategies:* aspects relating to assessment and measurement including test planning, standardized tests, marking and reporting, essay-type tests, scaling of test scores, uses and effects of assessment.

**58.742 Mathematics Curriculum and Instruction I** **S1 L3 S2 L1**

*Prerequisites: 10.001 or 10.011. Co-requisite: 58.702.*

Introduction to the application of educational studies to the teaching of the Mathematics curriculum in high schools, lesson planning and classroom management. *Communication and Microteaching:* techniques and problems of communication, development of teaching skills by peer-group microteaching. *Classroom Issues and Strategies:* includes mixed ability groups, streaming, individual instruction, children with special needs (eg handicapped, talented, immigrant, Aboriginal children), language in learning, discipline and class control.

**58.743 Mathematics Curriculum and Instruction II** **S1 L2 S2 L3**

*Prerequisites: 58.702, 58.742. Co-requisite: 58.703.*

A continuation of the application of educational studies to the teaching of the Mathematics curriculum in secondary schools; lesson preparation and presentation, classroom organization and management, introduction to special mathematics courses being used in secondary schools, eg elective and slow learner courses, preparation for 58.713 Teaching Practice II. Further development of teaching skills by peer-group micrpteaching may be undertaken. *Classroom Issues and Strategies:* aspects relating to classroom and community including the primary school, the teacher in the school community, teachers and parents, legal responsibilities and rights, transition, unemployment, leisure, support facilities.

**58.744 Mathematics Curriculum and Instruction III** **S1 L3 S2 L2**

*Prerequisites: 58.703, 58.713, 58.743.*

The teaching of senior secondary school mathematics syllabuses, curriculum development projects in mathematics and their application in NSW, critical analysis of learning problems of school students, investigation of practical remedies for such problems. The subject is designed to complement 58.714 Teaching Practice III, taken together these subjects provide a wide set of experiences which equip potential teachers to fit successfully into the NSW teaching environment. *Classroom Issues and Strategies:* aspects relating to assessment and measurement including test planning, standardized tests, marking and reporting, essay-type tests, scaling of test scores, uses and effects of assessment.

**58.793 Advanced Education I** **F 1CCH**

Students study *one* of the following segments: *Philosophy of Education segment:* some connected issues in social and political philosohpy, and their implications for educational theory and practice. Includes: freedom, compulsion and the aims of education; neutrality of education systems, schools, teachers and courses; and justice and equality. *Educational Psychology segment:* introduction to selected aspects of on-going research activities in educational psychology. The area is selected following discussions with staff members. *Sociology of Education segment:* more detailed and extensive examination of central topics studied in the pass strand. Consideration of selected issues to do with social theory, the nature of the sociological enterprise and sociological methods.

**58.794 Advanced Education II** **F 1CCH**

Each student engages in twenty-eight hours of supervised study appropriate to his or her proposed research, as approved by the Head of School.

**58.795 Advanced Education III** **F 4CCH**

Enrolment is subject to approval by the Head of School.

In their full-time Honours year, all students enrol in four twenty-eight-hour units of study appropriate to their research, as approved by the Head of School.

**58.799 Thesis** **F**

# History and Philosophy of Science

## Undergraduate Study

Students undertaking subjects in History and Philosophy of Science are required to supplement the class contact hours by study in the Library.

## Level II/III

**62.012 The Origins of Modern Science** **S1 L2T1**

*Prerequisite: A pass in four Level I units from Table I.*

An introductory subject dealing with the Scientific Revolution of the 17th century, the philosophical issues being discussed in their historical context. It surveys the major achievements of science during the period, particularly the Copernican Revolution, the construction of dynamics from Galileo to Newton, and Harvey's physiology. The cultural and intellectual background of these achievements and their effects on European thought will be discussed.

**62.022 Materials Machines and Men** **S2 L2T1**

*Prerequisite: As for 62.012. Excluded: 26.564, 26.251.*

The rise of technology in its social and cultural context before, during and since the Industrial Revolution. This Revolution, which has been described as the most significant event in human history since the Agricultural Revolution of the New Stone Age, is examined in some detail, and concentrates on technology and its effects on human beings. Considers the professionalization of engineering, the spread of industrialization in Britain, in Europe and the USA, and examines the Second Industrial Revolution. Emphasis on the social and economic effects of the interactions of technology and society.

*Assessment:* Essays, tutorial papers and performance in class.

**Note:** This subject may be counted towards a major sequence in the School of History.

### 62.032 The Scientific Theory — S2 L2T1

*Prerequisite: As for 62.012.*

Not offered in 1984.

A critical examination of the scientific theory — its origins, nature and nurture. With particular reference to selected historical examples chosen from both the physical and biological sciences, a number of philosophically interesting problems relating to scientific theories are subjected to analysis. Topics include: the principles of theory construction; perception and observation; the structure of scientific revolutions; scientific explanation; the status of laws and theoretical terms; the 'existence' of theoretical entities; relationships between theory and observation; the functions of models; the principles of theory establishment and rejection.

*Assessment:* One essay (33⅓ percent); tests (33⅓ percent); tutorials (33⅓ percent).

### 62.033 Development of Theories of Matter — S1 L0T2

*Prerequisite: As for 62.012.*

Not offered in 1984.

The development of man's ideas about the nature of matter: 'the oldest conceptual tool in the Western speculative tradition'. A broad coverage from antiquity to the mid-20th century, though the emphasis is placed largely on ideas in the 19th and 20th centuries. The main areas of study are: Greek matter theory; the 'organic' theories of the Renaissance; the 'mechanical philosophy'; Newton, Leibniz and Boscovich; 18th century chemistry; Dalton's atomic theory and the 'atomic debates'; the establishment of the atomic weight scale; 19th century theories of bonding and structure; Faraday, Maxwell, Hertz, and the origins of field theory; radioactivity; Thomson and Rutherford; the Bohr theory of the atom, the wave/particle model, the uncertainty principle and associated controversies; anti-matter; electronic theories of valency.

A set of notes is distributed each week and the subject is conducted entirely by seminars.

*Assessment:* 2 essays (25 percent each); weekly seminars (50 percent).

### 62.052 Scientific Knowledge and Political Power — S1 L2T1

*Prerequisite: As for 62.012.*

An introduction to the political dimensions of 20th century science. Topics include: growth of expenditure on science in the 20th century; attempts to define the social function of science in the inter-war years; the radical scientists' movement of the 1930s — the freedom *versus* planning debate; science and politics in the Second World War; government patronage and political expectations in the post-war period; science and economic growth; the science-technology relationship; the rejection of *laissez-faire* in the 1960s; approaches to science policy; critiques of the role of science in contemporary society; scientists as experts; the question of social responsibility in science.

*Assessment:* Essays (50 percent); tutorials (50 percent).

### 62.062 The Social System of Science — S2 L2T1

*Prerequisite: As for 62.012.*

An introduction to the social dimension of the practice of science. The production and application of scientific knowledge as an activity in constant interaction with its socio-economic, political and cultural environments. The principal features of this interaction in relation to each of the following aspects of scientific activity: the processes of research and discovery; the dissemination of research findings and their acceptance or rejection; the development or abandonment of accepted theories; and the technological applications of scientific knowledge.

### 62.072 Historical Origins of the American Scientific Estate — S1 L2T1

*Prerequisite: As for 62.012.*

The development of American scientific institutions and research from the early years of the Republic, when that country was a scientific backwater, to its present position of global dominance in terms of research resources. Questions about the historical roots of organized research in universities, industrial corporations and government organizations. The American case illustrates well the processes whereby the rapidly emerging scientific profession and its varied specialisms forged links between these sectors of society. Topics: the place of science in a young resource-rich democracy, the uses of science in Progressive ideology, and the war-born relationship of science, government and the military.

*Assessment:* 2 essays (60 percent); tutorial assessment (40 percent).

**Note:** This subject may be counted towards a major sequence in the School of History.

### 62.082 Science, Technology and Developing Countries — S1 L2T1

*Prerequisite: As for 62.012.*

The disparities between the scientific and technical capabilities of industrialized and developing societies. The reasons for these disparities and their economic and social consequences. Aspects include: the problems of dependency; the product cycle and its impact on location of production; concepts of the 'learning curve'; aspects of technology choice; bargaining processes; transnational corporations and the 'truncation' of the industrial sector; efforts to define 'appropriate' technologies; modes of technology transfer; alternate models and policies for scientific and technological development; the role of traditional technology; the impact of modern technology on international relations. Issues: the consequences of modern science and technology for the role of the military in developing countries; food and population problems; energy use; environmental impacts; class structure, etc. The social role and function of scientific communities in less developed countries and the process of diffusion of science from the centre to the periphy and the evolution of national scientific communities and institutions are addressed through the use of case studies.

*Assessment:* Essay (50 percent); tutorials (50 percent).

### 62.103 The Discovery of Time — S1 L2T1

*Prerequisite: As for 62.012.*

The evolution of ideas concerning time and history, including the age and history of the earth, devoting particular attention to the period from the 17th century to the present. Consideration is given to such questions as philosophical and scientific problems about the nature of time, historiographical ideas, the authority of the scriptures, social theories, the concept of Nature, the rise of the Romantic Movement,

the growth of historical consciousness, relativity and displacement in time, the intention being to provide an understanding of the intellectual setting within which history and geological theories and philosophical, physical and speculative ideas about time developed.

*Assessment:* 2 essays (30 percent each); tutorials (20 percent); class tests (20 percent).

**Note:** This subject may be counted towards a major sequence in the School of History.

### 62.104 The Darwinian Revolution — S2 L1T1

*Prerequisite: As for 62.012.*

Scientific, philosophical, and social antecedents and consequences of Darwin's theory of evolution. The prevailing ideas in biology before Darwin in the context of the general climate of ideas in the 18th and early 19th centuries. Darwin's life and work in some detail, followed by a consideration of the work of Mendel and the establishment of the 'synthetic' theory of evolution. The impact of evolutionary ideas in such diverse fields of thought as religion, literature, music, political theory, epistemology, ethics, and the social and behavioural sciences.

*Assessment:* (2 hours) (30 percent); tutorial exercises (40 percent); essay (30 percent).

**Note:** This subject may be counted towards a major sequence in the School of History.

### 62.106 Mind, Mechanism and Life — S1 L2T1

*Prerequisite: As for 62.012. Excluded: 62.043.*

The development of scientific ideas concerning the nature of life, mind and behaviour. While the subject includes both a brief treatment of early ideas and reference to issues in contemporary biological and behavioural sciences, the main focus is on the period from the Proto-Scientific Revolution of the 16th century to the advent of the general purpose computer. Topics include: Vesalius and the School of Padua; the biological thought of William Harvey; machines and the mechanical philosophy; Cartesianism and the mechanization of biology; classical theories of the relationship between mind and body; neurophysiology from the 18th to the early 20th century; the mechanist-vitalist disputes; Wundt, Fechner and the rise of experimental psychology; the Freudian revolution; Pavlov and the conditioned reflex; behaviorism and its critics; mind, brain, life and the computer.

*Assessment:* Essay (33⅓ percent); tutorial assessment (33⅓ percent); tests (33⅓ percent).

**Note:** This subject may be counted towards a major sequence in the School of History.

### 62.109 The History of Medical Theory and Practice — S1 L2T1

*Prerequisite: As for 62.012. Excluded: 26.568, 26.2506, 62.043.*

Development of theory and practice in Western Medicine from the time of Hippocrates to the 20th century. Material covered in four sections: **1.** 'bedside' medicine from antiquity to the French Revolution; **2.** 'hospital' medicine in the early 19th century; **3.** 'laboratory' medicine in the late 19th century; and **4.** 'technological' medicine in the 20th century, with particular emphasis on the social role of modern medicine.

*Assessment:* Essays, tutorial work and short class tests.

