The University of New South Wales

Sciences

Board of Studies in Science and Mathematics

Faculty of Biological Sciences

Faculty of Science

1987 Faculty Handbook

How to use this Handbook

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

General Information (pages 1-24) 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.

Undergraduate Study: 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 credit value, class contact or teaching hours per week, sessions when taught

Graduate Study is about higher degrees.

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

Information included is as for **Undergraduate Study: Subject Descriptions,** above.

Conditions for the Award of Higher Degrees.

Scholarships and Prizes available at undergraduate and graduate level in the faculty.

Staff list.

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

The University of New South Wales
PO Box 1 Kensington NSW Australia 2033 Phone 697 2222

Sciences

Board of Studies in Science and Mathematics
Faculty of Biological Sciences
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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 14 July 1986, but may be amended without notice by the University Council.

Contents

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.

Note: All phone numbers below are University extension numbers. If you are outside the University, dial 697 2222 and ask for the extension. Alternatively you may dial 697 and then the extension number. This prefix should only be used when you are certain of the extension that you require as callers using 697 cannot be transferred to any other number.

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 **Student Services** staff, located on the ground floor of the Chancellery, 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 the staff is especially concerned with the problems of overseas, Aboriginal, and physically handicapped and disabled students. Enquire at Room G19, phone 3114.

The **Senior Assistant Registrar (Student Administration)**, Ms Judith Tonkin, is located on the ground floor of the Chancellery. For particular enquiries regarding illness and other matters affecting performance in examinations and assessment, graduation ceremonies, release of examination results and variations to enrolment programs, phone 3102 or 3097.

The **Assistant Registrar (Undergraduate Office)**, Mr John Beauchamp, is located on the ground floor of the Chancellery. General inquiries should be directed to 3095.

The **Senior Administrative Officer (Examinations)**, Mr John Grigg, is located on the ground floor of the Chancellery. Enquiries regarding examinations, including examination timetables and clash of examinations should be directed to 3088.

The **Adviser for Prospective Students**, Mrs Fay Lindsay, is located with the Careers and Employment Section and is

available for personal interview. For an appointment phone 5434.

The **Careers and Employment Section** is located in Hut E15c at the foot of Basser Steps. Enquiries should be directed to 5430.

The **Off-campus Housing Service** is located in Room G19 in the Chancellery. For assistance in obtaining suitable accommodation phone 3116.

Student Loans enquiries should be directed to Room G19 in the Chancellery, phone 3115.

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 5427, 5426 or 5425.

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 5418 or 5422 for an appointment.

The **University Librarian** is Mr Allan Horton. Library enquiries should be directed to 2686.

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

The **Students' Union** has two offices on campus. One is located at the back of the Library Lawn (between the Chancellery and the Morven Brown Building), where the SU President, Education Vice President, Education Officer, Clubs and Societies Secretary and Postgraduate Officer are available to discuss student problems. The other is on the second floor of the Squarehouse, where the Secretary/Treasurer, Women's Officer, Overseas Student Director, the full-time Solicitor, *Tharunka* and *Campuswide* provide information and student services.

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 six 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.

1987

Faculties other than Medicine

Session 1 (14 weeks)	2 March to 10 May
	May Recess: 11 May to 17 May
	18 May to 14 June
	Study Recess: 15 June to 21 June
	Midyear Recess: 22 June to 26 July
Examinations	22 June to 8 July
Session 2 (14 weeks)	27 July to 23 August
	August Recess: 24 August to 30 August
	31 August to 8 November
	Study Recess: 9 November to 15 November
Examinations	16 November to 4 December

Faculty of Medicine

First and Second Years	As for other faculties
Third and Fourth Years	Term 1 (10 weeks) 19 January to 29 March
	Term 2 (9 weeks) 6 April to 10 May
	May Recess: 11 May to 17 May
	18 May to 14 June
	Term 3 (9 weeks) 22 June to 23 August
	August Recess: 24 August to 30 August
	Term 4 (10 weeks) 31 August to 8 November
Fifth Year	Term 1 (8 weeks) 19 January to 15 March
	Term 2 (8 weeks) 23 March to 17 May
	Term 3 (8 weeks) 25 May to 19 July
	Term 4 (8 weeks) 27 July to 20 September
	Term 5 (8 weeks) 28 September to 22 November

Australian Graduate School of Management

	Term 1 (10 weeks) 2 March to 8 May
	Term 2 (10 weeks) 1 June to 7 August
	Term 3 (10 weeks) 31 August to 7 November

University College/Australian Defence Force Academy

Session 1 (14 weeks)	2 March to 3 May
	May Recess: 4 May to 17 May
	18 May to 19 June
	Midyear Recess: 20 June to 12 July
Examinations	22 June to 10 July

Session 2 (13 weeks)	13 July to 23 August *August Recess: 24 August to 6 September* 7 September to 23 October
Examinations	26 October to 13 November

January

Thursday 1	Public Holiday — New Year's Day
Monday 5	List of graduands in Medicine for February Graduation Ceremony published in *The Sydney Morning Herald*
Friday 9	Last day for acceptance of applications by office of the Admissions Section for transfer to another undergraduate course within the University
Monday 12	Last day for applications for review of results of assessment
Monday 26	Public Holiday — Australia Day

February

Monday 2	Enrolment period begins for second and later year undergraduate students and graduate students enrolled in formal courses
Tuesday 3	Enrolment period begins for new undergraduate students and undergraduate students repeating first year
Tuesday 24	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 2	**Session 1 begins** — all courses except Medicine III, IV and V
Wednesday 4	List of graduands for April/May ceremonies and 1984 prizewinners published in *The Sydney Morning Herald*
Monday 9	*Last day for notification of correction of details published in The Sydney Morning Herald* on 4 March concerning April/May graduation ceremonies
Friday 13	Last day for acceptance of enrolment by new undergraduate students and re-enrolling undergraduate students (late fee payable thereafter)

April

Thursday 16	Last day for undergraduate students to discontinue without failure subjects which extend over Session 1 only
Friday 17	Good Friday — Public Holiday
Saturday 18	Easter Saturday — Public Holiday
Monday 20	Easter Monday — Public Holiday
Saturday 25	Anzac Day — Public Holiday
Wednesday 29	*Confirmation of Enrolment* forms despatched to all students

May

Friday 8	Last day for acceptance of corrected *Confirmation of Enrolment* forms
Monday 11	**May Recess begins**
Wednesday 13	Last day for undergraduate students completing requirements for degrees at the end of Session 1 to submit *Application for Admission to Degree* forms
Thursday 14	Publication of provisional timetable for June/July examinations
Sunday 17	**May Recess ends**
Friday 22	Last day for students to advise of examination clashes

June

Tuesday 2	Publication of timetable for June/July examinations
Monday 8	Queen's Birthday — Public Holiday
Sunday 14	**Session 1 ends**
Monday 15	**Study Recess begins**
Sunday 21	**Study Recess ends**
Monday 22	**Midyear Recess begins**
	Examinations begin

July

Wednesday 8	Examinations end
Monday 20	Assessment results mailed to students

Tuesday 21	Assessment results displayed on University noticeboards *To Friday 24 July:* Students to amend enrolment programs following receipt of June examination results
Sunday 26	**Midyear Recess ends**
Monday 27	**Session 2 begins**
August	
Friday 7	Last day for students to discontinue without failure subjects which extend over the whole academic year
Monday 24	**August Recess begins**
Tuesday 25	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
Sunday 30	**August Recess ends**
September	
Wednesday 2	List of graduands for October graduation ceremonies published in *The Sydney Morning Herald*
Monday 7	*Last day for notification of correction of details published in The Sydney Morning Herald* on 2 September concerning October graduation ceremonies
Friday 18	Last day for undergraduate students to discontinue without failure subjects which extend over Session 2 only
Monday 28	*Confirmation of Enrolment* forms despatched to all students
Tuesday 29	Last day to apply to UCAC for transfer to another tertiary institution in New South Wales
October	
Monday 5	Eight Hour Day — Public Holiday
Wednesday 7	Last day for acceptance of corrected *Confirmation of Enrolment* forms
Thursday 8	Publication of provisional examination timetable
Friday 9	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 16	Last day for students to advise of examination timetable clashes
Thursday 29	Publication of timetable for November examinations.
November	
Sunday 8	**Session 2 ends**
Monday 9	**Study Recess begins**
Sunday 15	**Study Recess ends**
Monday 16	**Examinations begin**
December	
Friday 4	Examinations end
Monday 21	Assessment results mailed to students
Tuesday 22	Assessment results displayed on University noticeboards
Friday 25	Christmas Day — Public Holiday
Monday 28	Boxing Day — Public Holiday

1988

Faculties other than Medicine

Session 1 **(14 weeks)**	7 March to 15 May
	May Recess: 16 May to 22 May 23 May to 19 June *Study Recess: 20 June to 26 June* *Midyear Recess: 27 June to 31 July*
Examinations	27 June to 13 July
Session 2 **(14 weeks)**	1 August to 28 August
	August Recess: 29 August to 4 September 5 September to 13 November
	Study Recess: 14 November to 20 November
Examinations	21 November to 9 December

Faculty of Medicine

First and Second Years	As for other faculties
Third and Fourth Years	Term 1 (10 weeks) 25 January to 3 April Term 2 (9 weeks) 11 April to 15 May *May Recess: 16 May to 22 May* 23 May to 19 June Term 3 (9 weeks) 27 June to 28 August *August Recess: 29 August to 4 September* Term 4 (10 weeks) 5 September to 13 November
Fifth Year	Term 1 (8 weeks) 25 January to 20 March Term 2 (8 weeks) 28 March to 22 May Term 3 (8 weeks) 30 May to 24 July Term 4 (8 weeks) 1 August to 25 September Term 5 (8 weeks) 5 October to 27 November

University College/Australian Defence Force Academy

Session 1 (14 weeks)	7 March to 8 May *May Recess: 9 May to 22 May* 23 May to 24 June *Midyear Recess: 25 June to 17 July*
Examinations	27 June to 15 July
Session 2 (13 weeks)	18 July to 28 August *August Recess: 29 August to 11 September* 12 September to 28 October
Examinations	31 October to 18 November

Australian Graduate School of Management

Term 1 (10 weeks) 7 March to 13 May

Term 2 (10 weeks) 6 June to 12 August

Term 3 (10 weeks) 5 September to 11 November

January

Friday 1	Public Holiday (New Year)
Friday 8	Last day for acceptance of applications by office of the Admissions Section for transfer to another undergraduate course within the University
Monday 11	Last day for applications for review of results of annual examinations
Tuesday 26	Australia Day — Public Holiday

February

Monday 1	Enrolment period begins for second and later year undergraduate students and graduate students enrolled in formal courses

March

Monday 7	Session 1 begins — all courses except Medicine III, IV and V

April

Friday 1 to Monday 4	Easter—Public Holiday
Monday 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 1986 the University had 18,950 students and over 4,050 staff who worked in more than eighty buildings.

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', ('with Hand and Mind') 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 29 members including parliamentary and ex officio members, members elected by the staff, students and graduates of the University and some appointed by the Minister for Education.

The Council meets at least five 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 ten faculties are Applied Science, Architecture, Arts, Biological Sciences, Commerce, Engineering, Law, Medicine, Professional Studies and Science. In addition, the Board of Studies of the Australian Graduate School of Management (AGSM), the Board of Studies in General Education and the Academic Board of the University College, Australian Defence Force Academy 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 undergraduate courses offered by the Faculties of Biological Science and Science.

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, together with the Deans and the two heads of the administrative divisions.

General Administration

The administrative work of the University is divided between the Deputy Principal (Administration) who is responsible for registrarial, property and staffing matters and the Deputy Principal (Planning and Information) who is responsible for planning information and analysis, finance and the provision of computing services.

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.

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) is available from individual schools.

Co-operative Bookshop

Membership is open to all members of the community, 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 2436.

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 423 men and women students, as well as tutorial and administrative staff members. College life is maintained in an atmosphere which emphasises co-operation, academic purpose and mutual respect. Apply in writing to the Master, PO Box 24, Kensington, NSW 2033.

International House

International House accommodates 154 male or female students from Australia and up to thirty other countries. Generally about 30 disciplines are represented. College life is multicultural and multidisciplinary. 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 210 graduates and under-graduates, without regard to race, religion, or sex. The College, which has its own resident tutors and a Senior Resident Academic Fellow, sponsors a wide range of activities for staff and students of the University and encourages inter-disciplinary discussion. 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 offers accommodation for 180 men of all ages, backgrounds and beliefs. Excellent study conditions and a comprehensive tutorial program are features of College life. These are set in the context of a wide range of cultural, social, spiritual and sporting activities in a friendly and open atmosphere. Non-resident membership of the College is available. Opus Dei, a prelature of the Catholic Church, is responsible for the spiritual care of the College. 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 activities of a spiritual nature are entrusted to Opus Dei, a personal prelature of the Catholic Church. Enquiries: 36 High Street, Randwick 2031. Telephone (02) 398 5693.

Other Accommodation

Off-campus Accommodation

Students requiring other than College accommodation may seek assistance in Room G19, the Chancellery, 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. Accommodation 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.

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-seven clubs.

The Association office is situated in the Link Building, B6, lower campus, and can be contacted on extension 4880. 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.

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.

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.

Student Services

The Student Services staff, located on the ground floor of the Chancellery, 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 and with off-campus housing and student loan matters, 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 G19 or by telephoning 697 3111.

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 thirty-seven 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 in the Link Building, B6, lower campus. The various services may be contacted by telephoning Recreation Program 697 4884; Grounds Bookings 697 4878; Tennis Bookings 697 4877; Sports Association 697 4880.

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, a 50-metre indoor heated swimming pool and a new three-storey 'Link Building'. 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 'Link Building' between the gymnasium and squash courts provides three additional training rooms on the upper floors and administrative and control functions at ground floor level. The recreational program includes intramurals, teaching/coaching, camps. The Centre is located on the lower campus adjacent to High Street. The Supervisor of Physical Recreation may be contacted by telephoning 697 4884.

Student Counselling and Research Unit

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

Together with the Careers and Employment Section, 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 and 5 pm on week days (up to 6 pm on some evenings). A 'walk-in' service for short interviews is available between 9 am and 5 pm. Appointments may be made by telephoning 697 5418 between 9.00 am and 5.00 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.

Together with the Student Counselling and Research Unit, this section is located in the huts near the foot of Basser Steps (access from College Road or Engineering Road).

For further information, telephone 697 5430.

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 697 5425, 697 5426 or 697 5427 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.** Only those persons who were enrolled as Life Members prior to January 1 1985, shall retain such 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 in May-June.

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.

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), where the SU President, Education Vice-President, Education Officer, Clubs and Societies Secretary and Postgraduate Officer are available to discuss student problems. The other is on the Second Floor of the Squarehouse (above the bar) at the bottom end of campus, where the Secretary/Treasurer, Women's Officer, Overseas Student Director, the full-time Solicitor, *Tharunka* and *Campuswide* provide information and student services.

The University Library

The University libraries are mostly situated on the upper campus. The library buildings house the Social Sciences and

Humanities Library on Level 4, the Physical Sciences Library on Level 7 and the Law Library on Level 8. The undergraduate collection is on Levels 3 and 4. 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 Australian Defence Force Academy, 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. For recorded hours of opening telephone 697 2687.

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

The University Union

The University Union provides the amenities which students, staff and graduates require in their daily University life and thus facilitates their knowing and understanding one another through associations outside the lecture room, the library and other places of work.

The Union is housed in a range of buildings across the campus, principal among which are the Roundhouse, the Blockhouse and the Squarehouse located near the Anzac Parade entrance to the University. 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 Union operates a licensed Bar and twelve Food Service points on the campus, providing services ranging from take-away snacks and cafeteria-type meals to an à la carte restaurant operation.

Shops run directly by the Union are the Logo Shop (University-crested gifts, mementoes and clothing), two newsagency/stationery shops, one stationery shop specializing in architecture requisites and an ice cream/confectionery shop. Other facilities operating within buildings occupied by the Union are banks, a credit union agency, hairdressers and a beauty salon, barber, delicatessen, casual clothing shop, pharmacy, dentist, optical dispensing and travel services.

Showers, meeting, games, music practice, reading, craft and dark rooms are provided as well as a Student Resource Area where photocopying, screen printing, stencil cutting and typewriter services and equipment hire are available.

The Union's cultural activities program encompasses creative leisure classes, lunch hour concerts and films, market days and exhibitions.

Further information on Union programs, activities and services is provided in the Annual Union Handbook and in the Creative Leisure Classes and Activities brochures published each session.

Student Membership of Faculties and Boards of Studies

The provisions for the appointment of student members to faculties and boards of studies, stated by resolutions of Council of 9 May 1977, 16 January 1978 and 9 July 1984 are:

1. A person who is not a student of the University shall be ineligible to be appointed as a member of a faculty under these rules.

For the purposes of these rules 'student' means a person who is enrolled as a candidate proceeding to a degree or diploma of the University.

2. Each faculty shall recommend to the Professorial Board for consideration and recommendation to the Council the number, or the formula for determining the number, of students eligible to be appointed as members of that faculty and may at any time recommend changes in such matters.

3. Each faculty may recommend to the Professorial Board for consideration and recommendation to the Council the creation of distinct and separate electorates for the appointment of students as members and may at any time recommend changes in such matters.

4. All elections referred to in this resolution shall be conducted annually by the Registrar or his nominee, who shall be the Returning Officer, in accordance with the provisions of this resolution and any other relevant resolution of the Council, on such a day, being either a day in April or a day in October, and at such places and during such hours and using such election machinery and method of counting as shall be agreed upon between the Registrar or his nominee and the Chairman of the relevant faculty.

5. Elections shall be by personal voting except that students registered as external students and those students not on campus because of course requirements shall be entitled to vote by post and shall be enabled to do so. The Registrar or his nominee in consultation with Chairman of the relevant faculty shall determine which students are so entitled.

6. The successful candidates in any election shall be appointed to their respective faculties by the Registrar or his nominee.

7. A person elected to be a member of a faculty under the provisions of this resolution shall be entitled to such membership for a term of twelve months either from the date of the declaration of the election result or from such other date as shall be agreed between the Registrar or his nominee and the Chairman of the relevant faculty save that such membership of a faculty shall not be retained on ceasing to be a student enrolled in the faculty which entitled election except that:

(1) a person who has ceased to be so enrolled by reason of having completed the course requirements between the time of election and the close of the period for which elected shall retain such membership for the full period, and

(2) a student who has been granted leave of absence from the University in order to carry out the duties of an appointment as a full-time salaried officer of the University Union, the Students' Union, or the Sports Association shall while occupying the office in question be deemed to be a student for the purpose of this resolution and shall retain such membership for the full period.

8. When a casual vacancy in the membership of a faculty occurs either by resignation or by virtue of the provisions of section **7.** above the Registrar shall submit to Council for consideration for appointment to the vacancy for the remainder of the period of membership the name of the candidate if any who polled the greatest number of votes of the unsuccessful candidates at the most recent election in the relevant electorate.

9. That where a casual vacancy occurring in student membership of faculties or boards of studies cannot be filled within the provisions of section **8.** above, the executive committee of any faculty or board of studies be empowered to nominate to the Vice-Chancellor a student or students for consideration of appointment by Council.

10. Any student enrolled at the date on which the nominations close for a course leading to a degree or diploma awarded in a faculty shall be entitled to be nominated for, to be elected for, and to vote in an election for, membership of that faculty in such electorates as may be provided for under section **3.** above.

11. Any student enrolled at the date on which nominations close for a course leading to degrees or diplomas awarded by several faculties shall be eligible in any year to be nominated for, to be elected for, and to vote in an election for, membership of each such faculty in such electorates as may be provided for under section **3.** above, provided that such a student shall not in any year be nominated for, be elected for, or vote in an election for, membership of a faculty unless enrolled in a subject controlled by that faculty in that year.

12. Any student enrolled at the date on which nominations close for a course which contains a General Studies component shall be entitled to be nominated for, to be elected for, and to vote in an election for, membership of the Board of Studies in General Education in such electorates as may be provided for under section **3.** above.

13. Any student enrolled at the date on which nominations close for the Science and Mathematics course (3970) shall be eligible to be nominated for, to be elected for, and to vote in an election for, membership of the Board of Studies in Science and Mathematics in such electorates as may be provided for under section **3.** above.

14. In the interpretation of these provisions the expression 'faculty' includes 'boards of studies'.

Electorates

Electorates for student membership of faculties and boards of studies were defined by Council resolution.

Faculty of Applied Science

Five members elected by and from the students of the Faculty.

Faculty of Architecture

Four members elected by and from the students of the Faculty.

Faculty of Arts

Six members elected by and from the students of the Faculty.

Faculty of Biological Sciences

(1) Two members elected by and from the graduate students of the Faculty.

(2) One member elected by and from the undergraduates of the Faculty.

In the event of insufficient nominations being received from either electorate, the vacant place(s) shall be filled by the candidate(s), if any, receiving the greatest number of votes of the unsuccessful candidate(s) in the other electorate of the Faculty.

Faculty of Commerce

One member for each 500 students elected by and from the students of the Faculty, with a minimum number of three members, including where possible at least one candidate registered for an undergraduate degree and at least one candidate registered for a graduate degree or diploma.

Faculty of Engineering

(1) Two members elected by and from the undergraduates of the School of Civil Engineering.

(2) Two members elected by and from the undergraduates of the School of Electrical Engineering and Computer Science.

(3) Two members elected by and from the undergraduates of the School of Mechanical and Industrial Engineering.

(4) Two members elected by and from the undergraduates of the School of Surveying.

(5) Two members elected by and from the graduate students of the Faculty.

Faculty of Law

One student member for every 200 registered students (or fraction thereof) or one student member for every ten full-time teachers on the Faculty (or fraction thereof), whichever is the greater, elected by and from the students of the Faculty.

Faculty of Medicine

(1) One member elected by and from the undergraduates in Year 1 of the Medicine course.

(2) One member elected by and from the undergraduates in Year 2 of the Medicine course.

(3) One member elected by and from the undergraduates in Year 3 of the Medicine course.

(4) One member elected by and from the undergraduates in Year 4 of the Medicine course and those students enrolled in the course leading to the award of the degree of BMedSc.

(5) One member elected by and from the undergraduates in Year 5 of the Medicine course and the graduate students of the Faculty.

Faculty of Professional Studies

(1) One member elected by and from the undergraduates in the School of Education.

(2) One member elected by and from the undergraduates in the School of Health Administration.

(3) One member elected by and from the undergraduates in the School of Social Work.

(4) One member elected by and from the graduate diploma students in the School of Education.

(5) One member elected by and from the graduate diploma students in the School of Health Administration, the School of Librarianship and the School of Social Work.

(6) One member elected by and from the graduate students, other than the graduate diploma students, in the School of Education.

(7) One member elected by and from the graduate students, other than the graduate diploma students, in the School of Health Administration, the School of Librarianship and the School of Social Work.

Faculty of Science

(1) Two members elected by and from the undergraduates in the Pure and Applied Chemistry degree course (3910) and the Optometry degree course (3950).

(2) One member elected by and from the graduate students of the Faculty.

Board of Studies in Science and Mathematics

Three members elected by and from the undergraduates in the Science and Mathematics course (3970).

Australian Graduate School of Management Board of Studies

(1) Two members elected by and from the students enrolled in either the MBA degree course.

(2) One member elected by and from the students enrolled for the degree of Doctor of Philosophy in the AGSM.

Australian Graduate School of Management Board of Management

One member elected by and from the higher degree students in the AGSM (elected for a calendar year).

The provision for retention of membership of faculties and boards by students who are appointed officers of the University Union, the Sports Association and the provisions for filling casual vacancies, *do not* apply to membership of the AGSM Board of Management.

Board of Studies in General Education

(1) One member elected by and from the graduate students of the Board of Studies.

(2) Three members elected by and from the undergraduates enrolled in courses containing a General Studies component.

Academic Board, University College, Australian Defence Force Academy

(1) One member elected by and from the undergraduates enrolled in the BA degree course.

(2) One member elected by and from the undergraduates enrolled in the BSc degree course.

(3) One member elected by and from the undergraduates enrolled in the BE degree course.

(4) One member elected by and from the graduate students of the University College.

Financial Assistance to Students

Tertiary Education Assistance Scheme

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

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

- Undergraduate and graduate bachelor degree courses;
- Graduate diplomas;
- Approved combined bachelor degree courses;
- Masters 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.

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. The Commonwealth Government has 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.

Students who are in extremely difficult financial circumstances may apply for assistance by way of a 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 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 Student Services, Room G19, 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, Aboriginal students may apply for loans from the Student Loan Funds.

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. Under the terms of this Bequest the Vice-Chancellor approved the establishment of a Centre for Aboriginal Students. This Centre, which began operating in 1985, provides support for Aboriginal students who are enrolled in the University and who wish to use the Centre and its resources. The Centre has a Resident Supervisor.

All enquiries relating to these matters should be made at the office of Student Services, Room G19, 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 Student 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 1 pm and 2 pm to 5 pm, Monday to Friday. During enrolment it is also open on some evenings.

Information may be obtained here about admission to first year undergraduate courses, 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.
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.

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.**

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.

An Adviser for Prospective Students, Mrs Fay Lindsay, is located in the huts near the foot of Basser Steps (access from Engineering Road), 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 twenty-four tertiary institutions in the State including all universities are required to lodge a single application form with the Universities and Colleges Admissions Centre (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 seven universities and the 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 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.

First year students who enrol and subsequently discontinue without failure their whole course will be permitted to re-enrol the following year providing they do not enrol at another tertiary institution. They must confirm their intention to re-enrol by lodging an application with the Universities and Colleges Admissions Centre.

Admission Requirements

A candidate for any degree of Bachelor of the University must have qualified for matriculation.

In addition, candidates must be selected before being permitted to enrol in a course. In 1987 it is necessary for the University to limit the number of students enrolling in all undergraduate courses.

Matriculated student

A candidate who has satisfied the conditions for matriculation and for admission to a course of study shall be classed as a 'matriculated student of the University', after enrolment.

A person who has satisfactorily met the conditions for admission may be provided with a statement to that effect.

Special entry to the University

Special provisions apply to Aboriginal students, to older students and to those who may have suffered educational disadvantage.

For details see after Supplementary Provision for Matriculation in the following section.

Enrolment Procedures and Fees Schedules 1987

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 (see section **13.** below) in which to pay fees from the Student Enquiry Counter, 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 number be given accurately. Cash should not be sent through the mail.

2. New Undergraduate Enrolments

Persons who are applying for entry in 1987 must lodge an application for selection with the Universities and Colleges Admissions Centre, GPO Box 7049, Sydney 2001, by 1 October 1986.

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 in accordance with the procedures set out in the current *Enrolment Procedures* booklet, available from the Student Enquiry Counter in the Chancellery and from School offices. Undergraduate students 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 1986.

First year students who enrol and subsequently discontinue without failure their whole course will be permitted to re-enrol the following year providing they do not enrol at another tertiary institution. They must confirm their intention to re-enrol by lodging an application with the Universities and Colleges Admissions Centre.

4. Restrictions Upon Re-enrolling

Students who in 1986 have infringed the rules governing re-enrolment should not attempt to re-enrol in 1987 but should follow the written instructions they will receive from the Registrar in December 1986.

5. New Research Students

Students enrolling for the first time in graduate research degree courses will be advised by letter concerning the method of enrolment. Enrolment other than in accordance with the procedure set out in this letter will incur a penalty (see section **16.** below).

6. Re-enrolling Research Students

Students undertaking research degree courses (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 undertaking formal masters degree courses (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 project report are required to re-enrol by the end of the second week of Session 1. Completion of enrolment after that time 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 enrol as a miscellaneous student in that subject.

(3) A student who is under exclusion from any course in the University may not 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.

(5) There are quota restrictions on the number of students allowed to enrol as miscellaneous, irrespective of whether they have approval from the Head of School. Applicants with written Head of School approval may be permitted to enrol providing there are places available in the quotas.

(6) As a general rule the University does not permit miscellaneous students to enrol in first year undergraduate subjects. Enquiries concerning eligibility for enrolment may be made at the Student Enquiry Counter, the Chancellery (telephone 697 3095).

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 students after the end of the second week of Session 1 (13 March 1987) except with the express approval of the Registrar 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 (7 August 1987) except with the express approval of the Registrar and the Heads of the Schools concerned.

10. Student Card — Conditions of Issue

All students enrolled in degree or diploma courses or as miscellaneous students are issued with a University of New South Wales Student Card. All students are issued with cards on their initial enrolment.

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

(1) The card must be carried at the University and shown on request. It must be presented when borrowing from the University libraries, when using Library facilities and when applying for concessions.

(2) The card is not transferable.

(3) The student to whom the card has been issued must notify the Circulation Department of the Library of its loss or theft. Failure to do so may result in the cardholder being held responsible for items issued on the card after its loss or theft.

(4) The card is valid only for the period of enrolment as indicated on the receipt issued by the Cashier at enrolment each year.

(5) The cardholder accepts responsibility for all Library books issued on his/her card and agrees to return books by the due date.

(6) If the card is damaged or becomes otherwise unusable, it is the cardholder's responsibility to seek replacement.

(7) The card always remains the property of the University and must be returned to it when the holder leaves the University.

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 pay their own fees and a refund 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 for an extension of time (see section **13.** below) 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 for an extension of time, which may be granted in extenuating circumstances. Such applications must be made, in writing, before the due date and lodged at the Student Enquiry Counter, the Chancellery.

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 cease to be entitled to the use of University facilities. Such students are not permitted to enrol 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 (24 April 1987). 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 (11 September 1987).

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.

Administration Charge $250

University Union Entrance Fee

Payable on first enrolment $43

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, or the Sports Association, 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 have been approved for 1987.

University Union annual subscription $123

Sports Association annual subscription $30

Students' Union Annual Subscription

Students enrolling in full-time courses $37

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

Miscellaneous Fund annual fee $43

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 or the Sports Association should make enquiries about the matter at the offices of those bodies.