**Note:** This subject may be counted towards a major sequence in the School of History.

### 62.551 The Arch of Knowledge: History of the Philosophy and Methodology of Science to 1800 — S1 L0T2

*Prerequisite: As for 62.012. Excluded: 62.013.*

The development of ideas concerning the nature and methods of the sciences from antiquity to 1800: Platonism and Aristotelianism; scholastic philosophy; the realist/nominalist debate; the Paduan school; Galileo and the mathematization of nature; Bacon and Baconianism; Descartes and Cartesianism; Newton and Newtonianism; Locke as an under-labourer in the Newtonian garden; criticisms of Newtonian science and Lockeian empiricist epistemology: Leibniz, Berkeley and Hume; French empiricism and philosophy of language: Condillac; Kant's Copernican Revolution and principles of Kantian philosophy.

A set of notes is distributed weekly and the subject is conducted by seminars.

*Assessment:* 2 essays (50 percent); 2 seminar presentations (50 percent).

### 62.552 Modern History of the Philosophy and Methodology of Science: 1800 to the Present — S2 L0T2

*Prerequisite: 62.551 or by permission of the Head of School. Excluded: 62.013.*

The development of ideas concerning the nature and methods of the sciences from 1800 to the present: Herschel, Mill and Whewell (British empiricism in conflict with Kantian transcendental philosophy); Comte, Mach and 19th century positivism; Peirce, James and pragmatism; Poincaré and conventionalism; Duhem and instrumentalism; Meyerson and realism; Frege, Russell and logicism; Wittgenstein and Hanson; Einstein and the new science; Bridgman and operationism; Eddington and selective subjectivism; the Vienna Circle and logical positivism; Carnap and positivist reductionism; Hesse and modellism; Popper and falsificationism; Lakatos and 'research programs'; Feyerabend and methodological anarchism; sociologists of knowledge.

A set of notes is distributed weekly and the subject is conducted by seminars.

*Assessment:* 2 essays (50 percent); 2 seminar presentations (50 percent).

### 62.553 The Social Construction of Scientific Knowledge — S2 L2T1

*Prerequisite: As for 62.012. Excluded: 62.083.*

The nature and extent of the influence that social conditions have upon the formation and acceptance of scientific knowledge. Topics include: Marxist theories of science and ideology; the 'strong program' for the sociology of scientific knowledge; 'field' theories and the analysis of 'disciplinary power' in science; and epistemological problems raised by commercial and governmental direction of science.

*Assessment:* Essays, tutorial work and short class tests.

### 62.554 Computers, Brains and Minds: Foundations of the Cognitive Sciences — S2 L2T1

*Prerequisite: As for 62.012.*

Introduction to contemporary discussions of the mind, thought, intelligence and consciousness. Focus on the issues which arise in connection with the so-called 'cognitive sciences' — the disciplines which include such fields as computer science, the various neurosciences, cognitive psychology, linguistics and the philosophy of mind. Stress on the recent revolutionary developments in the computer simulation of thought or 'artificial intelligence' and linguistics, since both these areas shed new light on traditional questions concerning the mind. Questions are: Can computers think? and Is the brain a machine? Exploration of the theories, methods and philosophical issues which arise from the 'computational' or 'information processing approach' to the mind.

*Assessment:* Essay (40 percent); tests (30 percent); tutorials (30 percent).

## Level III

### 62.105 Research Methods in History and Philosophy of Science — F L0T2

*Prerequisite: Completion of three HPS units with an average grade of Credit or better, or by permission of the Head of School.*

A weekly seminar designed to prepare students to carry out Honours level research in HPS. The historiography of science, and its relations to philosophical and social studies of science, are analysed through discussion of texts representing predominant approaches to HPS during the last 30-40 years. In addition, bibliographical, editorial, and other research exercises are carried out.

*Assessment:* Essay, seminars and written exercises.

## Level IV Honours Programs

### 62.014 History and Philosophy of Science Honours

Candidates are required to undertake a suitable program of study, as determined by the Head of School. The program includes 62.105, Research Methods in History and Philosophy of Science (unless this has previously been completed). It also includes seminars in either Advanced Philosophy of Science or Advanced Social Studies of Science, the presentation of a thesis, and such other course work as is determined by the Head of School. Students wishing to undertake this program should contact the School of History and Philosophy of Science at the earliest opportunity.

### 62.024 Science Studies Honours

As for 62.014 History and Philosophy of Science Honours. The program 62.014 normally includes the seminar in Advanced Social Studies of Science.

# Graduate Study

### 62.701G Philosophy and Methodology of Science — S1 L2

An introduction to some current and fundamental problems in the philosophy of science and society; the nature of scientific debates and forms of argument; the function of 'scientific' images in the exploration and conquest of man and nature; scientific understanding and explanations in terms of models, analogies and laws of nature; problems of creativity and logic in the construction, establishment, acceptance and rejection of theories; the dynamics of scientific development and change; the concept of scientific revolutions.

### 62.709G The Scientific Community — S2 L2

The sociological analysis of the pure science community, which establishes the characteristics of this subgroup of society by examining its internal and external social relations. The *internal* relations refer to cognitive and behavioural factors within the community itself that promote or retard the advancement of science. The *external* relations refer to the political, ideological, economic and bureaucratic forces in society that shape and control the scientific community and the knowledge it produces.

### 62.710G Science, Philosophy, and Social Values — S1 L2

Exposition and appraisal of some of the classical ethical theories. Examination of the claims of science to be able to provide a basis for moral judgments. Attempted establishment of an ethical framework which may serve as a basis for decision making when problems of an ethical nature arise in science. Selected case studies, in which decisions as to the most appropriate form of action are evaluated in the light of the ethical framework previously established.

### 62.713G Project — F L1

Students are required to prepare a minor research dissertation under the supervision of a member of staff and to attend introductory seminars and occasional addresses by visiting speakers.

### 62.714G Knowledge, Power and Public Policy — S1 L2

The growth of government interest in science during the 20th century, issues, institutions and policies. The nature and consequences of government support for research. The debate over the 'planning' of science. The arguments in favour of 'science policy'.

Science policy placed against the general background of the growth of government intervention in economic and social life during the last 100 years. The impacts of two world wars and the 'cold war'. Differences between countries in scientific organization and science policy.

**62.715G Cause, Belief and Progress in the History of Science** **S1 L2**

An historical perspective on general ideas relating to scientific knowledge in the modern period, including: the Idea of Progress from Bacon to Social Darwinism; the relations between religion, theology and science; historiographical interpretations of revolutionary episodes in the history of science; ideas relating to contemporary issues in science.

**62.716G Science and Society in the Twentieth Century** **FL2**

An introduction to the key issues raised by the interaction between science and society in the 20th century. The unit consists of six topic modules drawn from the following list, each presented over a period of four weeks.

**1.** *The Social and Economic Relations of Technology:* An introduction to fundamental concepts concerning: the imperatives of technology; the techno-structure; the political dimensions of technological change; technological determinism; the technological fix; the ideology of industrialization; alternative technology. **2.** *Theories of Social Change:* A comparative analysis of leading theories of social change, including Marxism and theories of industrial and post-industrial society, with emphasis on the role of science and technology. **3.** *Technology and Social Change:* A case study of the social impact of (a) energy technologies on Australia and/or the developing world; or (b) the microelectronic revolution on commerce and industry. **4.** *Historical Dimensions of Scientific Change:* A case study of a major conceptual advance in 20th-century science (eg, the development of relativistic physics or of genetics and molecular biology) as an introduction to problems of (a) scientific change and 'progress'; (b) scientific community relations, and (c) science, ideology and responsibility. **5.** *The Philosophy of Science:* Contemporary issues in the philosophical analysis of science, with emphasis on (a) the dynamics of conceptual change, and (b) scientific reasoning and 'method'. **6.** *Science as a Social Enterprise:* Scientific institutions; patterns of communication; norms and values; social determinants of conformity and innovation; the internal and external politics of science. **7.** *Social Responsibility in Science:* A history of the 'Social Responsibility Movement'; ethical and political dimensions of the problem of responsibility in science.

**62.718G Science in National Cultures: Comparative Historical Perspectives** **S2 L2**

Historical and contemporary aspects of the comparative development of scientific institutions and research styles in different national contexts. The modes of interaction and mutual perceptions of scientific communities in Western industrializing nations from the 19th century; the question of convergence in systems of scientific organization in East and West.

**62.720G The Sociology of Scientific Knowledge** **S2 L2**

An analysis of recent sociological theories concerning the nature and extent of the influence that social conditions have upon the formation and acceptance of scientific knowledge. Topics covered include: neo-marxist theories of science and ideology; the 'strong program' for the sociology of knowledge; 'field' theories and the analysis of 'disciplinary power' in science; and epistemological problems raised by commercial and governmental direction of scientific research. This unit builds upon the material covered in 62.709G The Scientific Community, although it may be taken independently of that unit, and it provides a suitable background for 62.701G Philosophy and Methodology of Science.

# Faculty of Science

## Graduate Study

**67.001G Experimental Project in Physical Oceanography** **F L9**

A report of an experimental project, including recording, preparation, analysis and interpretation of field or laboratory data.

**67.002G Geophysical Fluid Dynamics** **F L2**

Aspects of the physical features of the oceans. Includes ocean waves (rotational and gravitational), tides, large scale wind driven ocean circulation, coastal dynamics, thermohaline circulations and mixing processes.

**67.003G Instrumentation** **S1 L1**

Laboratory, moored, shipborne, airborne and space instrumentation commonly used in oceanographic experiments; their applications and limitations.

**67.004G Applied Time Series Analysis** **S1 L1½T½**

Classification of random processes, sampling for discrete analysis, Fourier analysis, spectra, filtering. Cross-spectra, estimation and hypothesis testing, confidence limits, application to experiment planning. Emphasis on computer analysis of actual data.

**67.005G Theoretical Project in Physical Oceanography**

A theoretical project aimed at developing the prediction of oceanographical phenomena, tailored to meet individual student background but taken only by those students with a strong theoretical background.

# Board of Studies in Science and Mathematics

## Undergraduate Study

**68.302 Introductory Marine Science** **S1 L3T1**

*Excluded: 25.601.*

Ocean basins, sediments, properties of seawater, ocean circulation, coasts and coastal processes. Marine biology and ecology, primary and secondary productivity.

### 68.313 Physical Oceanography S2 L2T2

*Prerequisites: 10.001 or 10.011; 1.001 or 1.011.*

The physical properties of the oceans, and their measurement. Oceanographic instrumentation. The design of small and large scale ocean experiments. Laboratory and field work.

### 68.451 Biological Laboratory Computing S2 L2T4

*Prerequisites: As for 10.021B. Excluded: 1.041, Programs 0601, 0610, 0611 & 6806.*

Concepts and problems in biology and biology-related areas amenable to the application of computers; experience in elementary BASIC programming and data analysis using large mainframes and laboratory microcomputers; use of microcomputers for collecting data from laboratory instruments, and for controlling instruments in experiments. Includes a segment taught in common with 1.041 Laboratory Computers in Physical Sciences.

### 68.430 Geology and Physics Honours

An honours program combining Geology and Physics in Program 0125, made by arrangement with the Heads of the two Schools.

### 68.503 Science of Interfaces L2T3

*Prerequisites: 2.002A, 1.012, 1.022.*

Not offered in 1984.

Elementary theory of terminated lattice and surface states; the solid-gas interface; general theory of absorption; corrosion; catalysis; liquid gas interface; ocean/atmosphere interactions; lung/air interactions; solid-liquid interactions and electrochemistry.

### 68.601 Genetics of Behaviour I S1 L2T3

*Prerequisite: 17.031. Excluded: 79.402.*

Behavioural traits in invertebrates and mammals, including man, in which genetic factors can be identified.

Principal subject areas: Models for behaviour genetics in invertebrates and mammals, with discussion of and practice in research methodologies; mathematical treatment of data; genetic factors in human intelligence; genetics of mental retardation and psychological illness in man, with appropriate clinical contact and discussion.

### 68.602 Genetics of Behaviour II S2 L2T3

*Prerequisite: 79.402 or 68.601. Excluded: 79.403.*

An advanced subject in the area of behaviour genetics in man and animals, including more complex aspects of statistical analysis of data, and options for in depth studies and practical experience in specific aspects of human and animal behaviour genetics.