(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 University College (Australian Defence Force Academy) 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 Registrar 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 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 Registrar 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 Registrar 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, the teaching 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 *Variation of Enrolment* form available from the appropriate Course Authority and the Student Enquiry Counter.

(2) Students withdrawing from courses (and see also information about withdrawal from subjects below) are required to notify the Registrar in writing or complete the withdrawal form available from the Student Enquiry Counter. In some cases such students will be entitled to fee refunds (see (5) below).

(3) Enrolment in additional subjects

Applications for enrolment in additional subjects must be submitted by:

13 March 1987 for Session 1 only and whole year subjects;
7 August 1987 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 (16 April or 18 September).

(b) for whole year subjects, the end of the second week of Session 2 (7 August).

(5) Withdrawal from Course

First year students who enrol and subsequently discontinue without failure their whole course will be permitted to re-enrol the following year providing they do not enrol at another tertiary institution. They must confirm their intention to re-enrol by lodging an application with the Universities and Colleges Admissions Centre.

(6) 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 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 (27 March 1987) 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 (16 April 1987) a refund of three-quarters of the Student Activities Fees paid will be made; if notice is given before the beginning of Session 2 (27 July 1987) 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 (18 September 1987) 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 (27 March or 21 August 1987) 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 (16 April or 18 September 1987) 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 Registrar to a student unable to notify the Registrar in writing by the times required provided evidence is supplied that the student has ceased attendance by those times.

(7) Acknowledgements

The Registrar 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 (17 April or 18 September) will be incorporated in the *Confirmation of Enrolment Program* notice forwarded to students on 28 April or 29 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.

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

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.

Higher degree and graduate diploma candidates may apply for suspension of enrolment under similar conditions.

Undergraduate Course Transfers

Students wishing to transfer from one course to another must complete and submit an application form, obtainable from the Student Enquiry Counter, the Chancellery, by Friday 9 January 1987.

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 1986 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 University 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.

Timetables

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

October. Students must advise the Examinations Section (the Chancellery) of any clash in examinations.

Final timetables indicating the dates, times, locations, and authorized materials 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

Assessment result advices include the final composite marks students achieve in subjects taken that session.

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 and change of address forms are obtainable at the Student Enquiry Counter, the Chancellery. Forms can be accepted up to Friday 3 July for Session 1 results and Friday 4 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 and in any event no more than seven days after the final examination in a subject.

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 the Officer-in-Charge Examinations Section (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 to make special arrangements for their examinations, should contact the Examinations Section as soon as the final timetable becomes available.

Use of Computers and Electronic Calculators

The use of computers or electronic calculators may be permitted in examinations conducted within the University. Computers and electronic calculators which are authorized by the University for this purpose must be *hand-held, internally powered, and silent.* Computers are distinguished from electronic calculators for this purpose by the existence of a full alphabetic keyboard on them. Computers are not permitted in examinations for which an electronic calculator has been specified. When an electronic calculator is permitted in an examination, any programmable memory on it must be cleared prior to entering an examination room.

The University does not provide computers or electronic calculators of the kind described in this rule for use in examinations 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 required to be in their places at least fifteen minutes before the commencement to hear announcements.

Reading the Examination Paper

The examination paper will be available for reading ten minutes before the instruction is given to commence writing.

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 Officer-in-charge, 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:

1. taking unauthorized materials into an examination;

2. submitting work for assessment knowing it to be the work of another person;

3. improperly obtaining prior knowledge of an examination paper and using that knowledge in the examination.

4. 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 specified material, 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.

Writing in Examinations

Candidates are permitted to take pens, pencils and erasers into the examination room but are advised that all answers must be written in ink. Except where expressly required, pencils may be used only for drawing, sketching or graphical work.

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.

Restriction upon Students Re-enrolling

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

First Year Rule

1. Students enrolled in the first year of any undergraduate course of study in the University shall be required to show cause why they 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.

The first year rule does not apply to students who discontinue without failure all Session 2 and whole-year subjects.

Repeated Failure Rule

2. Students shall be required to show cause 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 that 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 assessment committee may, in special circumstances, exempt students from some or all of the provisions of Rules **1.** and **2.**

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

Showing Cause

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

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

Appeal

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

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

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

The Chairman of the Professorial Board, or 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 a student's program.

Faculty/Board of Studies	Minimum Requirement	Course	Unit Values (UV)
Applied Science	Half the program	3000-3220	One-session subjects: UV 1 Two-session subjects: UV 2
Architecture	Half the program	3275, 3330	Elective subjects: UV 0 All other subjects: appropriate UV corresponding to credit points*
		3360, 3380	Elective subjects: UV 0 All other subjects: UV equal to the allocated hours*
Arts	18 Level I credit points*	3400-3420	
Biological Sciences	4 units	3431	Science subjects: appropriate UV* Arts subjects: 6 credit points = UV 1 12 credit points = UV 2
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	3610-3612, 3660-3662, 3680-3682, 3700-3702	5.061: UV 0 One-session subjects: UV 1 Two-session subjects: UV 2
	Half the program including Statics or Mathematics I	3620, 3730	All subjects: UV equal to the allocated hours*
	Half the program including Physics I or Mathematics I	3640, 3720-3725	One-session subjects: UV 1 Two-session subjects: UV 2
	Half the program	3740, 3760	One-session subjects: UV 1 Two-session subjects: UV 2
Law	Half the program	4710-4790	One-session subjects: UV 1 90.741: UV 0 All other two-session subjects: UV 2
Medicine	Half the program	3800	80.010: UV 3 81.001: UV 3 81.002: UV 6 70.001: UV 4 One General Studies elective: UV 1
Professional Studies	Half the program	4030, 4040	All subjects: UV 1
		4070-4080	All subjects: appropriate UV* One General Studies elective: UV 1
Science	Half the program	3950-3951	All subjects: appropriate UV* One General Studies elective: UV 1
Science and Mathematics	2 units	3970	All subjects: appropriate UV* One General Studies elective: UV 1
University College (Australian Defence Force Academy)	Half the program	BA, BSc	All subjects: UV 1
		BE	All subjects: appropriate weighted mark*

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 second Friday 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 *Confirmation of Enrolment Program* notice 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, 3970, 8080, 8220, and 8240** 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 September for those completing requirements at the end of Session 1, or before March 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 January.

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 first Wednesday in March.

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 first Wednesday in September.

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

If graduands are indebted to the University their names will not appear in the list of graduands published in the newspaper, and they will not be permitted to graduate until the debt has been cleared.

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 in April and 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 Department of the Registrar 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 4 December, 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 Ceremonials Section, Room LG2, the Chancellery (phone extension 3112).

Further Information

Lost Property

All enquiries concerning lost property should be made to the Supertintendent (Patrol and Cleaning Services) on extesion 3460 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.

Introduction to the Sciences Handbook

This handbook has been designed to assist understanding of the academic activities of three interrelated 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

Some People Who Can Help You

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 K. Irvine, Administrative Assistant

Dr B. J. Burn, Co-ordinator of Studies in Science and Mathematics
Room LG06, Biological Sciences 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 1987 or enrolling in graduate courses should obtain a copy of the free booklet ***Enrolment Procedures 1987*** 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 LG06, Biological Sciences Building. All re-enrolling students should collect one of these timetables along with a preliminary enrolment form (SM87). 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 Library and the undergraduate collection while those of the Faculty of Science are served mainly by the Physical Sciences Library. The undergraduate collection and services are useful to students from both faculties.

The Biomedical Library

The Biomedical Library provides library services for staff and students from the Faculties of Medicine and Biological Sciences, and from the Schools of Food Science and Technology, Health Administration and Wool and Pastoral Sciences. It is closely associated with the libraries of the teaching hospitals of the University.

The Biomedical Library is located on Levels 2, 3 and 4 of the Mathews Building Annexe and is connected to the other Special Libraries via a link through the undergraduate collection.

Professional staff are available at the Reader Assistance Unit on Level 2 to provide reference services and to assist in the use of the catalogues. Instructional classes in the use of the library and in specific subject material can be arranged.

Computerized literature searches and interlibrary loans are also available.

Biomedical Librarian — Monica Davis

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 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

Undergraduate Services

- The undergraduate collection caters for the needs of students in Years 1 and 2 and other groups where large numbers require mass teaching. Levels 3 and 4.
- The Open Reserve Section, houses books and other materials which are required reading. Level 2.
- The Audio Visual Section contains cassette tapes, mainly of lectures and other spoken word material. The section has wired study carrels and cassette players for student use. Level 3.
- The Reader Education program provides orientation tours and introductory library research method lectures to students.

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 Psychological Society

The Psychological Society aims to provide activities both educational and social for students of psychology, and, more generally, to act as an intermediary body between students of different years, and staff.

The Society organizes a variety of activities including staff-student functions, informal discussions, film showings, and occasional talks and seminars. An activities fee enables the Society 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 S. H. Huxham, School of Mathematical Sciences, N.S.W.I.T., P.O. Box 123, Broadway, NSW 2006.

Undergraduate Study: 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.

Most Schools and Departments do not offer a full range of Level III units in the evening. Those concerned are marked below with ‡.

Students seeking *general advice* should contact the Board of Studies in Science and Mathematics Office (Room LG06, Biological Sciences Building, map reference D25) and for *advice in specific disciplines* should contact the representative of the relevant School as listed below:

First Year Biology Unit	Dr B. Fox
‡ School of Anatomy	Dr D. J. Tracey
‡ Department of Applied Geology	Mr G. J. Baldwin
‡ School of Biochemistry	Mrs J. Gibbons
‡ Department of Biotechnology	Associate Professor N. W. Dunn
‡ School of Botany	Dr R. J. King
‡ School of Chemistry	Dr D. S. Alderdice Dr T. J. V. Findlay (Year 1) Associate Professor M. A. Long (Year 2) Dr P. R. Haddad (Year 4)
‡ School of Community Medicine	Dr A. E. Stark
‡ School of Electrical Engineering and Computer Science	Dr P. W. Baker
‡ School of Geography	Dr J. Dodson
‡ School of History and Philosophy of Science	Dr D. Miller
School of Mathematics	Associate Professor A. H. Low (Year 1) Miss M. Potter
‡ Marine Science	Dr P. Dixon
School of Mechanical and Industrial Engineering	Associate Professor E. J. Hahn
‡ School of Microbiology	Dr E. Hazel
‡ School of Philosophy	Mr P. C. Gibbons

‡ School of Physics	Dr G. J. Russell (Year 1) Dr J. R. Hanscomb
‡ School of Physiology and Pharmacology	Dr B. S. Nail *or* Associate Professor M. J. Rowe
‡ School of Psychology	Dr K. R. Llewellyn Mr T. J. Clulow
‡ School of Zoology	Dr P. 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: Chemical Engineering and Industrial Chemistry, Geography, Mines (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 Biological Sciences, Professor A. J. Wicken.

The Chairman is Professor H. J. Goldsmid.

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

‡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 humans' material conditions and in widening their imaginative horizons and their understanding of the universe.

9. To provide opportunities for the development of students' motivations and social maturity, and an awareness of their own capabilities in relation to a choice of career which will be fruitful to themselves 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 exception of quota restricted programs and with approval of the Co-ordinator of Studies, 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 LG06 (Biological Sciences Building, map reference D25).
- The programs listed 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 4 Level III units of each of 2 disciplines or 8 Level III units in a single 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, 10.011 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.

For Entry to Year 4 students are required:

1. to have completed Years 1, 2 and 3 of the specific program and to have satisfied prerequisite requirements as specified in Table 3;
2. 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;
3. to have completed relevant subjects normally with better than passing grades;
4. to have the approval of the appropriate Head of School at the end of Year 3.

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

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 or her studies for the pass degree, he or she has satisfied the prerequisites for proceeding to honours level laid down by the School or Schools concerned.

Workload

The expected maximum workload for students devoting most of their time to this course is four science units per session. This can only be exceeded in exceptional circumstances by students with a good academic record and requires the permission of the Co-ordinator of Studies.

Students with external commitments, such as part-time employment, in excess of ten hours per week, should take fewer units. External commitments are not to be taken into consideration in relation to such matters as extensions of time for written work or failure to attend examinations, which may, for some subjects, be scheduled on Saturday mornings.

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 combined 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 is not 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. A few programs are set out as Years 1, 2 and 3 and lead to the pass degree only.

Students wishing to take a double major are warned that due to timetabling difficulties it may take longer than three years to complete degree requirements.

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 program* **7000**
Biochemistry	*see program* **4100**
Biology	Biology is taught in Year 1 as a single discipline but in later years as specific subjects: biotechnology, biochemistry, botany, genetics, microbiology and zoology.
Biotechnology	*see program* **4200**
Botany	*see program* **4300**
Chemistry	*see programs* **0200, 0205**
Community Medicine	units *available in some programs* (the identifying number is **79**)
Computer Science	*see program* **0600**
Genetics	*see program* **6840**
Geography	*see program* **2700**
Geology	*see programs* **2500, 2503**
History and Philosophy of Science	*see program* **6200**
Information Systems	*see program* **1400**
Marine Science	*see programs* **6831, 6832, 6833, 6834**
Mathematics	*see programs* **1000, 1006, 1061, 6810**
Microbiology	*see program* **4400**
Pharmacology	*see program* **7300**
Philosophy	*see program* **5200**
Physics	*see programs* **0100, 0161, 2503**
Physiology	*see program* **7300**
Psychology	*see program* **1200**
Zoology	*see program* **4500**

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

The study programs offered by the School of Physics reflect the importance of Physics in science and technology at both the fundamental and at the applied levels. Thus within the Board of Studies in Science and Mathematics, professional training in Physics is provided by programs 0100 and 0161 while in areas such as Engineering a number of courses are available in which Physics is combined as a major study.

These features are summarized in the following table:

Professional Training in Physics	Physics in other Courses
Program	Courses
0100 Physics *Including:* Theoretical Physics Applied Physics Biophysics Physics/Geology 0161 Physics/Computer Science	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 Education with Physics

Professional Training

Program 0161 (Physics/Computer Science) has been carefully structured to include not only the basic units of Physics but also those Mathematics and Computer Science units necessary to meet the specific aims of the program. Only minor variations from this program can be considered.

On the other hand, program 0100 (Physics) offers greater flexibility in the choice of units particularly for the student who intends to take out the BSc degree at Pass level after 3 years. Also, for those students who intend to proceed further, Honours may be taken in either Physics, Theoretical Physics, Applied Physics, Physics/Geology or Biophysics.

Sample programs of study and guidance as to the choice of units can be obtained from the School. The following information relating to program **0100** should be particularly noted:

Program 0100

1. It is suggested that the units chosen in Year 1 might comprise 6.611, 1.061, 2.121, 2.131.
2. Students wishing to proceed to Year 4 (Honours) must complete at least 7 Level III units. These will normally be taken from the Physics units on offer (unless the student is specializing in Biophysics or in Geology) and include at least *one* of 1.0533, 1.0543, 1.133, 1.763 for students majoring in Physics or in Applied Physics.
3. For the study of Applied Physics certain Level III units are strongly recommended. These are units of a more applied nature eg 1.133 Electronics.
4. For the study of Theoretical Physics, additional mathematics units are specified. Thus in Year 2 students should include unit 10.111A (or 10.121A) and in Year 3, unit 10.212D (or 10.222D). Certain Level III units of a theoretical nature, eg 1.1133 are also strongly recommended.