# Anatomy

## Undergraduate Study

### 70.011A Histology I S1 L2T4

*Prerequisite: 17.031, 17.041.*

Elementary theory of light and electron microscopy. Cell morphology and cell ultrastructure. Introduction to simple histological techniques. Basic histology, including the morphological and functional properties of epithelial, connective, muscle and nervous tissues. Systematic histology, including a histological examination of the major systems of the body: cardiovascular, respiratory, lymphatic, integumentary, digestive, endocrine, urinary, reproductive and nervous (including eye and ear). Two lectures per week, each lecture followed by a 2-hour practical-tutorial class. Emphasis on the ability to interpret histological sections and selected electron micrographs of mammalian tissues and organs and to relate morphology to tissue and organ function.

### 70.011B Mammalian Embryology S2 L2T4

*Prerequisite: 70.011A.*

History of embryology and its development as a science. The mammalian reproductive system. Gametogenesis. Fertilization and cleavage. Development and implantation of blastocyst. Development of embryonic disc, embryonic membranes, placenta. Comparative mammalian placentation. Human embryogenesis. Development of human foetus. Characteristics of external form. Teratology. Human organology. Comparative mammalian development. Biochemistry and embryogenesis.

### 70.011C Introductory Anatomy S1 L2T4

*Prerequisites: 17.031, 17.041.*

Introduction to gross anatomy, based on a study of prosected specimens. Musculoskeletal, cardiovascular, respiratory, gastrointestinal, genitourinary and nervous systems. General topographical and surface anatomy. Normal variations including those related to sex and age.

### 70.012B Visceral Anatomy S2 L2T4

*Prerequisites: 70.011A, 70.011C.*

The topographical anatomy of the great visceral systems — gastrointestinal, respiratory, cardiovascular, and genitourinary — and of the head and neck. Living and radiological anatomy.

### 70.012C Neuroanatomy I S1 L2T4

*Prerequisites: 70.011A, 70.011C.*

The neurons, neuronal satellite cells. Functional anatomy of the central nervous system. Blood supply of central nervous system. Organs of special sense. Endocrine glands. Principles of peripheral nerve distribution.

### 70.013 Anatomy IV — F

*Prerequisite: Completion of the first three years of any Science program with a major in Anatomy (see Table 3).*

An honours program consisting of the preparation of an undergraduate thesis together with advanced tutorial courses and participation in School seminars.

### 70.304 Histology II — S2 L2T4

*Prerequisite: 70.011A. Excluded: 70.3041. (If 70.304 is taken after 70.3041, total counts only 1 unit.)*

Mammalian histology, with particular reference to the human. Practical histological procedures: fixation, section preparation, staining. Microscopy. Theoretical, practical and applied histochemistry.

### 70.3041 Histological and Histochemical Techniques — S2 L1T2

*Prerequisites: 17.031, 17.041 and any one of 41.101, 45.301, 70.011A. Excluded: 70.304.*

Practical histological procedures: fixation, section preparation, staining. Microscopy. Theoretical, practical and applied histochemistry.

### 70.305 Neuroanatomy II — S2 L1T2

*Prerequisite: Credit or better in 70.021C.*

In seminar format, topics in contemporary neuroanatomy, working from original papers. Includes: sensory and motor areas of the neocortex, hippocampus, cerebellum, and sense organs. Recent work on the development of the central nervous system. Recent advances in neurohistochemistry and neuroendocrinology. Students are required to undertake a substantial amount of private study.

### 70.306 Functional Anatomy I — S1 L2T4

*Prerequisites: 70.011A, 70.011C.*

Introduction to fundamental issues in the morphology and dynamics of human movement systems: Includes: physical properties of bone, muscle and connective tissue; biomechanics, movement analysis and neuromuscular control. These basic principles are applied to a detailed study of musculoskeletal components of head and neck and upper limb. Emphasis on modern analytical techniques and findings. Tutorials include detailed limb and joint dissections plus intensive study of surface and radiological anatomy.

### 70.307 Functional Anatomy II — S2 L2T4

*Prerequisites: 70.012C, 70.306.*

A continuation of 70.306. Includes: a detailed study of the musculoskeletal components of trunk and lower limb, functional morphology of muscle, biomechanics and energetics of walking and running.

# Pathology

## Undergraduate Study

### 72.301 Basic and Applied Pathology — F L2T1

*Prerequisites: 70.011A, 70.011C, 73.111 or equivalent.*

Lectures and practical class demonstrations. Includes exposition of the basic classification of pathological processes, study of the processes of cell and tissue degeneration, acute and chronic inflammation, vascular disease, including thrombosis, embolism, ischaemia and infarction. Aberrations of cell growth including study of atrophy, hypertrophy, hyperplasia and metaplasia, used to introduce the subject of neoplasia and carcinogenesis. Exposure to examples of specific disease entities of general practical importance exemplifying the basic or fundamental processes such as appendicitis, pneumonia, arthritis, pulmonary and myocardial infarction as well as lung, alimentary and cerebral tumours. Coverage of the processes of healing and regeneration with specific reference to healing of skin wounds and the healing of fractures.

## Graduate Study

### 72.402G Principles of Disease Processes — S1 L3 C3

*Prerequisite: 73.111 or equivalent, 70.011C or equivalent.*

The reaction of cells to injury, the inflammatory reaction; necrosis-vascular changes and infarction; reparative processes; fracture healing; neoplasia; reaction to implants; specific processes requiring prosthetic assistance.

# Physiology and Pharmacology

## Undergraduate Study

### 73.111 Physiology IA — F L2T4

*Prerequisites: 17.021 (or 17.041); 2.121 & 2.131, or 2.141; 10.001 or 10.011 or 10.021 B & C. Excluded: 73.121, 73.011A. Co-requisite: 41.101.*

Introduction to fundamental physiological principles, dealing first, with basic cellular function in terms of chemical and physical princi-

ples, and second, with the operation of the various specialized systems in the body, for example, the cardiovascular system, whose function it is to transport materials to and from the tissues of the body; the respiratory system which must maintain the exchange of oxygen and carbon dioxide between the atmosphere and the blood; the gastrointestinal system which enables food materials to be modified by digestion and absorbed into the circulation; the kidney which is involved in the regulation of body fluid and electrolyte balance and with the excretion of the waste products of metabolism; the endocrine system which releases chemical messengers, called hormones, that are carried in the blood stream to regulate a great variety of body functions, eg metabolism and reproductive activity; the nervous system which by means of very rapidly propagated electrical impulses is responsible for all our movements, sensations, memories, emotions and consciousness itself. A substantial series of practical class experiments on these different areas of physiology is included in the course. This subject is taken by students enrolled in any of the Physiology programs.

### 73.121 Physiology IB — F L2T4

*Prerequisites: As for Physiology IA except that 2.131 may be accepted as a co-requisite. Excluded: 73.111.*

Covers the same general areas of physiology as Physiology IA but in less detail and with less intensive practical courses. Physiology IB may be taken by students not intending to study physiology in Level III.

### 73.011A Principles of Physiology (Optometry) — F L2T4

*Prerequisites: As for Physiology IA exept that 2.131 may be accepted as a co-requisite. Excluded: 73.111.*

Covers the same general areas of physiology as Physiology IA but in less detail and with less intensive practical courses. Principles of Physiology is taken only by students in the BOptom degree course.

### 73.012 Physiology II — F L4T8

*Prerquisites: 73.111, 41.101, 41.111. Students enrolled in the Program 7302 (Physiology/Chemistry) may choose 2.003J and 10.2111 and 10.2112 in place of 41.101 and 41.111.*

A major subject offered in third year, providing a more advanced course of study in Physiology. Students spend considerable time performing laboratory experiments which illustrate various physiological principles and introduce them to the techniques used in physiological investigation. The course is orientated towards the areas of physiology constituting the major research interests of the School. It is divided into several sections which may be available in special circumstances as separate 1 and 2 unit Level III courses, including Membrane Biology, Neurophysiology and Organ Physiology, details of which are given below.

### 73.012A Membrane Biology — S1 L2T4

*For entry consult Head of School of Physiology and Pharmacology.*

The properties of cell membranes including permeation of ions, solutes and water across membranes, generation of electrical signals in nerve and muscle cells produced by ion movements, and transmission of information between cells. Stress on modern research techniques and on a critical examination of appropriate classical papers.

### 73.012B Neurophysiology — S1 L2T4

*For entry consult Head of School of Physiology and Pharmacology.*

A detailed study in two broad areas, neural mechanisms in sensation and the control of posture and movement. Includes the regulation of visceral and other autonomic effector structures and the neural substrates and correlates of certain higher functions such as speech, memory and consciousness. Directed towards the experimental analysis of nervous system function, to introduce the techniques and approaches used in neurophysiological research. Sensation: an integrated lecture and experimental course is given on somatic, visual and auditory sensory mechanisms. Laboratory work: students conduct psychophysical experiments to evaluate subjective sensory capabilities. The neural mechanisms underlying these subjective abilities are examined in animals in electrophysiological experiments which involve recording the impulse patterns from individual neurones within the sensory systems. Students are required to analyze the mechanisms employed by the nervous system to code information about specific parameters of sensory stimuli.

Lectures and experiments on motor function are directed towards an understanding of the various reflex and voluntary mechanisms controlling posture and movement. The section dealing with nervous control of visceral function is concerned mainly with regulation of cardiorespiratory activity.

### 73.012C Organ Physiology — S2 L4T8

*Prerequisites: for 73.012A, B, C: normally as for 73.012. For entry consult Head of School of Physiology and Pharmacology.*

An advanced study dealing with major physiological systems of the body and usually includes detailed segments from: the cardiovascular and respiratory systems; endocrines, kidney, fetal physiology, gastrointestinal physiology and exercise physiology. Emphasis on the functions of individual organs as well as the overall operations of particular body systems including their neural control mechanisms. Emphasis on the approaches and techniques involved in physiological research. Students are therefore required to carry out an extensive series of experiments which usually employ mammalian (including human) preparations.

### 73.012F Clinical Physiology — F L0T3

*Prerequisites: 73.111; 41.101; 41.111 or 2.002B; 70.011A; 70.011C; 80.014.*

This Level III subject is only available in course 3820, and only to those students not undertaking Physiology II. The subject is intended to supplement the Level II, Physiology 1A course in order to provide an adequate grounding for double degree students in applied or clinical aspects of physiology before they enter year three of the medical course.

Covers aspects of normal and disordered physiology in the following areas: cardiovascular and cardiorespiratory mechanisms; body fluid balance and kidney function; the endocrine system; central nervous system; gastrointestinal physiology.

### 73.022 Pharmacology — F L2T4

*Prerequisites: 73.111 or 73.121. Co-requisites: 73.012 or 41.102A & 41.102B or 2.003J and 2.033A.*

Includes a study of the absorption, distribution and metabolism of drugs as well as a study of the pharmacology of the autonomic nervous system, the cardiovascular system, the central nervous system, the kidney, the endocrine system and also a study of pharmacokinetics. A practical class program complements the lecture program by demonstrating a variety of basic pharmacological techniques.

## Honours and Graduate Study

Depending on their undergraduate records students may be accepted by the Head of the School to undertake a fourth year of study towards an honours degree in Physiology or in Pharmacology. This would usually be done by students planning a career in either of these fields. During the honours year the student carries out a research project under the supervision of a staff member and submits a thesis based on the research project. The student can usually nominate the general research area in which he wishes to work from those being studied in the School. Within this research area the student is given a specific project by the supervisor.

Higher degree study for an MSc of PhD degree may also be undertaken by selected students.

# Community Medicine

## Undergraduate Study

### 79.201 Population Genetics — S1 L2T3

*Prerequisites: 45.101, or 10.311A and 10.311B, or 10.321A and 10.321B, or 10.331.*

The genetic structure of populations: demographic structure, genetic relationships, mating systems (random and assortative mating, inbreeding, sexual selection), finite populations, systematic forces (selection, mutation, migration), genetic distance between populations, genetic load, stable populations, molecular population genetics, evolutionary trees; observed human population structures; computer methods.

### 79.202 Quantitative Methods in Human Genetics — S2 L2T3

*Prerequisites: one unit of genetics and one unit of statistical methods, or theory, as approved by the Head of School.*

Collection, interpretation and uses of genetical information relating to human populations: design of surveys, including twin and family studies; estimation and applications of genic and genotypic frequencies, selective values, mutation and migration rates, coefficients of kinship, inbreeding and assortative mating, effective population sizes, recombination fractions and heritabilities; segregation analysis; risks of recurrence of disease; genetical consequences of human intervention; computer methods.

### 79.302 Biochemical Genetics of Man — S1 L2T4

*Prerequisite: 41.101.*

Inherited variation of blood group antigens, serum proteins and red-cell enzymes, their possible selective roles, and their application to the study of differences between and within populations. Application of statistical techniques to analyzing population data.

# Faculty of Medicine

## Undergraduate Study

### 80.014 Human Behaviour — F L3

*Prerequisites: No formal prerequisites. Students normally take the subject in Year 2 of Course 3820.*

The research techniques, theoretical concepts and basic findings of the behavioural sciences, especially as these relate to medicine. Special emphasis is placed on the development of skills for the critical evaluation of scientific data concerning human behaviour and the oral and written expression of such evaluations. Topics include: scientific methods in behavioural sciences; the influence of heredity and environment on behaviour; human motivation and emotion; thinking and language; learning and memory; the psychology of stress; the psychophysiology of sleep; the psychology of aging; addictive behaviours; altered states of consciousness; gender differences; and the psychology of interpersonal behaviour. In addition to attending seminars, students carry out experimental practical work.

# Financial Assistance to Students

The scholarships and prizes listed below are available to students whose courses are listed in this handbook. Each faculty handbook contains in its **Financial Assistance to Students** section the scholarships and prizes available within that faculty. The **General Information** section of the Calendar contains a comprehensive list of scholarships and prizes offered throughout the University.

## Scholarships

### Undergraduate Scholarships

As well as the assistance mentioned, there are a number of scholarships available to students. What follows is an outline only. Full information may be obtained from Room G20, located on the Ground Floor of the Chancellery.

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

| Donor | Value | Year/s of Tenure | Conditions |
|---|---|---|---|
| **General** | | | |
| Bursary Endowment Board* | $180 pa | Minimum period of approved degree/ combined degree course | Merit in HSC and total family income not exceeding $6000 |
| Sam Cracknell Memorial | Up to $3000 pa payable in fortnightly instalments | 1 year | Prior completion of at least 2 years of a degree or diploma course and enrolment in a full-time course during the year of application; academic merit; participation in sport both directly and administratively; and financial need |
| Girls Realm Guild | Up to $1500 pa | 1 year renewable for the duration of the course subject to satisfactory progress and continued demonstration of need | Available only to female students under 35 years of age enrolling in any year of a full-time undergraduate course on the basis of academic merit and financial need |

*Apply to The Secretary, Bursary Endowment Board, PO Box 460, North Sydney 2060, immediately after sitting for HSC.

## Undergraduate Scholarships (continued)

| Donor | Value | Year/s of Tenure | Conditions |
|---|---|---|---|
| **General (continued)** | | | |
| Universities Credit Union | $500 pa | 1 year with the possibility of renewal | Prior completion of at least 1 year of any undergraduate degree course. Eligibility limited to members of the Universities Credit Union Ltd or members of the family of such members. |
| **Science** | | | |
| **Chemistry** | | | |
| John Ragnar Anderson Memorial Bequest | Up to $1500 pa | 1 year renewable for the duration of the course subject to satisfactory progess | Permanent residence in Australia and eligibility for admission to the full-time degree course in Chemistry |
| **Mathematics** | | | |
| Olivetti Australia Pty Ltd | Up to $600 pa | 2 years subject to satisfactory progress | Eligibility for admission to the third year of an honours program in the School of Mathematics in Pure/Applied Mathematics, Theoretical Mechanics or Statistics and leading to the award of the degree of Bachelor of Arts, Bachelor of Science, or Bachelor of Science Diploma in Education |
| George Szekeres Award | $200 pa | 1 year | Open to students entering the final year of the honours degree course in Pure Mathematics |

## Graduate Scholarships

Application forms and further information are available from the Student Enquiry Counter, located on the Ground Floor of the Chancellery. Information is also available on additional scholarships which may become available from time to time, mainly from funds provided by organizations sponsoring research projects.

The following publications may also be of assistance: **1.** *Awards for Postgraduate Study in Australia* and *Awards for Postgraduate Study Overseas*, published by the Graduate Careers Council of Australia, PO Box 28, Parkville, Victoria 3052; **2.** *Study Abroad*, published by UNESCO*; **3.** *Scholarships Guide for Commonwealth Postgraduate Students*, published by the Association of Commonwealth Universities*.

Where possible, the scholarships are listed in order of faculty.

*Available for reference in the University Library.

## Graduate Scholarships (continued)

| Donor | Value | Year/s of Tenure | Conditions |
|---|---|---|---|
| **General** | | | |
| University of New South Wales Postgraduate Scholarships | Living allowance of $5750 pa. Other allowances may also be paid | 1-2 years for a Masters and 3-4 years for a PhD degree | Applicants must be honours graduates (or equivalent). Applications to Dean of relevant Faculty. |
| Commonwealth Postgraduate Research Awards | | | Applicants must be honours graduates (or equivalent) or scholars who will graduate with honours in current academic year, and who are domiciled in Australia. Applications to Registrar by 31 October. |
| Commonwealth Postgraduate Course Awards | Living allowance of $6850 pa. Other allowances may also be paid. | 1-2 years; minimum duration of course | Preference is given to applicants with employment experience. Applicants must be graduates or scholars who will graduate in current academic year, and who have not previously held a Commonwealth Postgraduate Award. Applications to Registrar by 30 September. |
| Australian American Educational Foundation Travel Grant (Fulbright)* | | | Applicants must be graduates, senior scholars or post-doctoral Fellows. Applications close 30 September. |
| Australian Federation of University Women | Amount varies, depending on award | Up to 1 year | Applicants must be female graduates who are members of the Australian Federation of University Women |
| The Caltex Woman Graduate of the Year | $16000 over 2 years for further studies in USA, UK, Northern Europe or in special cases Australia. There are no special allowances for travel or accommodation for married graduates. | 2 years | Applicants must be female graduates who will have completed a University degree or diploma this year and who are Australian citizens or have resided in Australia for at least seven years. Selection is based on scholastic and literary achievements, demonstrable qualities of character and accomplishments in cultural and/or sporting/recreational activities. Applications close 30 September. |
| Commonwealth Scholarship and Fellowship Plan | Varies for each country. Generally covers travel, living, tuition fees, books and equipment, approved medical expenses. Marriage allowance may be payable. | Usually 2 years, sometimes 3 | Applicants must be graduates who are Commonwealth citizens or British Protected Persons, and who are not older than 35 years of age. Applications close with Registrar by 15 September. |

*Application forms are available from The Secretary, Department of Education, AAEF Travel Grants, PO Box 826, Woden, ACT 2606.

## Graduate Scholarships (continued)

| Donor | Value | Year/s of Tenure | Conditions |
|---|---|---|---|
| **General (continued)** | | | |
| Sam Cracknell Memorial | Up to $3000 pa | | See above under **Undergraduate Scholarships, *General*** |
| The English-Speaking Union (NSW Branch) | $5000 | | Applicants must be residents of NSW or ACT. Awarded to young graduates to further their studies outside Australia. |
| Gowrie Scholarship Trust Fund | $3500 pa. Under special circumstances this may be increased. | 2 years | Applicants must be members of the Forces or children of members of the Forces who were on active service during the 1939-45 War. Applications close with Registrar by 15 November. |
| Harkness Fellowships of the Commonwealth Fund of New York* | Living and travel allowances, tuition and research expenses, health insurance, book and equipment and other allowances for travel and study in the USA | 12 to 21 months | Candidates must be: **1.** Either members of the Commonwealth or a State Public Service or semi-government Authority. **2.** Either staff or graduate students at an Australian university. **3.** Individuals recommended for nomination by the Local Correspondents. The candidate will usually have an honours degree or equivalent, or an outstanding record of achievement, and be not more than 36 years of age. Applications close early August. |
| Frank Knox Memorial Fellowships at Harvard University | Stipend of $5600 pa plus tuition fees | 1, sometimes 2 years | Applicants must be British subjects and Australian citizens, who are graduates or near graduates of an Australian university |
| The Rhodes Scholarship** | Approximately £3000 stg pa | 2 years, may be extended for a third year | Unmarried male and female Australian citizens aged between 19 and 25 who have been domiciled in Australia at least 5 years and have completed at least 2 years of an approved university course. Applications close in early September each year. |
| Rothmans Fellowships Award† | $16500 pa | 1 year, renewable up to 3 years | The field of study is unrestricted. Applicants must have at least 3 years graduate experience in research. Applications close in July. |

*Application forms must be obtained from the Australian representative of the Fund, Mr L. T. Hinde, Reserve Bank of Australia, GPO Box 3947, Sydney, NSW 2001. These must be submitted to the Registrar by early August.

**Applications to Mr H. McCredie, Secretary of the NSW Committee, University of Sydney, NSW 2006.

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

## Graduate Scholarships (continued)

| Donor | Value | Year/s of Tenure | Conditions |
|---|---|---|---|
| **Biological Sciences** | | | |
| John Clark Memorial Award in Psychology | $1000 | 1 year | Applicants must be enrolled in a graduate course in psychology undertaking research in an area concerned with the ongoing problems of the community, particularly the behaviour of the 'whole person' in a social milieu |
| **Science** | | | |
| Contact Lens Society of Australia | $2000 pa | | To enable a graduate in optometry, medicine, or other appropriate discipline to undertake the degree of Master of Science or PhD in the School of Optometry. Enquiries to Dr B. Holden, School of Optometry. |
| The John Ragnar Anderson Memorial Scholarships in Chemistry | As determined by the Committee | | To enable a graduate to undertake full-time study approved by the Head of School of Chemistry for the award of a higher degree. The scholarship may be held concurrently with another scholarship awarded for the same purpose. Applications to Registrar by 31 October. |
| The Rutherford Scholarship | Travel, fees, etc. A stipend which, if held in the UK, is worth £3610 stg pa. | 3 years | To enable graduates under 26 years of age to undertake experimental research in a branch of natural science. It is tenable at a British Commonwealth University other than the country in which the applicant graduated. Applications close mid-February. |
| Science Research Scholarship of the Royal Commission for the Exhibition of 1851 | £3560 stg pa | 2 years. Renewal for further year possible | To enable graduates, usually not more than 26 years of age, to undertake research in some branch of pure or applied science at an overseas university. Applicants must be British Commonwealth citizens or citizens of the Republic of Ireland, Pakistan or South Africa, who have done at least 3 years of a university science course. Applications close mid-February. |
| Shell Scholarship in Science or Engineering | Approximately £4000 stg pa plus travelling expenses | 2 years, sometimes 3 | Applicants must be Australian citizens, under 25 years of age, with at least 5 years' domicile in Australia and who are completing the requirements for an honours degree in Science or Engineering. The successful candidate will undertake 2 years' graduate study towards the award of a higher degree at a British university. |

# Prizes

## Undergraduate University Prizes

The following table summarizes the undergraduate prizes awarded by the University. Prizes which are not specific to any School are listed under General. All other prizes are listed under the Faculty or Schools in which they are awarded.