5. Arrangements exist to enable a joint major in Physics/Geology. Students are expected to include 2 units of Geology in Year 2 and 4 units of Geology in Year 3. The possibility of joint majors in other subjects (eg Mathematics or Chemistry) exists.

6. For the study of Biophysics, students are required to take Chemistry and Biology units in Year 1 and Biochemistry in Year 2 in addition to Physics units.

7. In addition to the above there are other areas of study of major interest. Thus an introduction to Astrophysics and Optics is available to students choosing the elective units 1.1633, 1.713, 1.763, 1.773 and the study of Condensed Matter (Solid State) Physics may be furthered by the inclusion of elective units such as 1.3133 and 1.3143.

8. In certain circumstances unit 1.002 may be deferred to Year 3.

Subject descriptions of the units may be found in another section of this handbook. As is to be expected, several of the elective units mentioned above reflect the research interests of the various Departments of this School. These are at present five in number: Applied Physics, Astrophysics and Optics, Biophysics, Condensed Matter Physics, Theoretical Physics.

Physics in other Courses

The previous page lists those courses which have been arranged with other schools. Several of these can lead to honours in Physics (eg 3725, 5801) so it must not be thought that the only avenue to specialization in Physics is via the professional programs 0100, 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 or she has a special interest but which is not a recommended one in the program.

0100 Physics**

Year 1
1.001
10.001 *or* 10.011* — *Physics*
Choose 4 Level I units from:**†† — *Mathematics*
1. Table 1 *and/or*
2. Table 2 for program 0100

Year 2
1.002††, 1.012, 1.022, 1.032
10.1113*, 10.1114*, 10.2111*, 10.2112*
Choose 2 units from:**
1. Table 1 *and/or*
2. Table 2 for program 0100
1 General Studies elective

Year 3†
1.0133, 1.0143††, 1.023, 1.0333, 1.0343††, 1.043
Choose at least 3 units from:**
1. Table 1 *and/or*
2. Table 2 for program 0100
1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 7 Level III units.

Year 4 (Honours)
Choose one of 1.104, 1.304, 1.504, 1.604, 68.430

*Students are encouraged to select Higher Level Mathematics units where applicable.

**Students should read carefully the above description relating to program 0100 and seek advice from the School of Physics regarding the choice of units. An incorrect choice of units could exclude a student from the study of certain areas of Physics and/or prevent the combination of Physics with other disciplines.

†See footnote to program 6200.

††Students with a special interest in Biophysics may replace unit 1.002 with unit 2.102B and units 1.0143 and 1.0343 with the Biophysics units 1.1433 and 1.1533 provided 2.121, 2.131, 17.031 and 17.041 are completed in Year 1 and 41.101 is taken in Year 2.

0161 Physics/Computer Science

Year 1††
1.001, 1.061 — *Physics*
6.611 — *Computing*
10.001 *or* 10.011* — *Mathematics*
Choose 2 Level I units from Table I**

Year 2
1.012, 1.022, 1.032
6.621, 6.641
10.1113*, 10.1114*, 10.2111*, 10.2112*
Choose 1 unit from 1.062, 6.631†, 10.111A*
1 General Studies elective

Year 3
1.002, 1.0133, 1.023, 1.0333
Choose 2 further Level III Physics units
Choose 1 Level III Computer Science unit
Choose 2 units from:**
1. 1.062, 6.631†, 10.212A*, 10.212D*, 10.612
2. Level III Physics units
3. Level III Computer Science units
1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 6 Level III units.

Year 4 (Honours)**
Choose one of 1.104, 1.304, 1.504

*See footnote to program 0100.

**Students intending to proceed to Year 4 are required to choose appropriate units. This choice is determined by the requirements of program 0100. Students are required to consult the School of Physics.

†The 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.

††Quota restrictions apply to most Level III Computer Science units. Students wishing to take these units should in Year 1 apply for entry to the Computing quota. Advice should be obtained from the office of the Board of Studies in Science and Mathematics.

Geophysics

See program 2503

Recommended Double Majors

Physics/Geology
Physics and Science Policy Studies (See program 6200 for further details)

Chemistry

The School 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, and servicing to other faculties.

The study program 0200 offered by the School of Chemistry provides both a basic scientific education and a professional training in chemistry. Fundamental, applied, environmental and industrial aspects of chemistry are included. The program allows the study of chemistry to be combined with the study of another discipline, for example, physics, biochemistry, mathematics or computer science, by suitable choice of units.

Suitable choice of units makes it possible to study chemistry as a co-major with another branch of science (eg geology, biochemistry, computer science, biotechnology, physiology) to an advanced level. A combination of Level III chemistry and mathematics units provides a useful basis for specialization in aspects of physical or theoretical chemistry whilst a combination of Level III chemistry and geology units is suitable for those who wish to specialize later in geochemistry. Level III chemistry and physiology units could form the basis of specialized studies of body chemistry.

Students wishing to undertake the maximum number of chemistry units should follow Program 0205 Pure and Applied Chemistry. This involves 14 chemistry units and is referred to as a double major in terms of the Science and Mathematics course. It is designed for specialization in chemistry and should be selected by students who wish to devote their studies at Level III entirely to chemical topics.

The Chemistry 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. 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.

The Chemistry programs have a first year of study which includes chemistry, physics and mathematics, in common with many other programs, and an elective. It is in the choice of this elective that special care has to be given as an incorrect choice could exclude the combination of chemistry with another selected discipline at Level II or III, (eg omission of biology units would preclude taking biochemistry at Level II). Advice from the course advisors should be sought on this point.

The Chemistry programs lead to study 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 the time to research under the direction of a member of staff as supervisor. A 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.*

0200
Chemistry**

Year 1

1.001	*Physics*
2.121 *and* 2.131, *or* 2.141	*Chemistry*
10.001 *or* 10.011 *or both* 10.021B *and* 10.021C	*Mathematics*

Choose 2 Level I units from Table 1

Year 2*

2.102A, 2.102B, 2.102C, 2.102D
Choose 3 units from Table 1
2 General Studies electives

Year 3†

Choose 4 Level III Chemistry units of which at least 3 are from:
2.103A, 2.103B, 2.103C, 2.103D
Choose 4 units from Table 1

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units.

Year 4 (Honours)

2.004

*Students wishing to do a co-major of Chemistry with Geology or Biotechnology may apply for a variation of the specified units to the Programs Committee of the Board of Studies in Science and Mathematics.

**Students should read carefully the above descriptions relating to programs 0200 and 0205 and seek advice from the School of Chemistry regarding the choice of units.

†See footnote to program 6200.

0205
Pure and Applied Chemistry**

Year 1

1.001	*Physics*
2.121 *and* 2.131, *or* 2.141	*Chemistry*
10.001 *or* 10.011 *or both* 10.021B *and* 10.021C	*Mathematics*

Choose 2 Level I units from Table 1

Year 2

2.102A, 2.102B, 2.102C, 2.102D
Choose 3 units from Table 1
2 General Studies Electives

Year 3

2.103A, 2.103B, 2.103C, 2.103D
Choose 4 Level III Chemistry units

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units.

Year 4 (Honours)

2.004

**Students should read carefully the above descriptions relating to programs 0200 and 0205 and seek advice from the School of Chemistry regarding the choice of units.

Recommended Double Majors

Chemistry/Biochemistry
Chemistry/Biotechnology
Chemistry/Computer Science
Chemistry/Geology
Chemistry/Mathematics
Chemistry/Physics
Chemistry/Physiology
Chemistry/Science Policy Studies
(See program 6200 for further details)

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 (program 0600 — Computer Science), enrol in their first year in program 6806. Students in program 6806 may also have the alternative of entering program 1400 (Information Systems) at the end of their first year. Acceptance into programs 0600 or 1400 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) 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.

0600 Computer Science*

Year 1*

6.611 — *Computing*
10.001 *or* 10.011 — *Mathematics*
Choose 5 Level I units from:**
1. Table 1 *and/or*
2. The BA course *and/or*
3. Table 2 for program 0600

Year 2

6.621, 6.631, 6.641
Choose 5 units from:**
1. Table 1 *and/or*
2. The BA course *and/or*
3. Table 2 for program 0600
1 General Studies elective

Year 3

Choose 4 Level III Computer Science units
Choose 3 units from:**
1. Table 1 *and/or*
2. The BA course *and/or*
3. Table 2 for program 0600
1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units including 6.613, 6.632, 6.642 & 6.643.

Year 4 (Honours)

6.606

*In Year 1 students who have not gained direct entry to this program must enrol in program 6806. Enrolment in Year 2 is based on academic performance in Year 1.
**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: Economics, English, French, German, History, Political Science, Russian, Sociology, Spanish and Latin American Studies and Theatre Studies. History and Philosophy of Science and Philosophy subjects are available in Table 1. 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.)

Computer Science/Physics

See program 0161 Physics/Computer Science

Computer Science/Mathematics/ Statistics

See program 1061 Mathematics or Statistics/Computer Science

See also

1400 Information Systems

Mathematics

The School of Mathematics is divided into Departments of Pure Mathematics, Applied Mathematics 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. 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 is concerned with the development of mathematics and mathematical models for understanding scientific phenomena, for the solution of technical and industrial problems, and for use in the social, economic and management sciences. Problems originate not only from the physical and engineering sciences, but also from such diverse areas as the biological sciences, computer science, the communication industry and commerce. Courses in Applied Mathematics are designed to provide basic mathematical and computational skills needed for a wide range of applications, to develop the capability to construct, analyse, and interpret mathematical models, and to encourage enthusiasm for the role of the mathematician in a variety of contexts.

The major research interests of the Department of Applied Mathematics are:

1. Optimization control theory and operations research, with applications in a wide range of areas.
2. Numerical analysis and mathematical computing.
3. Nonlinear dynamical systems.
4. Fluid dynamics, with a special interest in oceanographic and environmental applications.

The Department of Applied Mathematics offers training to graduate research level in each of these areas.

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

Program 1000 (Mathematics)

Within this program it is possible to major in Pure Mathematics, Applied Mathematics or to undertake a General Mathematics major with a mixture of Pure and Applied Mathematics and possibly some Statistics; it is also possible by extending the program to four years to undertake Honours in Pure Mathematics or Applied Mathematics. Students wishing to major or undertake Honours in Statistics should consult program 1006.

Pure Mathematics major

Any completed 1000 program will be deemed to be a major in Pure Mathematics if it has included the equivalent of four units made up of units and half units listed in Table 1 as Pure Mathematics Level III or Higher Pure Mathematics Level III.

It is strongly recommended that students choose, among the many optional mathematics units, those which are appropriate to their interest. In particular, 10.081 in Year 1 is recommended. Furthermore:

1. Pure Mathematics units relevant to the mathematical aspects of Computer Science are 10.1115 and 10.1116 in Year 2, and 10.1123 and 10.1521 in Year 3.

2. Pure Mathematics units relevant to mathematics teaching are 10.1111, 10.1112, 10.1121, 10.1124, 10.1127 and 10.1128 in Year 3, or their higher equivalents.

3. Pure Mathematics units relevant to the applications of mathematics in physics or engineering are 10.1125, 10.1126, 10.1128, 10.1522 and 10.1523 in Year 3.

Pure Mathematics Department staff will be happy to advise students on choices of units appropriate to their study goals.

Pure Mathematics Honours

Honours in Pure Mathematics is obtained by completing 10.123, for which the normal prerequisites are at least three Pure Mathematics III units (total value) at the Higher Level. However, students with a credit average in at least four Level III Mathematics units may also be considered for entry into Pure Mathematics 4. Usually, students doing Honours in Pure Mathematics do Higher level courses from Year 1 onwards.

Pure Mathematics Department staff will be happy to advise students on choices of units appropriate to their study goals.

Applied Mathematics major

Any completed 1000 program will be deemed to be a major in Applied Mathematics if it has included four units (total value) of units and half units listed in Table 1 as Level III Applied Mathematics (or their higher equivalent). When selecting optional units in program 1000, the following choice of mathematics courses (or their higher equivalent) are strongly recommended.

Year 2: At least two of 10.2113, 10.2115, 10.4111, 10.4112.

Year 3: At least three of 10.212A, 10.212B, 10.212D, 10.212L, 10.212M, 10.212N, 10.222C.

In addition, Applied Mathematics students are expected to select relevant units from other disciplines according to the particular applications of mathematics in which they are interested. The following choices are recommended in first year.

1. Applied mathematics for physical and engineering sciences or for theoretical oceanography and fluid mechanics: *either* 1.001 *or* 5.006 *or both* 5.010 *and* 5.020.

2. Applied mathematics for economic or management sciences: 14.501, 14.511, 15.001, 15.011. Note that if 14.501 and 14.511 are chosen then all four must be taken in first year and permission must be obtained through the Board of Studies office as there is a quota. For further details see program 6810.

3. Applied mathematics for social or biological sciences, choose at least two of the following groups:
a. 17.031 *and* 17.041,
b. 12.100,
c. 1.001,
d. 2.141 *or both* 2.121 *and* 2.131.

4. Applied mathematics for computational methods or computer science: 6.611, 10.081.

Applied Mathematics Department staff will be happy to advise students on choices of units appropriate to their study goals.

Applied Mathematics Honours

A student interested in taking an Honours degree in Applied Mathematics is advised to enrol in 10.011 in first year and complete at least one Level II and three Level III Higher Applied Mathematics units (total value). However, students who have obtained a credit average in at least four Level III Mathematics units (total value) may also be considered for entry into 10.223 Applied Mathematics 4.

Students are advised to select optional units according to the recommendations above for an Applied Mathematics major. Students should obtain a copy of recommended programs for Applied Mathematics from the School of Mathematics office before entering Year 2, and they are strongly encouraged to consult a staff member in Applied Mathematics regarding appropriate courses of study.

Program 1006 (Statistics)

Statistics Major

The completed 3 year program 1006 (Statistics) will be deemed to be a major in Statistics.

Statistics Honours

Honours in Statistics are obtained by completing 10.323, the prerequisite for which is the completion of 3 years of program 1006 (Statistics) with all corresponding Higher Statistics Level II and Level III units and preferably all Higher Mathematics Level I, II and III units.

Program 1061 (Mathematics or Statistics/Computer Science) will be of particular interest to students who wish to combine a Mathematics (or Statistics) major with a substantial amount of computing.

Program 6810 (Mathematics of Management) includes 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. This program is 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 this course with a good record is eligible for entry to the Master of Commerce graduate degree program 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.

Mathematics/Computer Science

See Computer Science/Mathematics

1000 Mathematics***

Students intending to proceed to the Honours year should take Higher Mathematics subjects throughout.

Year 1
10.001 *or* 10.011 *Mathematics*
Choose 6 Level I units from:*
1. Table 1 *and/or*
2. The BA course *and/or*
3. Table 2 for program 1000

Year 2
10.111A, 10.1113, 10.1114, 10.2111, 10.2112
Choose 1 further Level II *or* III Mathematics unit
Choose 4 units from:*
1. Table 1 *and/or*
2. The BA course *and/or*
3. Table 2 for program 1000
1 General Studies elective

Year 3
Choose 4 Level III Mathematics units (not 10.312F or 10.262A)
Choose 3 units from:*
1. Table 1 *and/or*
2. The BA course *and/or*
3. Table 2 for program 1000
1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 6 Level III units.**

Year 4 (Honours)
10.123 *or* 10.223*

*Not more than 8 units of this program may be from subjects not in Table 1. The BA degree subjects are limited to those offered by the following schools: Economics, English, French, German, History, Political Science, Russian, Sociology, Spanish and Latin American Studies and Theatre Studies. History and Philosophy of Science and Philosophy subjects are available in Table 1. 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 credit points at Level I or 4 credit points at Upper Level are equivalent to 1 unit.)

**Students proposing to take Honours in Pure or Applied Mathematics are advised to include at least three units of Level III Higher Mathematics units (total value) from the relevant department. However, students who have obtained a credit average in at least four Level III Mathematics units may also be considered for entry into Mathematics Honours.

***Students should read carefully the above description relating to program 1000 and seek advice from the School of Mathematics regarding the choice of units.

1006 Statistics

Students intending to proceed to the Honours year should take Higher Mathematics subjects throughout.

Year 1††
10.001 *or* 10.011 *Mathematics*
Choose 6 units from:*
1. Table 1 *and/or*
2. The BA course *and/or*
3. Table 2 for program 1000

Year 2
10.111A, 10.1113, 10.1114, 10.2112, 10.311A, 10.311B, 10.3111, 10.3112
Choose 2½ units from:*
1. Table 1 *and/or*
2. The BA course *and/or*
3. Table 2 for program 1000
1 General Studies elective

Year 3
Choose 4 units from 10.312A, 10.312C, 10.322D, 10.312F, 10.3121, 10.3122, 10.3123, 10.3124
Choose 3 Level III Mathematics *and/or* Computer Science units
1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 4 Higher Level III Statistics units including 10.3225.

Year 4 (Honours)
10.323

*See footnote to program 0100.
††See footnote to program 0161

1061 Mathematics or Statistics/Computer Science

Students intending to proceed to the Honours year should take Higher Mathematics subjects throughout.

Year 1††

6.611 *Computing*
10.001 *or* 10.011 *Mathematics*
Choose 5 Level I units from:

1. Table 1 *and/or*
2. The BA course *and/or*
3. Table 2 for program 1000

Year 2

10.111A, 10.1113, 10.1114, 10.2112
6.621, 6.641
Either
a. 10.2111, 10.261A, 10.331 (*or* 10.311A *and* 10.311B)
If required choose 1 further unit from:
1. 6.631 *or*
2. Mathematics *or*
3. 14.602
or
b. 10.311A, 10.311B, 10.3111, 10.3112,
½ unit from Table 1
1 General Studies elective

Year 3

Continue the strand chosen in Year 2:
Either
a. 6.646
10.262A
3 Level III Mathematics units
2 units from Table 1
or
b. 5 Level III Statistics units including 10.312F
1 Computer Science unit
1 unit from Table 1
1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 7 Level III units including 10.3225.

Year 4 (Honours)

10.123* *or* 10.223* *or* 10.323*

*The requirements for entry to the Honours year are as for programs 1000 and 1006.
††See footnote to program 0161.

Mathematics/Marine Science (Physical Oceanography)

See program 6831

Recommended Double Majors

Mathematics or Statistics/Computer Science
Mathematics/Geology

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.

Program 1200 in the Science and Mathematics course leads to a major in Psychology after 3 years and to Honours after 4 years. Choice of support subjects will depend upon which facet of Psychology is of interest to the student. Suitable supporting subjects range from Anatomy, Physiology, Genetics of Behaviour to History and Philosophy of Science and Philosophy. If necessary students may contact the School for advice.

There is also a four year full-time professional science degree course (Course **3431**) 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 may lead to careers in research, teaching and applied fields such as personnel selection and management, vocational guidance, advertising and clinical practice.

1200 Psychology

Year 1

10.001 *or* 10.011 *or both* 10.021B & 10.021C *Mathematics*
12.100 *Psychology*
Choose 4 Level I units from:
1. Table 1 *and/or*
2. Table 2 for program 1200

Year 2*

12.200
Choose 2 units from:
12.201, 12.202, 12.204, 12.205
Choose 5 units from Table 1 (no more than 1 from Level II Psychology)
1 General Studies elective

Year 3*
Choose 4 Level III Psychology units
Choose 3 units from Table 1
1 General Studies elective

Year 4 (Honours)
12.403 *or* 12.404

*Students intending to proceed to honours in Psychology must take 12.200, 12.201 and 12.202 in Year 2, together with 4 other units from Table 1 (a total of 7 units in Year 2). In Year 3 students must take 8 Level III Psychology units including 12.300 and 12.305 from Group A for 12.404 in Year 4. Additionally, students intending to take 12.403 in Year 4 are required to also include 12.301 from Group B.

Recommended Double Majors

Psychology/Anatomy
Psychology/Physiology

Information Systems

Information Systems is concerned with information systems analysis and design, data management, computer processing, edp audit, management information systems and applied expert systems within business and government organisations. There is a growing maturity in the discipline as the underlying theory and associated principles become better understood and as advanced information processing techniques emerge. In many respects the development of the knowledge base which forms the discipline parallels developments in computing technology as new opportunities become apparent for the solution of information processing problems. Hence, information systems is concerned with the way in which computer systems are used within organisations — mainly business and government. There is a high degree of complementarity between the roles of Computer Science and the discipline of Information Systems. The program is intended to develop students' conceptual and practical skills in the discipline. After an introductory first year students study systems design, database, communications and commercial programming in parallel with computer science, mathematics and management accounting units. An honours year is available for well qualified students. This specializes in advanced information systems and data management topics.

1400
Information Systems

Year 1*
6.611 *Computing*
10.001 *or* 10.011 *Mathematics*
Choose 5 Level I units from:
1. Table 1 *and/or*
2. Table 2 for program 1400

Year 2
6.621, 6.641
14.501, 14.511, 14.602, 14.603
10.331 *or* 10.311A
Choose 1 unit from:
1. Table 1 *or*
2. Table 2 for program 1400
1 General Studies elective

Year 3
14.522, 14.605, 14.607, 14.608
Choose 3 units including at least one at Level III from:
1. Table 1 *and/or*
2. Table 2 for program 1400 *and/or*
3. 14.611
1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 6 Level III units.

Year 4 (Honours)
14.794, 14.853, 14.857, 14.886, 14.887, 14.891
If 14.611 has not previously been taken this unit should replace 14.857.

*In Year 1 students must enrol in program 6806. Enrolment in Year 2 is based on academic performance in Year 1.

Geology and Geophysics

Programs in Geology and Geophysics are offered to the Board of Studies in Science and Mathematics by the Department of Applied Geology in the School of Mines. The School is part of the Faculty of Applied Science and the Department of Applied Geology is dedicated to teaching and research in resource geology as well as in the fundamentals of the science.

Geology is the study of the nature and evolution of the earth. It is concerned with the composition and modes of formation and deformation of the igneous, sedimentary and metamorphosed rocks and concentrations of minerals that comprise the earth's crust and interior. Geology enquires into the essential controls on the development and distribution of such rocks and minerals in space and geologic time. Likewise it is concerned with the nature, distribution, and evolution of life forms through time. Resource geology is concerned with the application of all geological knowledge to the location and extraction of mineral and energy deposits, and to engineering and environmental tasks, ie activities that are fundamental to the well-being of modern society. Thus geology has an applied, professional function as well as being a scientific discipline.

Geophysics employs sophisticated instrumentation in order to construct physical earth models and is a companion discipline to Geology.

Program for Professional Geology

After June 1986, the Australasian Institute of Mining and Metallurgy requires that its corporate members, including professional geologists, shall have completed a four year course. Students wishing to enter the geology profession should preferably undertake the four year Course **3000** Applied Geology in the Faculty of Applied Science that is specifically designed to meet the needs of a professional geologist. However, an identical course of study is available in the Science Faculty program 2500 by taking the three year program with a double major in Applied Geology and by achieving a standard that enables progression to the Year 4 program and graduation with Honours. Training of a professional geologist demands a thorough understanding of basic geological principles; accordingly, in the early part of the course students receive instruction in fundamental geological subjects. As with other science based disciplines, appropriate standards in Physics, Chemistry and Mathematics are also required. As the course progresses, increasing emphasis is placed on practical applications of geological principles to mineral and energy exploration and development and to engineering and environmental geology. Mineral and energy exploration techniques including geochemical and geophysical methods are also studied. Year 4 is divided between a core of advanced geological topics, and one strand chosen from mineral resources, sedimentary basin resources, engineering and environmental geology, or geophysics. Session 2 of Year 4 is devoted to a specialized research project.

Geophysics

Professional geophysicists work closely with geologists and, appropriately, studies of both disciplines are undertaken in the one school. Fundamental and applied geophysics are taught to geology students in program 2500 (and Course **3000**), but students who intend to become professional geophysicists should take program 2503.

Single Major in Geology

Because Geology is a natural companion to other sciences, such as Chemistry (in Geochemistry), Botany and Zoology (in Palaeontology) and Geography, and of widespread interest to science in general, program 2500 is organized so that a single major in Geology may be acquired. Selected students who have completed such studies may undertake an honours degree that includes geological topics. Students interested in a combination of geology with another science should consult the Department of Applied Geology about recommended programs. Those who are specifically interested in combining Geology with Zoology and/or Botany should carefully read the following section.

Geology with Zoology and Botany

Geology and the Biological Sciences meet in a common field of study (Palaeontology) concerned with the evolution and environmental controls on the growth of ancient life forms. Palaeontologists may have an applied function, providing geologists with essential information about the relative ages and depositional environments of sedimentary rocks, particularly the strata with a potential to yield fossil fuels. Students intending to pursue this combination should take the subjects designated in footnote (*) to program 2500.

Geology in Marine Science

Students interested in marine sciences should consider program 6833 which is concerned with geological aspects of the marine environment.

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**.

2500 Geology

Year 1

1.001*	*Physics*
2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or* 10.011 *or both* 10.021B & 10.021C	*Mathematics*
25.110, 25.120	*Geology*

Year 2

25.211, 25.212, 25.221

Choose at least 4½* units from:

1. 25.223, 25.2261 (compulsory for Double Major) *and*

2. Table 1 other than units offered by Applied Geology

1 General Studies elective

Year 3
25.311, 25.312
Choose at least 2 Applied Geology units from:
25.314, 25.3162, 25.321, 25.324, 25.325, 25.3261, 25.3271, 25.333
(Double Majors in Applied Geology must take all of these subjects)
Choose further units from Table 1 to give a total of 23 for the complete program*
1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units.

Year 4 (Honours)
Either
a. 25.434
or
b. for Double Major:
25.410, 25.4101, 25.420
Choose one of the following sub-strands
25.412, 25.414, 25.415, 25.931

*Carefully read the description of program 2500 and seek advice from the Department of Applied Geology about the choice of units. Students following a combination of Applied Geology with Zoology and/or Botany are permitted in Year 1 to substitute the two Biology units, 17.031 & 17.041, for 1.001. In Year 2 they should take 43.111, 45.101, 45.201, 45.301 and 1 unit chosen from 17.012, 43.131 *and* 43.112; in Year 3 25.324, *either* 25.321 *or* 25.325, 45.302 and 2 units chosen from 43.152, *either* 43.112, 43.172, 45.112, 45.121, 45.402.

2503 Geophysics

Year 1

1.001	*Physics*
2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or* 10.011	*Mathematics*
25.110, 25.120	*Geology*

Year 2
1.002, 1.012, 1.022, 1.032
10.2111, 10.2112
25.5212, 25.223, 25.2261
2 General Studies electives

Year 3
25.3162, 25.333, 25.9311, 25.9312,
25.9313, 25.9314, 25.9321
Choose 2 units from Level III Physics
Choose 2 units from:
1. Table 1 *and/or*
2. Table 2 for program 2503

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units.

Year 4 (Honours)
25.434

Recommended Double Majors

Geology/Botany and Zoology
Geology/Chemistry
Geology/Geography
Geology/Mathematics
Geology/Physics

Geography

Geography is the scientific study of variations from place to place on the earth's surface. It provides an analytical framework for understanding and investigating many of society's pressing problems such as the use and management of scarce resources, the impact of environmental hazards on human activities, soil erosion and conservation, land use conflicts, and the spatial organization of human affairs.

Program 2700 comprises a three-year structured sequence of substantive subjects in physical and human Geography, with particular emphasis on studies of the natural environment, as well as a grounding in basic analytical skills and techniques (eg statistical methods and computing, remote sensing and air photo interpretation, field and laboratory techniques) required for problem-solving and application. Because of its essentially interdisciplinary nature, a training in Geography is increasingly recognized as a relevant qualification for employment in a wide range of planning and conservation-related fields.

Considerable flexibility exists in program 2700 for students to combine subjects in Geography with those from cognate disciplines to suit individual interests and career aspirations. Studies in Geography with a co-major in other sciences, especially Geology and Botany, are encouraged. Details of particular courses of study and subject combinations offered within the program are available from the School Office.

2700 Geography

Year 1
10.001 *or* 10.011 *or both* 10.021B *and* 10.021C *Mathematics*
27.819 *and either* 27.818 *or both* 27.010 *and* 27.030 *Geography*
Choose further Level I units from Table 1 to make a total of 8

Year 2
Choose 3 Level II Geography units
Choose 5 units from Table 1
1 General Studies elective

Year 3
Choose 4 Level III Geography units
Choose 3 units from Table 1
1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units and must have completed 27.050.

Year 4 (Honours)
27.844

Recommended Double Majors

Geography/Botany
Geography/Geology

Biochemistry

Biochemistry is the study of the chemistry of living organisms 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 molecular rather than descriptive level. Biochemistry also represents a fundamental component of medical science and has an important role in many aspects of modern medicine.

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, and their interconversions in cells and tissues, the relationship between the structures and functions of enzymes, other proteins, hormones and biological membranes.

At Level III further double units (41.102A Biochemistry of Macromolecules and 41.102B Physiological Biochemistry) and a single unit (41.102E Molecular Biology of Higher Organisms) are offered at a more advanced level.

In Year 4, the Honours Course in Biochemistry (41.103 Biochemistry Honours) offers the opportunity for those students who have obtained above average results to carry out a research project under supervision and to receive training in the latest research techniques.

Program 4100 Biochemistry

The program outlined below leads to a single major in Biochemistry and also provides for a considerable choice of units offered by other Schools. It can be used as a framework to lead to co-majors with other disciplines, for example, microbiology, chemistry, physiology, biotechnology, zoology, botany or anatomy; other co-majors are possible. In arranging co-majors, the programs of the two relevant Schools should be consulted, especially if there is a possibility of proceeding to Year 4 (Honours). Program 4100 also can be followed to achieve a single major in biochemistry supported by one or two minor sequences — for example biochemistry with some chemistry and some microbiology or biochemistry with some physiology and some anatomy. The program also permits 5 Level III units of biochemistry to be taken rather than the minimum of 4 units. All of these combinations can serve as prerequisites for an Honours Year in biochemistry provided that passes are obtained in a total of 8 Level III units including above average results in Biochemistry.