Information regarding the establishment of new prizes may be obtained from the Examinations Section located on the Ground Floor of the Chancellery.

| Donor/Name of Prize | Value $ | Awarded for |
|---|---|---|
| **General** | | |
| Sydney Technical College Union Award | 150.00 and medal | Leadership in the development of student affairs, and academic proficiency throughout the course |
| University of New South Wales Alumni Association | Statuette | Achievement for community benefit – students in their final or graduating year |
| **School of Accountancy** | | |
| Australian Society of Accountants | 75.00<br>75.00 | 14.501 Accounting and Financial Management IA<br>14.522 Accounting and Financial Management IIA |
| Chamber of Manufactures of New South Wales | 50.00 | 14.703 Advanced Auditing |
| Coopers and Lybrand | 200.00 | 14.542 Accounting and Financial Management IIB |
| Corporate Affairs Commission | 100.00 | 14.803/14.903G Regulation of Accounting |
| Datec Pty Ltd | 200.00 | 14.605 Information Systems IIIB |
| | 150.00 | Best honours thesis related to information systems design, data management or management science techniques used for commercial applications |
| Esso Australia Ltd | 500.00 | Overall outstanding achievement in the subjects 14.501 Accounting and Financial Management IA, 14.511 Accounting and Financial Management IB, 14.522 Accounting and Financial Management IIA, 14.542 Accounting and Financial Management IIB |
| Greenwood, Challoner & Co | 100.00 | 14.742 Business Law II |
| Hungerford, Hancock & Offner | 100.00 | 14.563 Accounting and Financial Management IIIA |
| Law Book Co Ltd | 50.00<br>Books | 14.511 Accounting and Financial Management IB |
| Peat, Marwick, Mitchell and Company | 200.00 | 14.805/14.905G EDP Auditing |
| Planning Research Corporation (Aust) Pty Ltd | 200.00 | 14.583 Accounting and Financial Management IIIB |
| Price Waterhouse | 250.00 | General Proficiency in Accounting and Financial Management subjects |
| Schroder Darling & Company Limited | 200.00 | 14.613 Business Finance II |
| Rod Sinden Memorial | 250.00 | 14.794 Honours thesis on an accounting topic |
| Taxation Institute of Australia | 100.00 | 14.783 Taxation Law |
| John Menzies McKellar White Memorial | 200.00 | 14.859/14.959G Advanced Studies in Taxation |
| E. S. Wolfenden Memorial | 100.00 | 14.563 Accounting and Financial Management IIIA |
| Arthur Young & Co | 60.00 | 14.613 Business Finance II |

## Undergraduate University Prizes (continued)

| Donor/Name of Prize | Value $ | Awarded for |
|---|---|---|
| **School of Anatomy** | | |
| The Prize in Practical Anatomy | 100.00 | Practical Anatomy (including Radiological Anatomy) – Year 2 of the medical course |
| The Gray's Point Prize in Anatomy | 50.00 | Highest aggregate mark in Year 1 of Anatomy |
| The Winifred Dickes Rost | 50.00 | Outstanding merit in Anatomy in final year of the Science and Mathematics Course |
| Jane Skillen | 40.00 | Outstanding merit in all branches of Anatomy |
| **School of Biotechnology** | | |
| Mauri Brothers & Thomson (Aust) Pty Ltd | 175.00 | Best result in the Level II Biotechnology subject |
| | 175.00 | Best result in one of the Level III Biotechnology subjects |
| | 175.00 | Best result in the Biotechnology honours program |
| **School of Chemical Engineering and Industrial Chemistry** | | |
| Abbott Laboratories Pty Ltd | 100.00 | Bachelor of Engineering degree course in Chemical Engineering – Year 4 |
| The Australian Gas Light Company's in Chemical Engineering | 50.00 | Subject selected by Head of School |
| Australian Paper Manufacturers Ltd | 100.00 | Best result in 48.163 Instrumentation and Process Control in Industrial Chemistry |
| | 100.00 | 48.163 Instrumentation and Process Control I – in Chemical Engineering |
| Chamber of Manufactures of New South Wales | 50.00 | Subject selected by Head of School |
| Chemical Technology Society | 25.00 | Bachelor of Science in Industrial Chemistry |
| | 25.00 | Bachelor of Science degree course in Industrial Chemistry, Years 1 and 2 or Stages 1 to 4 |
| CSR Limited | 50.00 | Subject within the discipline of Industrial Chemistry, selected by Head of School |
| Esso Australia Ltd | 200.00 | Best performance in Year 2 Chemical Engineering |
| Institution of Chemical Engineers | 100.00 and medal | Best result for the thesis in the final year, or equivalent part time stage, of the Bachelor of Engineering degree course |
| Shell | 100.00 | General proficiency in the second year or its part-time equivalent in either the Chemical Engineering course or the Industrial Chemistry course |

## Undergraduate University Prizes (continued)

| Donor/Name of Prize | Value $ | Awarded for |
|---|---|---|
| **School of Chemical Engineering and Industrial Chemistry (continued)** | | |
| | 100.00 | General proficiency in the third year or its part-time equivalent in either the Chemical Engineering course or the Industrial Chemistry course |
| | 100.00 | General proficiency in the fourth year or its part-time equivalent in either the Chemical Engineering course or the industrial Chemistry course |
| | 100.00 | For a student who, in the opinion of the Head of School, has performed some meritorious activity of note either inside or outside the University |
| Simon-Carves Australia | 21.00 | Best performance in 48.135 Thermodynamics |
| Stauffer Australia Limited | 50.00 | Subject selected by Head of School |
| Western Mining Corporation Ltd | 150.00 | Best overall performance in 48.036 Chemical Engineering Laboratory I |
| | 150.00 | Best overall performance in 48.044 Chemical Engineering Laboratory II |
| **School of Chemistry** | | |
| ACI Australia Limited | 60.00 | Subject selected by Head of School |
| Chamber of Manufactures of New South Wales | 50.00 | |
| CSR Chemicals Ltd | 200.00 | Chemistry Honours |
| Inglis Hudson Bequest | 15.00 | 2.002B Organic Chemistry I |
| Jeffery Bequest | 100.00 | 2.043L Chemistry and Enzymology of Foods |
| Merck Sharp & Dohme (Aust) Pty Ltd | 52.50 | Chemistry – Level II subjects in the Science and Mathematics Course |
| | 52.50 | Chemistry – Level III subjects in the Science and Mathematics Course |
| RACI Analytical Chemistry Group | 150.00 | 2.013D Advanced Analytical Chemistry |
| The Nestlé Co (Aust) Ltd | 175.00 | |
| Tooth & Co Ltd | 50.00 | Subject selected by Head of School |
| UNSW Chemical Society Parke-Pope | 50.00 | |
| UNSW Chemical Society George Wright | 50.00 | |
| **School of Economics** | | |
| Australian Finance Conference | 75.00 | 15.083 Public Finance |
| Brinds Ltd | 100.00 | 15.013 Macroeconomics III (Honours) and 15.153 Microeconomics III (Honours) |

## Undergraduate University Prizes (continued)

| Donor/Name of Prize | Value $ | Awarded for |
|---|---|---|
| **School of Economics (continued)** | | |
| Economic Society in Economics | 100.00 and three years' membership of the Economic Society | Final year in Bachelor of Arts degree course with honours in Economics, Bachelor of Commerce degree course with honours in Economics or Bachelor of Commerce degree course with honours in Economics and Econometrics |
| The Statistical Society of Australia (New South Wales Branch) | 100.00 and one year's free membership of the Society | General proficiency throughout the Bachelor of Commerce degree course in Econometrics |
| **School of Electrical Engineering and Computer Science** | | |
| Austral Crane | 37.50 | Bachelor of Engineering degree course in Electrical Engineering, Year 3 |
| | 37.50 | Power or Control elective |
| Chamber of Manufactures of New South Wales | 50.00 | Subject selected by Head of School |
| Electricity Supply Engineers Association of New South Wales | 40.00 | Overall performance including proficiency in Electric Power Distribution in Year 3 full-time or equivalent part-time degree course |
| J. Douglas Maclurcan | 40.00 Book order | Control Systems |
| The Wilfred Holmes Memorial Award | 120.00 | A student eligible to enter the final year of the degree course and who is deemed to be in necessitous circumstances |
| **School of Mathematics** | | |
| Applied Mathematics | 50.00 | Excellence in Level III Applied Mathematics subjects |
| Head of School's | 50.00 | Excellence in 5 or more Level II Mathematics subjects (Arts: 20 credit points or more) |
| J. R. Holmes | 50.00 | Excellent performance in at least 4 pass-level (up to 1 pass-level unit may be replaced by a higher-level unit) Pure Mathematics Level III units taken over no more than two consecutive years |
| ICI Theory of Statistics IV | 100.00 | Theory of Statistics IV |
| Pure Mathematics | 50.00 | Excellence in Level III Pure Mathematics subjects |
| School of Mathematics | 30.00 | Excellence in 10.011 Higher Mathematics I |
| | 30.00 | Excellence in basic second year Higher Mathematics subjects (10.121A, 10.1213, 10.1214, 10.2211, 10.2212) |
| | 30.00 | Excellence in 5 or more Level II Mathematics subjects (Arts: 20 credit points or more) |

## Undergraduate University Prizes (continued)

| Donor/Name of Prize | Value $ | Awarded for |
|---|---|---|
| **School of Mathematics (continued)** | | |
| I. P. Sharp Associates | 75.00 | Higher Theory of Statistics II |
| Statistical Society of Australia (New South Wales Branch) | 50.00 and one year's free membership of the Society | General proficiency – Theory of Statistics subjects |
| Theoretical Mechanics | 50.00 | Excellence in Level III Theoretical Mechanics subjects |
| W. D. & H. O. Wills (Aust) Ltd Theory of Statistics III | 50.00 | Theory of Statistics III or Higher Theory of Statistics III |
| **School of Metallurgy** | | |
| Alcan Australia Ltd | 100.00 | Subject selected by Head of School |
| Austral Crane | 150.00 | |
| Australian Institute of Metals | 50.00 and one year's membership of the Institute | |
| Australian Welding Institute | 30.00 Book order | |
| Chamber of Manufactures of New South Wales | 50.00 | |
| The Broken Hill Proprietary Co Ltd | 100.00 | |
| The Electrolytic Refining and Smelting Co of Australia Ltd | 40.00 | |
| Western Mining Corporation Ltd | 150.00 | Best overall performance in Year 3 full-time (or its equivalent part-time) in Bachelor of Engineering (or Bachelor of Science (Technology)) degree course |
| | 150.00 | Best overall performance in Year 4 full-time (or its equivalent part-time) in the Bachelor of Engineering (or Bachelor of Science (Technology)) degree course |
| Zinc Corp Ltd | 80.00 | Subject selected by Head of School |
| **School of Optometry** | | |
| Australian Optometrical Association | 200.00 | Subject selected by Head of School |
| Bausch & Lomb Soflens | Diagnostic set of contact lenses valued at 700.00 | 31.841 Clinical Optometry |
| Contavue | Trial fitting set of contact lenses | Best essay or project on contact lenses |
| L. G. Darcey Memorial | 30.00 | 31.811 Optometry I |
| Hoya Australia Pty Ltd | 250.00 | Highest academic record in the Optometry degree course |

## Undergraduate University Prizes (continued)

| Donor/Name of Prize | Value $ | Awarded for |
|---|---|---|
| **School of Optometry (continued)** | | |
| Hydron (Australia) Pty Ltd | 75.00 | 31.813 Optometry III |
| | 75.00 | Optometry Year 4 |
| International Optics | 30.00 | Subject selected by Head of School |
| Theo Kannis | 250.00 | 31.841 Clinical Optometry |
| G. Nissel & Co Aust Pty Ltd | Trial fitting set of contact lenses | 31.813 Optometry III and 31.841 Clinical Optometry — Contact Lenses sections |
| Optical Products Pty Ltd | 100.00 | Subject selected by Head of School |
| Optometric Vision Research Foundation | 100.00 | Research project |
| Optometrists' Association of NSW | 50.00 | Subject selected by Head of School |
| Optyl (Australia) Pty Ltd | 100.00 | 31.812 Optometry II |
| Bryan Powell | 100.00 | Colour vision section of 31.841 Clinical Optometry |
| Filmer Sceats Memorial | 30.00 | 31.812 Optometry II |
| Martin Wells Pty Ltd | 200.00 | 31.821 Special Anatomy and Physiology |
| | 200.00 | 31.831 Diseases of the Eye |
| | 200.00 | Final Year Essay |
| The Keith Woodland Memorial | 75.00 | Binocular vision component of 31.813 Optometry III and 31.841 Clinical Optometry |
| **School of Physics** | | |
| ETP-Oxford | 200.00 | Student(s) who prepare the most meritorious design study of an optical system in 1.713 Advanced Laser and Optical Applications |
| The Gordon and Mabel Godfrey | 100.00 | Excellence in at least three of the Year 3 Theoretical Physics subjects 1.5133, 1.5233, 1.5333, 1.5433 and 1.5533 |
| | 100.00 | Excellence in 1.504 (Year 4 of the honours degree course in Theoretical Physics) |
| | 300.00 | Student who has completed Year 3 and is entering the final year of the Honours degree course in Theoretical Physics |
| Head of School's in Physics | 30.00 | Most creditable Year 4 honours thesis |
| Institute of Physics | 50.00 | Highest aggregate marks in three of the Units 1.0133, 1.0143, 1.023, 1.0333, 1.043 and 1.0343 |
| Laser Electronics | 200.00 | Excellence in the laboratory work in 1.763 Laser and Optical Technology Laboratory I |
| Physics Staff for Applied Physics | 30.00 | Highest aggregate marks in three units of the following subjects: 1.133, 1.3033, 1.3133, 1.3233, 1.3333, 1.3533, 1.713, 1.763, 1.0533 and 1.0543 |
| Physics Staff for Physics I | 50.00 | Highest mark in 1.011 |
| Physics Staff for Physics II | 50.00 | Highest aggregate mark in 1.002, 1.012, 1.022 and 1.032 |