4100 Biochemistry

Year 1

2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or* 10.011 *or both* 10.021B *and* 10.021C	*Mathematics*
17.031, 17.041	*Biology*

Choose 2 Level I units from Table 1*

Year 2

2.102B
41.101
Choose 4 or 5 units from Table 1
1 General Studies elective

Year 3†

41.102A
Choose at least 2 units from: 41.102B, 41.102E
Choose further units from Table 1 to give a total of 23 for the complete program
1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units.

Year 4 (Honours)

41.103

*Recommended are units offered by the School of Physics and the Department of Computer Science. Also recommended is 68.451.
†See footnote to program 6200.

Recommended Double Majors

Biochemistry/Biotechnology
Biochemistry/Botany
Biochemistry/Chemistry
Biochemistry/Microbiology
Biochemistry/Science Policy Studies
(for further details see program 6200)
Biochemistry/Zoology

Biotechnology

Biotechnology employs a body of multidisciplinary expertise directed towards the utilization and recycling of natural resources by controlled biological action, usually in a reactor. Its study provides an appreciation of the capabilities of biological systems and the skills required to maximize these capabilities on the industrial scale. Particular attention is given to: the selection of the appropriate systems and their maximization by genetic and/or enzyme tailoring; the design of biological reactors and their ancillary equipment; optimization and control of the processes. It is by these means that products are manufactured at ensured standards of quality. The products include certain foods and beverages, baker's yeast, antibiotics, steroids, vaccines, enzymes, amino acids, nucleotides, vitamins, organic acids, alcohols, metals, plant growth regulators and insecticides. Specific mammalian proteins, such as insulin and growth hormone, are also produced by microorganisms which have been genetically engineered to contain the appropriate mammalian gene.

Students wishing to undertake training in biotechnology may do so by combining such training with a major in another relevant discipline, preferably biochemistry, microbiology or chemistry. The fourth (Honours) year includes further formal training as well as research in biotechnology.

Alternatively, students with no previous training in biotechnology may undertake the biotechnology honours year, provided they have the necessary background training in biochemistry and microbiology; in such cases the Level III biotechnology units constitute the formal component.

4200 Biotechnology

Year 1

2.141 *or both* 2.121 *and* 2.131 — *Chemistry*
10.001 *or* 10.011 *or both* 10.021B *and* 10.021C — *Mathematics*
17.031, 17.041 — *Biology*
Choose 2 Level 1 units from Table 1

Year 2

41.101
Choose at least one of: 42.101, 44.101
Choose additional units from Table 1 to make a total of 7
2 General Studies electives

Year 3

42.102A, 42.102B
Choose 4 Level III units from a single discipline* in Table 1
Choose 2 units from Table 1

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units.

Year 4 (Honours)

42.103

*Recommended disciplines are Biochemistry, Chemistry, Microbiology.

Recommended Double Majors

Biotechnology/Biochemistry
Biotechnology/Chemistry
Biotechnology/Microbiology

Botany

Botany is concerned with all aspects of the structure and function of both green and non-green plants and the relation of plants to their environments. The major aspects of the subject range from plant anatomy and morphology through physiology, ecology, taxonomy and palynology to mycology and plant pathology. The applications of these studies are particularly relevant in the fields of agriculture, horticulture, forestry, conservation and related environmental sciences.

Botany may be taken as a major or a minor study in the Science and Mathematics Course (3970).

4300 Botany

Year 1

2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or* 10.011 *or both* 10.021B *and* 10.021C	*Mathematics*
17.031, 17.041	*Biology*

Choose 2 Level I units from Table 1

Year 2
43.111
Choose at least one of the following: 17.012, 43.131, 43.121
Choose additional units from Table 1 to make a total of 8
1 General Studies elective

Year 3
Choose 4 Level III Botany units
Choose 3 units from Table 1
1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 7 Level III units.

Year 4 (Honours)
43.103

Recommended Double Majors

Botany/Biochemistry
Botany/Geography
Botany and Zoology/Geology
Botany/Microbiology
Botany/Zoology

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.

The program in Microbiology requires students to take basic courses in Chemistry, Mathematics and Biology in Year 1, as well as 41.101 Biochemistry in Year 2.

4400 Microbiology*

Year 1

2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or* 10.011 *or both* 10.021B *and* 10.021C	*Mathematics*
17.031, 17.041	*Biology*

Choose 2 Level I units from Table 1

Year 2
41.101
44.101, 44.121
Choose 4 units from Table 1
1 General Studies elective

Year 3
44.102, 44.112
Choose 3 units from Table 1
1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units.

Year 4 (Honours)
44.103

***1.** Those students interested in a specialist career in Microbiology should also choose 44.122 and 44.132 in Year 3. Students wishing to include 44.122 Immunology in their program are strongly advised to take 70.011A Histology in Year 2. **2.** Many students combine a major in Microbiology with a major in Biochemistry or Biotechnology. **3.** Students should note that Mycology is an aspect of Microbiology which is taught in the School of Botany in units 43.131 and 43.132. **4.** The subject 45.101 Biometry is recommended as a useful elective. In particular, students interested in environmental microbiology or in a research career in any area are strongly advised to take this subject.

Recommended Double Majors

Microbiology/Biochemistry
Microbiology/Biotechnology
Microbiology/Botany

Zoology

Zoology is built on the foundation of the first year units Biology A and B, Mathematics and Chemistry.

In their second year all Zoology students study Biometry, Invertebrate Zoology, Vertebrate Zoology and either General Ecology or Introductory Genetics or both. Students must also complete two Level II units of either Biochemistry or Chemistry or Mathematics or Physics. Other units are then chosen to make a total of seven or eight for the year. The areas from which these units are chosen will depend mainly on the student's interests. Examples of some of the units which are often chosen are Flowering Plants. Introductory Microbiology, Control Mechanisms, Organic Chemistry, Analytical Chemistry, Physiology and Mathematics. The choice of optional units is important because it determines which units may be included in the third year. Students are urged to seek advice from the school's student advisors at the end of Year 1 and Year 2.

A major in Zoology requires the study of at least 4 Level III Zoology units, three of which must be selected from Evolutionary Theory, Insects, Comparative Physiology and Animal Behaviour. The choice of other units in third year depends on students' interests. For instance those interested in Entomology would probably include Economic Zoology amongst their units; those interested in Ecology might include Population & Community Ecology, Marine Ecology and Vertebrate Zoogeography & Evolution; those interested in Animal Physiology would probably include Ecological Physiology. The additional units may be either chosen from those offered by the School of Zoology or by other schools. In all, seven or eight units are studied in third year to make a total of at least 23 units, as required by the regulations of the Science and Mathematics Course.

It is possible to study other disciplines as a co-major with Zoology eg Botany, Biochemistry, Mathematics, Marine Science, Anatomy, Physiology, Geography, Geology. In general, students completing a co-major with Zoology must satisfy the requirements of the Zoology program but some minor variations may be permitted when students include 4 Level III units from both Zoology and the co-major discipline. Students should consult the School about these prior to enrolment in Year 2.

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 plus a research project.

4500 Zoology

Year 1

2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or* 10.011 *or both* 10.021B *and* 10.021C	*Mathematics*
17.031, 17.041	*Biology*

Choose 2 Level I units from Table 1

Year 2

17.012 *and/or* 45.601
45.101, 45.201, 45.301
Choose 2 units from Table 1 from 1 of the following schools: Biochemistry, Chemistry, Physics, Mathematics
Choose 1 or 2 units from Table 1 to give a total of 8
1 General Studies elective

Year 3

Choose 3 units from 45.121, 45.122, 45.402 *and either* 45.132 *or* 45.142
Choose 1 further Level III Zoology unit
Choose 3 units from Table 1
1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units

Year 4 (Honours)

45.103

Recommended Double Majors

Zoology/Anatomy
Zoology/Biochemistry
Zoology/Botany
Zoology and Botany/Geology
Zoology/Mathematics
Zoology/Physiology

Philosophy

Philosophy is a wide-ranging discipline, catering for a great diversity of interests, for instance, in science, reasoning, persons, and social issues, and encouraging critical and imaginative thought about the foundations of other subjects. Apart from providing considerable choices for students majoring in Philosophy, the diversity of Upper Level subjects makes it possible for students majoring in other disciplines to select subjects complementing their main interest.

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 one unit value. They can be taken separately, and a student can gain Level II status in Philosophy (ie qualify to enrol in Upper Level subjects) by passing in only one. However, students enrolling in one normally enrol in both, and students wishing to major in Philosophy must do so.

Value of Upper Level Subjects in Philosophy

With the exception of two subjects which each count as one science unit, all Level II/III subjects in Philosophy are half units, of which three together can be counted as two science units.

Major in Philosophy

Students majoring in Philosophy must take the equivalent of two Level II/III units in Year 2, and the equivalent of four Level II/III units in Year 3.

Level II/III

Some Level II/III subjects deal with particular philosophical topics; others can be taken in sequence to give more sustained treatments of larger areas. Students may select freely among these, subject to stipulations regarding prerequisites. They are welcome to seek advice and further information from the School.

In certain circumstances the prerequisite 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.

5200 Philosophy

Year 1
10.001 *or* 10.011 *or both* 10.021B and 10.021C *Mathematics*
52.103, 52.104 *Philosophy*
Choose 4 Level I units from Table 1

Year 2
Choose 2 Philosophy units*
Choose 6 units from Table 1
1 General Studies elective

Year 3
Choose 4 Philosophy units*
Choose 3 units from Table 1
1 General Studies elective

*Due to the extra library work required in the preparation of essays, a combination of 3 half unit Philosophy subjects count as the equivalent of 2 Science units.

History and Philosophy of Science

Students may take units within the School of History and Philosophy of Science leading to the award of pass or honours degrees in History and Philosophy of Science, or to the award of an honours degree in Science Studies.

Units 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.

Units in the sequence leading to honours in Science Studies are intended for students wishing to qualify themselves as science policy advisers. Training is provided therefore in both 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 (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 coursework 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.

The Pass Degree
The program offered by the School of History and Philosophy of Science gives students a wide range of options from which to choose in studying the historical, philosophical and social aspects of science and technology. Students intending to complete the pass degree are required to take eight HPS units, of which three are prescribed and five are elective. The remaining units in this program may be chosen from those listed in Table I, which allows sufficient flexibility for the completion of a second major in a scientific discipline, if this is desired. Students wishing to enquire about such a double major within program 6200 are invited to contact the School of HPS and the relevant second School for further information. It should be noted that students who undertake a double major combining program 6200 with one of the programs 0100 (Physics), 0200 (Chemistry) or 4100 (Biochemistry), and who include the Science Studies sequence (62.052, 62.062, 62.072, 62.082) may replace 1 General Studies elective with a science unit.

The Honours Degree
Students intending to proceed to an honours degree in HPS may choose from two alternative fourth year programs: 62.014 History and Philosophy of Science Honours, focusing on the intellectual history of science and the philosophy of science; or 62.024 Science Studies Honours, focusing on the social history of science and science policy studies. For entry to 62.014 a student must complete the first three years of program 6200 with marks that result in an average of Credit or better in the eight HPS units included. For entry to 62.024 a student must complete a more specialized sequence within program 6200, as prescribed in the footnote to that program, again with an average result of Credit or better in the eight HPS units included. In either case, the three-year program leading to honours entry offers sufficient scope for the completion of a second major in a scientific field, if this is desired. Such a double major is particularly appropriate for a program leading to honours-level work in science policy studies; however all students intending to complete an honours degree within program 6200 are invited to contact the School of HPS and the relevant second School for further information regarding combined major sequences.

6200
History and Philosophy of Science/Science Studies

Year 1
10.001 *or* 10.011 *or both* 10.021B *and* 10.021C *Mathematics*
62.110 *or* 62.111 *or* 62.211 *HPS*
Choose 5 Level I units from Table 1

Year 2
62.022, 62.032
Choose 1 additional HPS unit*
Choose 5 units from Table 1
*1 General Studies elective***

Year 3†
Choose 4 HPS units*
Choose 3 units from Table 1
*1 General Studies elective***
Students proposing to proceed to Year 4 (Honours) must complete 7 Level III units.

Year 4 (Honours)
Either 62.014 or 62.024*

*Students intending to proceed to 62.024 (Science Studies Honours) must complete 62.052, 62.062, 62.072 and 62.082 by the end of Year 3.

**26.251, and 26.2506 may not be included in this program.

†Students who undertake a double major combining this program with one of the programs 0100 (Physics), 0200 (Chemistry) or 4100 (Biochemistry), and who include the Science Studies sequence (62.052, 62.062, 62.072, 62.082) may replace 1 General Studies elective with a Science unit.

Recommended Double Majors

History and Philosophy of Science/Anatomy
History and Philosophy of Science/Botany
History and Philosophy of Science/Geology
History and Philosophy of Science/Zoology
Science Policy Studies/Biochemistry*
Science Policy Studies/Chemistry*
Science Policy Studies/Physics*

*See footnote to program 6200.

Board of Studies in Science and Mathematics

6801
For Anatomy Programs

Year 1

10.001 *or* 10.011 *or both* 10.021B *and* 10.021C — *Mathematics*
17.031, 17.041 — *Biology*
Choose 4 appropriate Level I units from Table 1

Enrolment in Year 2 of program 7000 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 — *Mathematics*
6.611 — *Computing*
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 0600 and 1400 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.

6810
Mathematics of Management*†

Year 1

10.001 *or* 10.011** — *Mathematics*
14.501, 14.511 — *Accounting*
15.001, 15.011 — *Economics*
Choose 2 Level I units from:
1. Table 1 *or*
2. Table 2 for program 6810

Year 2

10.111A, 10.1113, 10.1114, 10.2111, 10.2112
10.2113, 10.2115, 10.311A
14.522, 14.602
Choose 1 unit from: 14.542, 14.603, 14.613, 15.042
1 General Studies elective

Year 3

14.583
Choose 2 units from: 10.212A, 10.412D, 10.212L, 10.212M, 10.311B, 10.312A
Choose 2 further Level III Mathematics units
Choose 1 unit from: 14.605, 14.607, 14.608, 14.614, 14.615
Choose 1 unit from:
1. Table 1 *or*
2. Table 2 for program 6810
1 General Studies elective

*Enrolment in this program requires the approval of the Chairman of the Board of Studies in Science and Mathematics and the head of the School of Accountancy.

**Throughout this program Mathematics subjects can be replaced by the corresponding Higher Mathematics subject.

†For details see preamble to Mathematics programs.

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 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 Environmental 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 25.631 Marine Geology, 25.632 Estuarine Geology, 25.6341 Marine Mineral Deposits and Resources, 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.