## Undergraduate University Prizes (continued)

| Donor/Name of Prize | Value $ | Awarded for |
|---|---|---|
| **School of Physics (continued)** | | |
| Physics Staff for Physics IV Honours | 50.00 | Highest mark in 1.104, 1.304 or 1.504 |
| Physics Staff for Theoretical Physics | 30.00 | Highest aggregate marks in 1.1133, 1.5133, 1.5233, 1.5333, 1.5433 and 1.5533 |
| Quentron Optics | 200.00 | Excellence in 1.713 Advanced Laser and Optical Applications |
| Radiation Research | 200.00 | Excellence in the laboratory work in 1.773 Laser and Optical Technology Laboratory II |
| **School of Psychology** | | |
| Australian Psychological Society | 100.00 | A Year 4 Psychology subject selected by Head of School |
| Milon Buneta | 50.00 | Best Psychology Year 2 performance by a student in the Bachelor of Science degree course in Psychology |
| Psychology Staff | 80.00 | Best Psychology Year 2 |

## Graduate University Prizes

| Donor/Name of Prize | Value $ | Awarded for |
|---|---|---|
| **School of Biotechnology** | | |
| Mauri Brothers & Thomson (Aust) Pty Limited | 175.00 | Best overall performance in the Master of Science (Biotechnology) degree course |
| **School of Chemistry** | | |
| Smith Kline and French | 100.00 | Best performance in the Graduate Diploma in Food and Drug Analysis course |
| **School of Optometry** | | |
| Hydron Contact Lens | A trial fitting set of contact lens | 31.705G Advanced Contact Lens Theory and Practice |
| Theo Kannis | 250.00 | 31.701G Advanced Clinical Optometry |

**Faculty of Biological Sciences***

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*Comprises First Year Biology Teaching Unit, Schools of Biochemistry, Biotechnology, Botany, Microbiology, Psychology and Zoology.*

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**Honorary Associate (School)**

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**Professor of Psychology and Head of School**

Vacant

**Professor of Psychology**

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**Professor of Psychology**

Vacant

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**Professor of Zoology**

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Arthur Woods, MA *Oxf.*, FRES, MIBiol

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Renate Sandeman

**Administrative Assistant**

Louise Ann Mazzaroli, BA PhD *N.S.W.*

**Honorary Associates**

Ronald Strahan, MSc *W.Aust.*, FSIH
Kenneth Radway Allen, MA ScD *Camb.*

**Honorary Visiting Fellows**

Thomas Ritchie Grant, BSc *Cant.*, PhD *N.S.W.*
Robert Maxwell Herd, MSc *N.S.W.*, PhD *Car.*
Bruce Roderick Hodgson, BSc PhD *N.S.W.*
Judith Everleigh Marlow, BSc *Lond.*
Charles Pregenzer, BS *N.Y. State*, MA *Hofstra*, PhD *N.S.W.*
Grahame John Wardon Webb, BSc PhD *N.E.*
Dedee Daryl Patrice Woodside, BSc *Car.*, PhD *A.N.U.*

**Faculty of Science***

# Staff

*Comprises Schools of Chemistry, Mathematics, Optometry and Physics.*

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**Chairman**

Professor S. E. Livingstone

**Lecturer**

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## School of Chemistry

**Professor of Chemistry and Head of School**

James Stanley Shannon, DIC PhD *Lond.*, DSc *Adel.*, FRACI

**Professor of Organic Chemistry and Head of Department of Organic Chemistry**

David St Clair Black, MSc *Syd.*, PhD *Camb.*, AMusA, FRACI

*For Board of Studies in Science and Mathematics, see later in this section.

**Professor of Physical Chemistry and Head of Department of Physical Chemistry**

Peter John Derrick, BSc PhD *Lond.*, ARACI

**Professor of Theoretical and Physical Chemistry**

Raymund Marshall Golding, MSc *Auck.*, PhD *Camb.*, FNZIC, FInstP, FRACI

**Professor of Inorganic Chemistry and Head of Department of Inorganic and Nuclear Chemistry**

Stanley Edward Livingstone, PhD DSc *N.S.W.*, FSTC, FRACI, FRSC, CChem

**Professor of Analytical Chemistry and Head of Department of Analytical Chemistry**

Vacant

**Executive Assistant to Head of School**

W. J. Dunstan

**Administrative Officer**

Frederick Ferris Lewis, CEng, MIREE

**Administrative Assistant**

Dominic Vincent Portelli, BA *N.S.W.*

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Lister Waverley Ormsby Martin, BSc *Syd.*, ARACI
Neville Charles Stephenson, MSc *Syd.*, PhD DSc *N.S.W.*, FRACI

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Phyllis Lorraine Robertson, MSc *N.Z.*, PhD *Cant.*

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Richard Szczepanski, BSc *N.S.W.*
Nguyen Than Trong, MSc *N.S.W.*
Michael Keys Withers, MSc *N.S.W.*

## Department of Analytical Chemistry

### Associate Professors

Douglas Peter Graddon, MSc PhD *Manc.*, DSc *N.S.W.*, FRSC, CChem, ARACI
Ian Kelvin Gregor, BSc *N.E.*, MSc PhD *N.S.W.*

### Senior Lecturers

Peter William Alexander, MSc PhD *Syd.*, ARACI
Sergio Dilli, BSc PhD *N.S.W.*, ASTC, ARACI
Jaroslav Petr Matousek, IngChem *T.U.Prague*, PhD *N.S.W.*, FRACI

### Lecturer

Paul Raymond Haddad, BSc PhD *N.S.W.*, DipMilStud, ARACI

### Senior Tutor

Ronald Stanley Haines, BSc PhD *N.S.W.*

### Tutors

Glen William Dillow, BSc *N.S.W.*
Anton Philip Taverne, BSc *N.S.W.*

## Department of Inorganic and Nuclear Chemistry

### Associate Professors

Douglas John Carswell, MSc PhD DipEd *Syd.*, CChem, FRACI, FRSC
Ian Gordon Dance, MSc *Syd.*, PhD *Manc.*, ARACI
Harold Andrew Goodwin, BSc PhD *Syd.*, ARACI

### Senior Lecturers

James Roy Backhouse, MSc *Syd.*, PhD *N.S.W.*
Mervyn Allan Long, MSc PhD, *Auck.*, ANZIC
David John Phillips, BSc PhD *Lond.*, ARACI

## Department of Organic Chemistry

### Associate Professor

Michael John Gallagher, MSc *Qld.*, PhD *Camb.*, FRACI

### Associate Professors

Peter Steele Clezy, BSc PhD *Tas.*, DSc *N.S.W.*, ARACI
George Crank, MSc *Qu.*, PhD *Monash*, CChem, MRSC
John Johnson Henry Simes, MSc DipEd *Syd.*, *PhD Liv.*, FRACI

### Senior Lecturers

Roger Bishop, BSc *St.And.*, PhD *Camb.*, ARACI
Norman William Herbert Cheetham, BSc PhD *Qld.*
John Lawrence Courtney, BSc PhD *N.S.W.*, ASTC, ARACI
William John Dunstan, MSc *Syd.*, ARACI
Peter Thomas Southwell-Keely, BSc *Syd.*, PhD *N.S.W.*
John David Stevens, BSc *Tas.*, PhD *N.E.*, ARACI

### Lecturers

George Vernon Baddeley, BSc *Manc.*, DPhil *Oxf.*
Robert Francis Toia, BSc PhD *W.Aust.*, ARACI

### Senior Tutors

Satya Narayana Murthy Durvasula, MSc *And.*, PhD *Syd.*, CChem, MRSC
Inno Salasoo, BSc PhD *N.S.W.*, ASTC, ARACI

## Department of Physical Chemistry

### Associate Professors

John Lyndon Garnett, MSc *N.S.W.*, PhD *Chic.*, ASTC, FRACI
Brian John Orr, MSc *Syd.*, *PhD Brist.*, FRACI

### Senior Lecturers

David Scott Alderdice, MSc *Syd.*, PhD *Lond.*
Brian Raymond Craven, MSc PhD *N.S.W.*, ASTC
William David Johnson, BSc *Syd.*, MSc *N.E.*, PhD *N.S.W.*
Alan David Rae, MSc PhD *Auck.*, ANZIC

### Lecturers

Martin Peter Bogaard, BSc PhD *Syd.*
Ruby Foon, MSc PhD *Melb.*
Derek Richard Smith, BSc PhD *Wales*
Gary David Willett, BSc PhD *LaT.*, ARACI

## First Year Chemistry

**Director of First Year Classes in Chemistry**
Tristan John Victor Findlay, BSc PhD *St.And.*, FRACI, FRSC, CChem

**Senior Lecturer**
Norman Thomas Barker, MSc PhD *N.S.W.*

**Lecturers**
Helen Jane Dyson, BSc PhD *Syd.*, ARACI
Clive Reginald Taylor, BSc *Syd.*

**Senior Tutors**
Peter See Kien Chia, MSc PhD *N.S.W.*
Naseem Hasan Peerzada, MSc *Punjab*, PhD *LaT.*
Joan Pauline Ross, BSc *Syd.*

**Tutors**
Jeffrey John Gibson, MSc *Syd.*
Derek Alan Harris, BSc *Macq.*

# School of Mathematics

**Professor of Pure Mathematics and Head of School**
Gavin Brown, MA *St.And.*, PhD *N'cle.(U.K.)*, FAA

**Professor of Applied Mathematics**
Viliam Teodor Buchwald, BSc *Manc.*, MSc PhD *Lond.*, FIMA

**Professor of Applied Mathematics**
John Markus Blatt, BA *Cinc.*, PhD *C'nell.* and *Prin.*, FACS

**Professor of Pure Mathematics**
Michael George Cowling, BSc *A.N.U.*, PhD *Flin.*

**Professor of Statistics**
Abraham Michael Hasofer, BEE *Faruk*, BEc PhD *Tas.*, MIEAust

**Associate Professor and Director of First Year Studies**
Angus Henry Low, MSc DipEd *Syd.*, PhD *N.S.W.*

**Senior Tutors**
Donald Sidney Craig, BSc *Qld.*
William Thomas Perrins, MA *Camb.*, DipEd *Mitchell C.A.E.*

**Tutors**
James William Franklin, MA *Syd.*, PhD *Warw.*
Jane Marie Lake, BSc *W.Aust.*
Kevin Graham Mansfield, BSc *Auck.*
Neil James Ormerod, BA PhD *N.S.W.*

**Professional Officer**
Veronica Paul, BSc *Wales*, DipEd *N.E.*

**Administrative Officer**
Margaret Alison Potter, BA DipEd *Syd.*

## Department of Pure Mathematics

**Associate Professor**
John Harold Loxton, MSc *Melb.*, PhD *Camb.*

**Senior Lecturers**
Peter Windeyer Donovan, BA *Syd.*, DPhil *Oxf.*
Mary Ruth Freislich, BA *Witw.*, MA *N.S.W.*
Jack David Gray, BA *Syd.*, PhD *N.S.W.*
David Christopher Hunt, BSc *Syd.*, MSc PhD *Warw.*
Ezzat Sami Noussair, BA BSc *Cairo*, PhD *Br.Col.*
John Frederick Price, MSc *Melb.*, PhD *A.N.U.*
Iain Raeburn, BSc *Edin.*, PhD *Utah*
John St Alban Sandiford, MSc *Syd.*
Dennis William Trennerry, BSc PhD *Adel.*