6831

Marine Science (Physical Oceanography)

Year 1

1.001	*Physics*
1.041 *or* 6.611	*Computing*
10.001 *or* 10.011	*Mathematics*

Choose 2 units from 1 of the strands:

1. 2.141 *or both* 2.121 *and* 2.131 *or*	*Chemistry*
2. 17.031, 17.041 *or*	*Biology*
3. 25.110, 25.120	*Geology*

10.081 or choose 1 further unit from the above strands

Year 2

10.1113, 10.1114, 10.2111, 10.2112
1.002
68.302
Continue the strand chosen in Year 1:
1. 2.102A *or*
2. at least 1 unit from: 17.012, 45.152, 43.111 *or*
3. 25.621
Choose additional units from Table 1 to give a total of 8
1 General Studies elective

Year 3

10.2116 *or* 10.2216
10.292A
10.212D *or* 10.222D
10.212B *or* 10.222B
10.2922
68.313
Choose 3 units from: 1.022, 1.032, 1.3533, 1.062, 1.133, 10.212A, 10.412B, 10.422A, 10.331, 10.422B, 10.4129, 25.6342
45.112 *or* 25.631 *or* 25.632 *or* 2.043A *or* 43.172 *or* 25.635
1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units including 10.422A.

Year 4 (Honours)

68.304

6832

Marine Science (Biological Oceanography)

Year 1

2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or* 10.011 *or both* 10.021B *and* 10.021C	*Mathematics*
17.031, 17.041	*Biology*

Choose 2 units from 1 of the strands:

1. 1.001 *or* 1.021 *or*	*Physics*
2. 25.110, 25.120	*Geology*

Year 2

2.102A
43.111
44.101
41.101 *or* 45.201
68.302
Choose 1 unit from the subjects related to the strand chosen in Year 1:
1. 10.031 *or* 10.331 *or* 10.301 *or*
2. 25.622
Choose units from: 17.012, 41.101, 44.121, 45.101, 45.201, 45.301 to give a total of 8
1 General Studies elective

Year 3
43.172
45.112
Choose 2 Level III units from Table 1 which may include the subjects corresponding to the strand chosen in Years 1 and 2:
1. 68.313, 10.032 *or*
2. 25.632
Choose 3 units from Table 1
1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units.

Year 4 (Honours)
68.304

6833

Marine Science (Earth Science Oceanography)

Year 1

10.001 *or* 10.011 *or both* 10.021B *and* 10.021C	*Mathematics*
25.110, 25.120	*Geology*

Choose 4 units from 2 of the strands:

1. 1.001 *or* 1.021 *and/or*	*Physics*
2. 17.031, 17.041 *and/or*	*Biology*
3. 2.141 *or both* 2.121 *and* 2.131	*Chemistry*

Year 2
68.302
25.621, 25.622
Continue both of the strands chosen in Year 1:
1. 10.031 *or* 10.331 *or* 10.301 *and/or*
2. At least 1 unit from: 17.012, 43.111, 45.201 *and/or*
3. 2.102A
Choose additional units from Table 1 to give a total of 8
1 General Studies elective

Year 3
25.631, 25.632, 25.6341, 25.6342
Choose 3 Level III units from Table 1 which may include the subjects corresponding to the strands chosen in Years 1 and 2:
1. 68.313, 10.032 *and/or*
2. 43.172, 45.112 *and/or*
3. 2.123E
Choose 1 unit from Table 1
1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units.

Year 4 (Honours)
68.304

6834

Marine Science (Environmental Chemistry)

Year 1

2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or* 10.011	*Mathematics*

Choose 4 units from 2 of the strands:

1. 1.001 *and/or*	*Physics*
2. 17.031, 17.041 *and/or*	*Biology*
3. 25.110, 25.120	*Geology*

Year 2
2.102A, 2.102D
68.302
Continue both of the strands chosen in Year 1:
1. 10.031 *or* 10.331 *and/or*
2. At least 1 unit from: 17.012, 43.111, 45.201 *and/or*
3. 25.622
Choose additional units from Table 1 to give a total of 8
1 General Studies elective

Year 3
2.043A, 2.003D
Choose 2 Level III units from Table 1 which may include the subjects corresponding to the strands chosen in Years 1 and 2:
1. 68.313, 10.032 *and/or*
2. 43.172, 45.112 *and/or*
3. None
Choose 3 units from Table 1
1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 8 Level III units.

Year 4 (Honours)
68.304

Genetics

The Genetics program is designed to provide students with a firm foundation of genetical knowledge and also to 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 and organismal. The three groups of subjects in second 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, and 68.451 is therefore strongly recommended as a year 1 subject.

Entry into a fourth (Honours) year is available, for above-average students, upon application to the Genetics Program Committee.

6840 Genetics

Year 1
2.141 *or both* 2.121 *and* 2.131 — *Chemistry*
10.001 *or* 10.011 *or both* 10.021B *and* 10.021C — *Mathematics*
17.031, 17.041 — *Biology*
Choose 2 Level I units from Table 1

Year 2
41.101
44.101
45.601
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 further units from one of the following groups:
1. 2.102B
2. 6.611; 17.012; 68.601 *or* 9.801
3. 43.111 *or* 43.131; 45.201 *or* 45.402; 45.301 *or* 9.801; 62.104; 68.601
2 General Studies electives

Year 3
Choose 8 units from: 6.621, 6.646, 9.802, 9.811, 41.102A, 41.102E, 42.102A, 42.102C, 43.112, 44.102, 44.122, 45.121, 68.602, 79.201, 79.202, 79.302

Students proposing to proceed to Year 4 (Honours) must complete 7 Level III units.

Year 4 (Honours)
68.404

Anatomy

Entry to Anatomy programs is limited to a quota of approximately 60. Students in Year 1 must enrol in Program 6801, and apply in October for entry to Anatomy the following year. Selection is determined by academic merit, based on a weighted aggregate of marks obtained in Year 1. Allowance is made for the relative difficulty of first year units in Mathematics and Physics, the more difficult subjects being given a greater weight. Introductory Chemistry is included in the aggregate even though not counting for a degree. The quota does not apply to the Science/Medicine course (course 3820).

Anatomy subjects are, in general, only available to students who have been admitted to the Anatomy quota. However, students in programs 4400 (Microbiology-Immunology strand) and 6840 (Genetics) may take 70.011A, 70.304, and 70.3041.

Students enrolled in programs for which Anatomy or Histology is relevant (eg Biochemistry, Physiology, Psychology) and who wish to study one or more Anatomy units should consult the Head of School.

A major in Anatomy may suitably be combined with a major in Biochemistry (70.304 or 70.3041 recommended), Physiology (note relevance of Neuroanatomy 1 and 2 to Neurophysiology), or Psychology (take Neuroanatomy 1 and 2). Owing to timetabling difficulties, the double major with Biochemistry may be impossible to complete in the minimum time.

72.301 Basic and Applied Pathology may be counted as a Level III Anatomy unit.

7000 Anatomy

Year 1*
10.001 *or* 10.011 *or both* 10.021B *and* 10.021C — *Mathematics*
17.031, 17.041 — *Biology*
Choose 4 Level I units from Table 1
Apply for entry to the Anatomy quota for following year

Year 2
70.011A, 70.011C
Choose 5 or 6 units from:
1. Table 1 *and/or*
2. Anatomy units in Table 2 (70.011B is recommended)
1 General Studies elective

Year 3
Choose at least 4 Level III Anatomy units (may include 72.301)
Choose further units from Table 1 to give a total of 23 for the complete program
1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 6 Level III units.

Year 4 (Honours)
70.013

*In Year 1 students must enrol in program 6801. Enrolment in Year 2 is based on academic performance in Year 1.

Recommended Double Majors

Anatomy/Biochemistry
Anatomy/Physiology
Anatomy/Psychology
Anatomy/Zoology

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 1 (the core subject for students who intend to proceed to the study of Physiology at a higher level).

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. Students intending to major in Physiology should note Physiology 2 prerequisites.

Physiology 2 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 1 and the Level II Biochemistry subject. Physiology 2 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 III 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. Students who wish to take Physiology as a major subject should follow Strand **1.** of the program 7300.

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 2, or with Level III Biochemistry or Chemistry subjects. Pharmacology is also a full year subject. Students who wish to form a major subject with Pharmacology should follow Strand **2.**

Physiology 2 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 seminar programs.

7300
Physiology and Pharmacology

Year 1

2.141 *or both* 2.121 *and* 2.131	*Chemistry*
10.001 *or* 10.011 *or both* 10.021B *and* 10.021C	*Mathematics*
17.031, 17.041	*Biology*
Choose 2 Level I units from Table 1	

Year 2*
73.111
Either
1. 41.101
or
2. Choose 3 Level II units (should normally include prerequisite subjects for one of the Pharmacology co-requisite subjects shown for year 3)
Choose 4 units from Table 1
1 General Studies elective

Year 3
Continue the strand chosen in Year 2:
Either
1. 73.012
or
2. 73.022
and either
2 Level III Chemistry units
or
41.102A *and* 41.102B
or
73.012

Choose further units from Table 1 to give a total of 23 for the complete program.
1 General Studies elective

Students proposing to proceed to Year 4 (Honours) must complete 7 Level III units.

Year 4 (Honours)
73.013 *or* 73.023

*For an explanation of the division into strands **1.** and **2.** refer to the preamble.

Recommended Double Majors

Physiology/Anatomy
Physiology/Biochemistry
Physiology/Chemistry
Physiology/Psychology
Physiology/Zoology

Undergraduate Study
Board of Studies in Science and Mathematics
Faculty of Engineering

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/arts 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/arts 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
2.951 **3.** (*or* 2.121)
5.0011, 5.0012, 5.030, 5.0303, 5.061, 5.0721, 5.421
10.001 (*or* 10.011)

Year 2
5.0201, 5.300, 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)

Choose 4 units from Table 1 or Table 2 for course 3681 **2.**

For later Years, see overleaf

Courses 3611/3661/3681/3701 continued

Year 3
5.043, 5.122, 5.620, 5.621
Choose 5 units from Table 1 or Table 2 for course 3681 [2].
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 (*or* 10.351)

Year 3
1.002 *or* 1.012 *or* 1.022 *or* 2.102A
5.043, 5.122, 5.620, 5.621
4 Level III units from Table 1 and Table 2 offerings of School of Electrical Engineering and Computer Science for course 3681 [8].
1 General Studies elective [6].

Materials Science Majors

Year 2
2.102A
4.412A, 4.422B, 4.432, 4.642 [9].
5.0201, 5.300, 5.4221
and either **Option 1.:**
2.102B, 2.131
4.632 *or* 4.442 (recommended)
10.022
or **Option 2.:**
10.111A (*or* 10.121A), 10.1113 (*or* 10.1213), 10.2111 (*or* 10.2211), 10.2112 (*or* 10.2212)
1 unit from [10.]: 1.022, 1.982, 2.131, 4.442, 4.632, 10.1114 (*or* 10.1214)

Year 3
4.634
5.043, 5.122, 5.620, 5.621
10.331 *or* 10.351
1 General Studies elective [6].
and either **Option 1.:**
4.413, 4.423, 4.433C, 4.443, 4.453
48.403
or **Option 2.:**
3½ appropriate Level II or III units from Schools of Physics, Chemistry or Metallurgy offerings in Table 1 or in Table 2 for course 3681 [14].

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
1.002 *or* 1.012 *or* 1.022 *or* 2.002A
5.0201, 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

Year 3
5.043, 5.122, 5.620, 5.621
10.331 *or* 10.351[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
5.0201, 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)

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, 5.620, 5.621
10.331 *or* 10.351
1 General Studies elective [6].

Statistics Majors

Year 2
1.002 *or* 1.012 *or* 1.022 *or* 2.102A
5.0201, 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), 10.3111 (*or* 10.3211), 10.3112 (*or* 10.3212)

Year 3
5.043, 5.122, 5.620, 5.621
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].

For Notes, see overleaf

Notes

1. Students planning to take higher level Computer Science subjects should also take 6.611 Computing I or 8.1120 Computing. Other students may seek permission to take some appropriate alternative subject.

2. The following considerations pertain to the choice of optional units in Years 2 and 3:
(1) They include no more than 1 Level I unit.
(2) They include at least 4 Level III units which satisfy the relevant major requirements.
(3) They include no more than 1 unit from Schools other than Chemistry, Electrical Engineering and Computer Science, Mathematics, Materials Science and Engineering and Physics.
(4) They include at least 1 Level II unit from the Schools of Chemistry or Physics.
(5) They include 10.331 Statistics SS, 10.351 Statistics SM *or* 10.311B Basic Inference.
(6) 4.632 Metallurgical Engineering 1C and 4.642 Metallurgical Engineering 1D are both deemed to have ½ unit values.

3. Students are recommended to choose 2.951 unless they wish to pursue studies requiring 2.121. The prerequisites of 2.121 and 2.131 for 2.102A Physical Chemistry may be waived on application to the Head of the School of Chemistry. Materials Science Option 1 majors must choose 2.121.

4. Materials Science majors may omit 10.1114 Complex Analysis or substitute 10.022 Engineering Mathematics 2 for the mathematics subjects. The balance of the units must then be made up from units from the Schools of Chemistry, Materials Science and Engineering or Physics offerings in Table 1 or Table 2 for course 3681.

5. If 4.412A, 4.422B and 4.432, Physical Metallurgy 1A, 1B and 1C respectively, are taken, students should take 5.4221 instead of 5.422.

6. Anticipated. Actual General Studies requirements correspond to whatever is required in Year 2 of the normal Mechanical and Industrial Engineering degree course.

7. Students intending to major in Computing Science and planning to take 6.647 Business Information Systems may substitute 14.501 Accounting and Financial Management IA instead of 6.631 Computing 2B.

8. 6.646 Computer Applications is 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. Provided 5.4221 is taken concurrently with 4.642, the prerequisite requirement of 4.632 for 4.642 is assumed to be satisfied.

10. Materials Science majors who took 2.121 Chemistry 1A in Year 1 must take 2.131 Chemistry 1B. Those who took 2.951 Chemistry 1ME and wish to keep open the option of majoring in mathematics should include 10.1114 (or 10.1214) Complex Analysis in their selection; otherwise they are advised to select 1.022 Modern Physics or 1.982 Solid State Physics.

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. Students who followed the Year 2 for Computer Science majors should substitute 1.002 or 1.012 or 1.022 or 2.102A; those that followed the Year 2 for Statistics majors should substitute 1 Level II or III unit from the Schools of Physics or Mathematics offerings in Table 1.

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. These must include either 4.413, 4.423, 4.433C, 4.443 and 4.453, Physical Metallurgy 2A–2E inclusive, together with either 2.003A Physical Chemistry or 1.023 Statistical Mechanics (for which the prerequisite of 1.012 is waived provided students have passed 2.002A).

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 9 January 1987.

Having completed Years 1 and 2 of course **3640** students in their third year complete a specific course of study consisting of four Level III Science units chosen from related disciplines, the appropriate General Studies electives and no less than four other Level II or Level III 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. Tertiary Education Assistance Scheme (TEAS) support is available for the six years of the combined degree programs including honours level Science.

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 0600**

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 1000

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.

**For this strand only the Level I unit, 14.501 Accounting and Financial Management 1A may be taken in place of one of the other Level II or Level III units. Students should note that this subject is a prerequisite for the Level III unit, 6.647 Business Information Systems.