**Lecturers**
Charles Dixon Cox, BSc DipEd *Qld.*
Shaun Anthony Requa Disney, BA BSc *Adel.*, DPhil *Oxf.*
Rodney Kelvin James, BSc PhD *Syd.*
Colin Eric Sutherland, BSc *Cant.*, PhD *Calif.*
David Graham Tacon, BSc *N'cle.(N.S.W.)*, PhD *A.N.U.*

**Senior Tutor**
Michael David Hirschhorn, BSc *Syd.*, MSc *Edin.*, PhD *N.S.W.*

**Emeritus Professor**
George Szekeres, DiplChemEng *Bud.*, Hon.DSc *N.S.W.*, FAA

**Honorary Associates**
Gregory Maxwell Kelly, BSc *Syd.*, BA PhD *Camb.*, FAA
Alfred Jacobus van der Poorten, BSc PhD *N.S.W.*

## Department of Applied Mathematics

**Associate Professors**
Michael Newton Barber, BSc *N.S.W.*, PhD *C'nell.*
Ian Hugh Sloan, BA BSc *Melb.*, MSc *Adel.*, PhD *Lond.*
William Eric Smith, MSc *Syd., and Oxf.*, PhD *N.S.W.*, MInstP, MAIP

**Senior Lecturers**

Brian James Burn, MSc *Otago*, PhD *Camb.*
Elvin James Moore, MSc *W.Aust.*, PhD *Harv.*
Alexander Hugh Opie, BSc DipEd *Melb.*, PhD *Monash*, FAIP
Kok-Lay Teo, BSc *Sing.*, MASc PhD *Ott.*, MIEEE, AMIEE

## Department of Statistics

**Associate Professor**

Clyde Arnold McGilchrist, BSc BEd *Qld.*, MSc PhD *N.S.W.*

**Senior Lecturers**

Peter John Cooke, MSc *N.E.*, MS PhD *Stan.*
John Anthony Eccleston, BSc *Syd.*, MSc *Manc.*, PhD *C'nell.*
Anthony Gilbert Lewis Elliott, BSc *W.Aust.*
Manohar Khanderao Vagholkar, MSc *Bom.*, DIC PhD *Lond.*

**Lecturers**

Ronald Bruce Davis, BSc *Syd.*, *MSc N.S.W.*, DipEd *N.E.*
Peter Petocz, BA PhD *N.S.W.*

**Professional Officer**

Rhonda Gock, BSc MStats *N.S.W.*

**Honorary Associate**

Geoffrey Kennedy Eagleson, BSc PhD *Syd.*

## Department of Theoretical and Applied Mechanics

**Senior Lecturers**

Michael Leslie Banner, BE MEngSc *Syd.*, PhD *Johns H.*
John Desmond Fenton, BE MEngSc *Melb.*, PhD *Camb.*
William Dennis McKee, BSc *Adel.*, MSc *Flin.*, PhD *Camb.*

**Lecturers**

Peter James Blennerhassett, BE *W.Aust.*, PhD *Lond.*
David Charles Guiney, BSc PhD *Adel.*
Douglas Edward Mackenzie, BSc *Tas.*, FIMA, MACE
David Allan Mustard, BSc *Syd.*, MSc *N.S.W.*
Richard Wyndham O'Brien, BE *N.S.W.*, PhD *Camb.*

**Senior Tutor**

Albert Tator Daoud, BSc *R'dg.*, PhD *N.S.W.*, FInstP

**Honorary Associates**

Captain Daniel James McKeegan, BSc *Syd.*, MSc PhD *N.S.W.*, RAN
Simon Jacques Prokhovnik, BA MSc *Melb.*

# School of Optometry

**Professor of Optometry and Head of School**

Hermann Barry Collin, BSc MAppSc PhD *Melb.*, LOSc *V.C.O.*, FAAO

**Associate Professor**

Brien Anthony Holden, BAppSc *Melb.*, PhD *City*, LOSc *V.C.O.*, FAAO

**Senior Lecturers**

John Andrew Alexander, MSc PhD *N.S.W.*, ASTC, FIO, FAAO
Stephen John Dain, BSc PhD *City*, FBCO, MIESAust

**Lecturers**

Philip James Anderton, BOptom BSc *N.S.W.*, MScOptom *Melb.*
David Philip Crewther, MSc *Melb.*, PhD *Caltech.*
Graham Leslie Dick, MSc *N.S.W.*, ASTC, FIO
Daniel James O'Leary, MSc PhD *Wales*, FBOA, FSMC
David Cecil Pye, MOptom *N.S.W.*

**Professional Officer**

Angela Kathleen McCarthy, MSc *N.S.W.*, ASTC, FIO

**Tutors**

Shoba Ayyar, BOptom *N.S.W.*
Robin Esther Lee, BOptom *N.S.W.*

**Instructor**

Ian William Robinson

# School of Physics

**Professor of Experimental Physics and Head of School**

Hiroshi Julian Goldsmid, BSc PhD DSc *Lond.*, FAIP

**Professor of Experimental Physics**

Kenneth Norman Robert Taylor, BSc PhD *Birm.*

**Professor of Physics**

Vacant

**Professor of Theoretical Physics and Head of Department of Theoretical Physics**

Heinrich Hora, DiplPhys *Halle*, DrRerNat *Jena*, DSc *N.S.W.*, FInstP, FAIP

**Professor of Applied Physics**

Vacant

**Associate Professors**

Graham James Bowden, BSc DipAdvStudSc PhD *Manc.*
Hans Gerard Leonard Coster, MSc PhD *Syd.*, MInstP, MAIP
Dan Haneman, DSc *Syd.*, PhD *R'dg.*, FAIP
John Charles Kelly, BSc *Syd.*, PhD *R'dg.*, DSc *N.S.W.*, FInstP, MAIP, MAmPS

**Executive Assistant to Head of School**

Dr J. R. Hanscomb

**Director of First Year Studies**

Dr G. J. Russell

**Administrative Officer**

Patricia Shaw, BCom *N.S.W.*

**Senior Lecturers**

Peter Russell Elliston, BSc *Melb.*, PhD *Monash*
Colin Trevor Grainger, BSc DipEd *Syd.*, MSc *N.E.*, PhD *N.S.W.*, MInstP, MAIP
John Robert Hanscomb, BSc *Qld.* MSc PhD *N.S.W.*, MAIP, GradInstP
Erik Harting, BSc PhD *N.S.W.*, ASTC, MAIP
Veronica Jean James, BA BSc *Qld.*, PhD *N.S.W.*, MAIP
Zdenek Kviz, DipPhys *Brno*, CScRerNatDr *Charles*, PhD *Prague*
Peter Mitchell, BSc PhD *Adel.*, MAIP
George Lange Paul, MSc *Syd.*, PhD *Edin.*
James Martin Pope, MSc *Brist.*, DPhil *Sus.*, AInstP
Graeme John Russell, BSc PhD *N.S.W.*, MIP, MAIP
Raymond Gary Simons, BSc *Syd.*, MSc *Tel Aviv*, PhD *N.S.W.*
Kenneth Reid Vost, BSc *Glas.*, MSc PhD *N.S.W.*, AMAusIMM

**Lecturers**

Kenneth Hulme Marsden, BSc *Lond.*, MSc *N.S.W.*, MAIP, ARCS
David John Miller, BSc PhD *N.S.W.*, DipEd *Syd.*, MAIP, MAmPS, MAAPT
John William Vanstan Storey, BSc *LaT.*, PhD *Monash*
Betty Louise Turtle, BSc *Adel.*, PhD *A.N.U.*
Joseph Albert Wolfe, BSc *Qld.*, PRD *A.N.U.*

**Senior Tutors**

Lance Breger, BA *Lake Forest Coll.*, MSc *Northwestern*, PhD *Ill.*, DipEd *W.Aust.*
Ian Richard Dunn, BSc BA *Melb.*, MIEEE
Edward Peter Eyland, BSc MPhysics *N.S.W.*, BD *Lond.*
Martin Desmond Knight, BSc *N.S.W.*
Paul Michael O'Halloran, BA *Macq.*, MEd *N.S.W.*

**Tutors**

Terence Patrick Beven, BSc PhD *Tas.*, MAIP
Paul McNamara, BSc *N.S.W.*
Michael Ramsey, BSc *N'cle.(N.S.W.)*
Sophia Sakellis, DipPhysics *Patras*, MSc *N.S.W.*
Lynette Heather Taaffe, BSc *Syd.*
Andrew Venning, BSc *Griff.*

**Professional Officers**

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Robert Louis Dalglish, BSc PhD *N.S.W.*
Jerzy Kurianski
Barry Perczuk, BSc PhD *Monash*
Jeremy Karl Walter, BSc *Lond.*

**Honorary Associates**

John Stuart Dryden, MSc *Melb.*, DIC PhD *Lond.*, FAIP
John Eric Giutronich, BSc *Syd.*, PhD *N.S.W.*, MAIP

**Honorary Visiting Fellows**

Victor Kastalsky, BSc PhD *N.S.W.*, ASTC, MInstP, MAIP
Stephen George Szirmai, BSc PhD *N.S.W.*

## Department of Applied Physics

**Associate Professor**

David Henry Morton, MA *Oxf.*, FInstP, FAIP

**Senior Lecturers**

John Ian Dunlop, BSc PhD *N.S.W.*, MAIP, MAASATI
Leslie Beven Harris, BSc *Lond.*, BA DipEd *Durh.*, PhD *N.S.W.*, CEng, FIM, FInstP
Victor Raymond Howes, BSc PhD *Lond.*

## Department of Theoretical Physics

**Associate Professor**

Jaan Oitmaa, BSc PhD *N.S.W.*, FAIP

**Senior Lecturers**

David Neilson, BSc *Melb.*, MS PhD *N.Y. State*
Robert John Stening, MSc *Syd.*, PhD *Qld.*, DipTertEd *N.E.*, FRMetS

**Lecturers**

Michael Allister Box, BSc *Monash*, PhD *Syd.*, GradAInstP
John Richard Shepanski, MSc *Syd.*, MAIP

**Tutors**

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Gabriel Viera, BSc *N.S.W.*

**Board of Studies in Science and Mathematics**

# Staff

*The Board of Studies in Science and Mathematics includes all members of the Faculty of Biological Sciences and the Faculty of Science, and some members of specific schools in other faculties contributing to the Science and Mathematics Course: Applied Geology, Chemical Engineering and Industrial Chemistry, Geography, Metallurgy (Applied Science); History and Philosophy of Science, Philosophy (Arts); Accountancy, Economics (Commerce); Electrical Engineering and Computer Science, Mechanical and Industrial Engineering, Surveying (Engineering); Anatomy, Community Medicine, Physiology and Pharmacology (Medicine); Education (Professional Studies); and the Department of General Studies (Board of Studies in General Education).*

Dean

Professor V. T. Buchwald

Chairman

Professor A. J. Wicken

Co-ordinator of Studies in Science and Mathematics

Dr B. J. Burn

Administrative Assistant

Robyn Kay Mulholland, BA DipEd *N.S.W.*, MA *Syd.*

## Student's Timetable

| Time | Monday | | Tuesday | | Wednesday | | Thursday | | Friday | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Session 1 | Session 2 | Session 1 | Session 2 | Session 1 | Session 2 | Session 1 | Session 2 | Session 1 | Session 2 |
| 9-10 | | | | | | | | | | |
| 10-11 | | | | | | | | | | |
| 11-12 | | | | | | | | | | |
| 12-1 | | | | | | | | | | |
| 1-2 | | | | | | | | | | |
| 2-3 | | | | | | | | | | |
| 3-4 | | | | | | | | | | |
| 4-5 | | | | | | | | | | |
| 5-6 | | | | | | | | | | |
| 6-7 | | | | | | | | | | |
| 7-8 | | | | | | | | | | |
| 8-9 | | | | | | | | | | |

# The University of New South Wales Kensington Campus 1984

**Theatres**

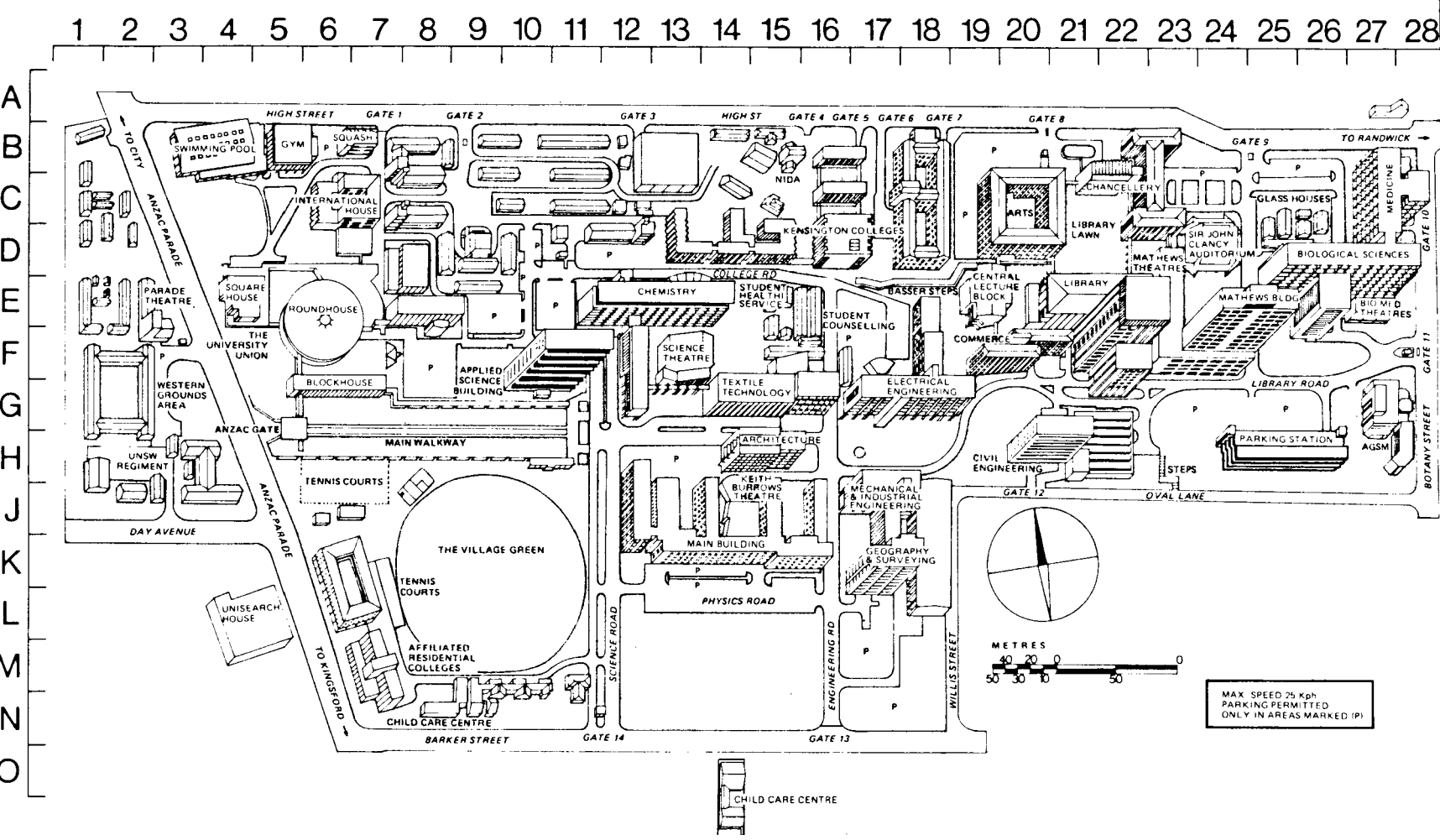
Biomedical Theatres E27
Central Lecture Block E19
Classroom Block (Western Grounds) H3
Rex Vowels Theatre F17
Keith Burrows Theatre J14
Main Building Theatrette K14
Mathews Theatres D23
Parade Theatre E3
Science Theatre F13
Sir John Clancy Auditorium C24

**Buildings**

Affiliated Residential Colleges
*New (Anglican)* L6
*Shalom (Jewish)* N9
*Warrane* M7
Applied Science F10
Architecture H14
Arts (Morven Brown) C20
Banks F22
Barker Street Gatehouse N11
Basser College C18
Biological Sciences D26
Central Store B13
Chancellery C22
Chemistry
*Dalton* F12
*Robert Heffron* E12
Civil Engineering H20
Commerce (John Goodsell) F20
Dalton (Chemistry) F12
Electrical Engineering G17
Geography and Surveying K17
Goldstein College D16
Golf House A27
Gymnasium B5
House at Pooh Corner N8
International House C6
Io Myers Studio D9
John Goodsell (Commerce) F20
Kanga's House O14
Kensington Colleges C17
*Basser* C18
*Goldstein* D16
*Philip Baxter* D14
Main Building K15
Maintenance Workshop B13
Mathews F23
Mechanical and
Industrial Engineering J17
Medicine (Administration) B27
Menzies Library E21
Metallurgy E8
Morven Brown (Arts) C20
New College (Anglican) L6
Newton J12
Parking Station H25
Philip Baxter College D14
Robert Heffron (Chemistry) E12
Sam Cracknell Pavilion H8
Shalom College (Jewish) N9
Sir Robert Webster
(Textile Technology) G14
Squash Courts B7
Swimming Pool B4
Unisearch House L5
University Regiment J2
University Union
(Roundhouse) — Stage I E6
University Union
(Blockhouse) — Stage II G6
University Union
(Squarehouse) — Stage III E4
Wallace Wurth School of Medicine C27
Warrane College M7
Wool and Pastoral Sciences B8

**General**

Academic Staff Office C22
Accountancy F20
Admissions C22
Adviser for Prospective Students C22
Alumni and Ceremonials C22
Anatomy C27
Applied Geology F10
Applied Science (Faculty Office) F10
Architecture
(including Faculty Office) H14
Arts (Faculty Office) C20
Australian Graduate
School of Management G27
Biochemistry D26
Biological Sciences (Faculty Office) D26
Biomedical Library F23
Biotechnology D26
Bookshop G17
Botany D26
Building H14
Careers and Employment C22
Cashier's Office C22
Centre for Biomedical Engineering A28
Centre for Medical Education
Research and Development C27
Centre for Remote Sensing K17
Chaplains E15a
Chemical Engineering and
Industrial Chemistry F10
Chemistry E12
Child Care Centres N8, O14
Civil Engineering H20
Closed Circuit Television Centre F20
Commerce (Faculty Office) F20
Committee in Postgraduate Medical
Education B27
Community Medicine D26
Computing Services Unit E21
Drama B10
Economics F20
Education G2
Electrical Engineering and
Computer Science G17
Energy Research, Development and
Information Centre B8b
Engineering (Faculty Office) K17
English C20
Examinations C22
Fees Office C22
Food Technology F10
French C20
General Staff Office C22
General Studies C20
Geography K17
German Studies C20
Graduate School of the Built
Environment H14
Health Administration C22
History C20
History and Philosophy of Science C20
Industrial Arts C1
Industrial Engineering J17
Institute of Rural Technology B8b
Japanese Economic and Management
Studies Centre F20
Kanga's House O14
Kindergarten (House at Pooh Corner) N8
Landscape Architecture K15
Law (Faculty Office) E21
Law Library E21
Librarianship F23
Library E21
Lost Property F20
Marketing F20
Mathematics F23
Mechanical Engineering J17
Medicine (Faculty Office) B27
Metallurgy E8
Microbiology D26
Mining Engineering K15
Music B11b
National Institute of Dramatic Art C15
Nuclear Engineering J17
Off-campus Housing C22
Optometry J12
Organizational Behaviour F20
Pathololgy C27
Patrol and Cleaning Services F20
Philosophy C20
Physics K15
Physical Education and
Recreation Centre (PERC) B5
Physiology and Pharmacology C27
Political Science C20
Postgraduate Extension Studies (Closed
Circuit Television) F20
Postgraduate Extension Studies (Radio
Station and Administration) F23
Psychology F23
Public Affairs Unit C22
Regional Teacher Training Centre C27
Russian C20
Science and Mathematics Course
Office F23
Social Work G2
Sociology C20
Spanish and Latin American Studies C2
Sport and Recreation E4
Student Counselling and Research E15
Student Health E15b
Student Records C22
Students' Union E4
Surveying K17
Teachers' College Liaison Office F15b
Tertiary Education Research Centre E15
Textile Technology G14
Town Planning K15
University Archives C22
University Press A28
University Union (Blockhouse) G6
Wool and Pastoral Sciences B8a
Zoology D26


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
A B C D E F G H J K L M N O
HIGH STREET
GATE 1
GATE 2
GATE 3
HIGH ST
GATE 4
GATE 5
GATE 6
GATE 7
GATE 8
GATE 9
TO RANDWICK
TO CITY
ANZAC PARADE
SWIMMING POOL
GYM
SQUASH
INTERNATIONAL HOUSE
NIDA
KENSINGTON COLLEGES
CHANCELLERY
ARTS
LIBRARY LAWN
GLASS HOUSES
MEDICINE
SIR JOHN CLANCY AUDITORIUM
MATHEWS THEATRES
BIOLOGICAL SCIENCES
GATE 10
COLLEGE RD
CHEMISTRY
STUDENT HEALTH SERVICES
BASSER STEPS
CENTRAL LECTURE BLOCK
LIBRARY
MATHEWS BLDG
BIO MED THEATRES
GATE 11
PARADE THEATRE
SQUARE HOUSE
ROUNDHOUSE
THE UNIVERSITY UNION
STUDENT COUNSELLING
COMMERCE
SCIENCE THEATRE
APPLIED SCIENCE BUILDING
TEXTILE TECHNOLOGY
ELECTRICAL ENGINEERING
LIBRARY ROAD
BLOCKHOUSE
WESTERN GROUNDS AREA
ANZAC GATE
MAIN WALKWAY
ARCHITECTURE
PARKING STATION
AGSM
BOTANY STREET
UNSW REGIMENT
TENNIS COURTS
KEITH BURROWS THEATRE
MECHANICAL & INDUSTRIAL ENGINEERING
CIVIL ENGINEERING
STEPS
GATE 12
OVAL LANE
DAY AVENUE
THE VILLAGE GREEN
MAIN BUILDING
GEOGRAPHY & SURVEYING
TENNIS COURTS
PHYSICS ROAD
UNISEARCH HOUSE
TO KINGSFORD
SCIENCE ROAD
ENGINEERING RD
WILLIS STREET
AFFILIATED RESIDENTIAL COLLEGES
CHILD CARE CENTRE
BARKER STREET
GATE 14
GATE 13
METRES
40 20 0 0
50 30 10 50
MAX. SPEED 25 Kph
PARKING PERMITTED
ONLY IN AREAS MARKED (P)
CHILD CARE CENTRE

This Handbook has been specially designed as a source of reference for you and will prove useful for consultation throughout the year.

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

The Calendar and Handbooks also contain a summary list of higher degrees as well as the conditions for their award applicable to each volume.

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

Separate Handbooks are published for the Faculties of Applied Science, Architecture, Arts, Commerce, Engineering, Law, Medicine, Professional Studies, Science (including Biological Sciences and the Board of Studies in Science and Mathematics), the Australian Graduate School of Management (AGSM) and the Board of Studies in General Education.

The Calendar and Handbooks are available from the Cashier's Office.

The Calendar costs $5.00 (plus postage $1.00, interstate $1.20).

The Handbooks vary in cost: Applied Science, Architecture, Arts, Commerce, Engineering, Professional Studies, and Sciences are $3.00. Postage is $1.00 in each case ($1.20 interstate). Law, Medicine and AGSM are $2.00. Postage is 60 cents in each case (70 cents interstate).

A set of books is $32.00. Postage is $2.00 ($4.50 interstate).

The General Studies Handbook is free. Postage is 60 cents (70 cents interstate).