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.

Approval may be given to change the programs listed below to allow for timetabling and the student's academic interests. For any changes to subjects in italic print you should consult the Science and Mathematics Course Office, Room 211, Mathews Building.

Geography and Environmental Chemistry

Year 1
1.981*
2.121
8.1110, 8.1120, 8.1130, 8.1140
8.1210, 8.1410, 8.1610
10.001***
25.5112

Year 2
2.102A, 2.102C, 2.102D, 2.131
8.2110, 8.2210, 8.2320, 8.2410, 8.2420, 8.2430
10.022
27.010, 27.030
1 General Studies elective

Year 3
2.043A
8.2220, 8.2610, 8.3110, 8.3410, 8.3420, 8.3430, 8.3440
Two of the following: 27.133††, 27.143††, 27.153††, 27.183††
29.441, 29.491
2 General Studies electives

Year 4
8.2120, 8.2310, 8.3210, 8.3220, 8.3230, 8.3310, 8.3320, 8.3330, 8.3510, 8.3610, 8.3620, 8.3640
27.193, 27.175, 27.176
At least 1½ units chosen from:
27.133††, 27.143††, 27.153††, 27.183††, 27.862, 27.863

Year 5
Choose 2 units from Table 1 in the Combined Sciences Handbook at Level II or higher
8.4110, 8.4220, 8.4320, 8.4330, 8.4420, 8.4430, 8.4440, 8.4520, 8.4620
Two of the following subjects:
8.4210, 8.4310, 8.4410, 8.4510, 8.4610

Note: All material not in italic typeface relates to the BE degree component of this combined course.
* ***See footnotes at end of Course outline.
††These subjects are offered in pairs in alternate years. The two subjects offered in Year 3 are therefore excluded from those available in Year 4.

Physics with Mathematics

Year 1
1.001
2.991**
8.1110, 8.1120, 8.1130, 8.1140
8.1210, 8.1410, 8.1610
10.001***
25.5112

Year 2
1.012, 1.022, 1.032
8.2110, 8.2210, 8.2320, 8.2410, 8.2420, 8.2430
10.1113, 10.1114, 10.2111, 10.2112
10.381
1½ General Studies electives

Continued overleaf

Year 3
1.002, 1.023, 1.043
8.2220, 8.2310, 8.2610, 8.3110, 8.3410, 8.3420, 8.3430, 8.3440
10.111A†
29.441, 29.491

Year 4
1.0333
8.2120, 8.3210, 8.3220, 8.3230, 8.3310, 8.3320, 8.3510, 8.3610, 8.3620, 8.3630, 8.3640
1 General Studies elective
Choose 2 Level II or Level III Mathematics units from Table 1 in the Combined Sciences Handbook
Choose 1 unit from:
1.133, 1.0533, 1.0133, 1.0143

Year 5
8.4110, 8.4220, 8.4320, 8.4330, 8.4420, 8.4430, 8.4440, 8.4520, 8.4620
Choose two of the following subjects:
8.4210, 8.4310, 8.4410, 8.4510, 8.4610
½ General Studies elective
Choose 1 unit from Table 1 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 course.
** ***See footnotes at end of Course outline.

Computing with some Mathematics

Year 1
1.981*
2.991**
8.1110, 8.1120, 8.1130, 8.1140
8.1210, 8.1410, 8.1610
10.001***
25.5112

Year 2
6.621, 6.631, 6.641
8.2110, 8.2210, 8.2320, 8.2410, 8.2420, 8.2430
10.111A†
10.1113†
10.1114†
10.331
1 General Studies elective

Year 3
6.642, 6.643
8.2120, 8.2220, 8.2310, 8.2610, 8.3110, 8.3410, 8.3420, 8.3430, 8.3440, 8.3640
10.2111†
10.2112†
29.441, 29.491
Choose ½ Level II or Level III Mathematics unit from Table 1 of the Combined Sciences Handbook

Year 4
6.646
Choose two of 6.613, 6.632, 6.633
8.2310, 8.3220, 8.3230, 8.3310, 8.3320, 8.3330, 8.3510, 8.3610, 8.3620, 8.3630
1 General Studies elective
Choose 1 Level II or Level III Mathematics unit from Table 1 in the Combined Sciences Handbook

Year 5
8.4110, 8.4220, 8.4320, 8.4330, 8.4420, 8.4430, 8.4440, 8.4520, 8.4620
1 General Studies elective
Choose 1 unit from Table 1 in the Combined Sciences Handbook at Level II or higher
Two of the following subjects:
8.4210, 8.4310, 8.4410, 8.4510, 8.4610

Footnotes to Course 3730 Programs
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.
**Students who have not satisfied the chemistry prerequisite for 2.991 Chemistry 1CE are required to take 2.111 Introductory Chemistry in Session 1 and 2.991 in Session 2.
***Students who have achieved a certain standard may attempt 10.011 Higher Mathematics 1.
†Students are encouraged to select higher level mathematics units where applicable.

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 16) 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* 1.021
2.121 & 2.131, *or* 2.141
10.001 *or* 10.011 *or both* 10.021B & 10.021C
17.031, 17.041
1 General Studies elective††

Year 2

41.101*
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 80.014** 4 Level III Anatomy units†	General Studies elective 80.014** 41.102A 41.102B	General Studies elective 80.014** 73.012
Single Major	together with: 73.012F 3 Elective units	together with: 2 Level III Anatomy units† 73.012F 1 Elective unit	together with: 2 Level III Anatomy units† 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 41.102B	(double major not available)	41.102A 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 2.102B Organic Chemistry.

**80.014 Human Behaviour 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 must 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 qualification 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.

No new enrolments will be accepted into this course from 1987. Students already enrolled in the course may continue with their studies until completion of requirements for the award. The following arrangements apply:

1. Those students who have completed all of the Year 3 Education program by the end of 1986 should enrol in the Year 4 Education program in 1987 to complete the Education component for the award of the pass degree.

2. All other pass degree students registered in this course (4070) should enrol in 1987 with a view to completing the Science component of the course in 1987 or 1988. The Education component will be available only in the fourth year of the course after completion of all or most of the Science component.

Details of the fourth year Education program to be offered in this course in 1988 and 1989 are under review and are not available until late 1987.

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.

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, or Education*.

The grades in this program are 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 Year 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 to students in the fourth year of the course in 1987. 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 in their fourth year in 1987 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, 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:

10.1127, 10.2113, 10.2115, 10.212L, 10.212M, 10.331, 10.311A, 10.311B, 10.3111, 10.3112, 10.312A, 10.312B, 10.312C, 10.312D, 10.312E, 10.2116, 10.292A, 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.

Students in the second and third years of the course should choose a program available in the Science and Mathematics course (3970) which will allow them to major in Mathematics.

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

From 1987 all Mathematics Education students enrolled in the pass degree course will complete the education component in the fourth year of the course.

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. No student will be enrolled in the first year of the Mathematics Education course (4070) in 1987. Students in fourth year must be enrolled in one of the Mathematics programs for the Course 4070, the Education program and, in the case of the Mathematics and Science program (5811), general studies. Students in second and third years should be enrolled in one of the Mathematics programs for the Course 3970 and 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

Students enrolled in the pass course in 1987, 1988 and 1989 will study education only in the fourth year of their course. Students enrolled in the education honours course will also study education in their fifth year. In 1987 the subjects available are as follows:

Year	Subject	Hours per week*
4	58.704	2.2
	58.714	3
	58.744	2½
Honours in Education		
4	58.793	1
	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 or a mathematics program from the Science and Mathematics course (3970):

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.

*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 Level are equivalent to 1 unit). The BA degree subjects are limited to those offered by the following schools: Economics, English, French, German, History, Political Science, Russian, Sociology, Spanish and Latin American Studies and Theatre 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

†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.

No new enrolments will be accepted into this course from 1987. Students already enrolled in the course may continue with their studies until completion of requirements for the award. The following arrangements apply:

1. Those students who have completed all of the Year 3 Education program by the end of 1986 should enrol in the Year 4 Education program in 1987 to complete the Education component for the award of the pass degree.

2. All other pass degree students registered in this course (4080) should enrol in 1987 with a view to completing the Mathematics component of the course in 1987 or 1988. The Education component will be available only in the fourth year of the course after completion of all or most of the Mathematics component.

Details of the fourth year Education program to be offered in this course in 1988 and 1989 are under review and are not available until late 1987.

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, Biotechnology, 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 Year 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 for fourth year students in 1987 is based on the prescribed programs from the Science and Mathematics Course (**3970**) rearranged to spread over one additional year. For second and third year students the science programs are completed in three years as specified in the Science and Mathematics Course. 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 1.021 for biological science programs from the Science and Mathematics Course), 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		58.793,	58.794
	58.795,	58.799	

From 1987 all Science Education students enrolled in the pass course will complete the education component in the fourth year of their course.

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. No student will be enrolled in the first year of the Science Education Course (**4080**) in 1987.

Second and third year students must be enrolled in a science program from the Science and Mathematics Course (**3970**) and in General Studies.

Fourth year students in 1987 must be enrolled in one of the Science Education programs listed below, the Education program and General Studies.

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 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 or 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 1 *and/or* 2.121 Chemistry 1A 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 1 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

Students enrolled in the pass course in 1987, 1988 and 1989 will study education only in the fourth year of their course. Students enrolled in the education honours course will also study education in their fifth year. In 1987 the subjects available are as follows:

Year	Subject	Hours per week*
4	58.704	2.2
	58.714	3
	58.734	4
Honours in Education		
4	58.793	1
	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 listed below is available to students in the fourth year of the course and 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.

Students in the second and third years of the course should choose the science program in the Science and Mathematics Course which is appropriate to their major area of study.

5801†† Physics

Year 1
1.001
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
10.1113†, 10.1114†
10.2111†, 10.2112†
17.031, 17.041
or
25.110, 25.120

Year 3
1.002
Choose 2 units from:
1.0133, 1.0143, 1.023, 1.0333, 1.0343, 1.043
Choose 1 HPS unit

Year 4
Choose 2 units from:
1.0133, 1.0143, 1.023, 1.0333, 1.0343, 1.043
Choose 2 units from Table 1*†

Students proposing to proceed to Year 5 (Honours) year must take 6 Level III units

Year 5 (Honours)
Choose one of 1.104, 1.304 *or* 1.504

*Units available for choice from Table 1 in this program are those from schools other than Mechanical and Industrial Engineering, Electrical Engineering, Mathematics, Psychology, Geography, Philosophy.
†Students are encouraged to select Higher level Mathematics units where applicable.
††Students should read carefully the notes accompanying program 0100 Physics and seek advice from the School of Physics regarding choice of units. For students proceeding to Year 5 consideration is given in Year 4 to students wishing to include further units of Mathematics.

5820 Chemistry

Year 1
1.001
2.141 *or both* 2.121 *and* 2.131
10.001 *or* 10.011 *or both* 10.021B & 10.021C
17.031, 17.041
or
25.110, 25.120

Year 2
2.102A, 2.102B, 2.102C, 2.102D
17.031, 17.041
or
25.110, 25.120
Choose 1 unit from: Table 1*

Year 3
Choose 2 Level III Chemistry units
Choose 1 HPS unit
Choose 1 unit from Table 1*

Year 4
Choose 2 Level III Chemistry units
Choose 2 units from Table 1*

Students proposing to proceed to Year 5 (Honours) must take 7 Level III units

Year 5
2.004

*See this footnote to program 5801.

5825 Geology

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

Year 2
17.031, 17.041
25.211, 25.212, 25.221
Choose 2 units from Table 1*

Year 3
25.311, 25.312
Choose 1 HPS unit
Choose 1 unit from Table 1*

Year 4
Choose 2 Level III Geology units
Choose 2 units from Table 1*

Students proposing to proceed to Year 5 (Honours) must take 7 Level III units

Year 5 (Honours)
25.434

*See this footnote to program 5801.

5841 Biochemistry

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

Year 2
2.102B
25.110, 25.120
41.101
Choose 1 unit from Table 1*

Year 3
41.102A
Choose 1 HPS unit
Choose 1 unit from Table 1*

Year 4
Choose at least 2 units from:
41.102B, 41.102E
Choose 2 units from Table 1*

Students proposing to proceed to Year 5 (Honours) must complete 7 Level III units.

Year 5 (Honours)
41.103

*See this footnote to program 5801.

5843 Botany

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

Year 2
25.110, 25.120
43.111
Choose 4 units from Table 1*

Year 3
Choose 2 Level III Botany units
Choose 1 HPS unit
Choose 1 unit from Table 1*

Year 4
Choose 2 Level III Botany units
Choose 2 units from Table 1*

Students proposing to proceed to Year 5 (Honours) must take 7 Level III units

Year 5 (Honours)
43.103

*See this footnote to program 5801.

5844 Microbiology

Year 1
1.001
2.121 *and* 2.131, *or* 2.141
10.001 *or* 10.011 *or both* 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
Choose 1 HPS unit
Choose 1 unit from Table 1*

Year 4
44.112
Choose 2 units from Table 1*

Students proposing to proceed to Year 5 (Honours) must take 7 Level III units

Year 5 (Honours)
44.103

*See this footnote to program 5801.

5845 Zoology

Year 1
1.001
2.121 *and* 2.131, *or* 2.141
10.001 *or* 10.011 *or both* 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 or Mathematics

Year 3
Choose 2 units from 45.121, 45.122, 45.142, 45.402
Choose 1 HPS unit
Choose 1 unit from Table 1*

Year 4
17.012
Choose 1 unit from 45.121, 45.122, 45.142, 45.402
Choose 1 Level III Zoology unit
Choose 1 unit from Table 1*

Students proposing to proceed to Year 5 (Honours) must take 6 Level III units

Year 5 (Honours)
45.103

*See this footnote to program 5801.

5873 Physiology

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

Year 2
25.110, 25.120
41.101
73.111

Year 3
73.012

Year 4
Choose 1 HPS unit
Choose 3 units from Table 1*

Students proposing to proceed to Year 5 (Honours) must take 7 Level III units

Year 5 (Honours)
73.013

*See this footnote to program 5801.

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
10.001 *or* 10.011
90.112, 90.741

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
2.141 *or both* 2.121 & 2.131
10.001 *or* 10.011 *or both* 10.021B & 10.021C
90.112, 90.741

Year 2

2.102A, 2.102B, 2.102C, 2.102D
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, 90.741
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, 90.741
Choose 4 Level I units from Table 1

Year 2
10.111A*, 10.1113*, 10.1114*, 10.2111*, 10.2112*
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 Mathematics units from Table 1
Choose 2 other units of appropriate levels from Table 1

*Students are encouraged to select Higher Level Mathematics units where applicable.

Psychology

Year 1
10.001 *or* 10.011 *or both* 10.021B & 10.021C
12.100
90.112, 90.741
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
2.141 *or both* 2.121 & 2.131
10.001 *or* 10.011 *or both* 10.021B & 10.021C
25.110, 25.120
90.112, 90.741

Year 2
1.001
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 both* 10.021B & 10.021C
27.111 *or* 27.818
27.819
Choose further Level I Science units from Table 1 to make a total of 6.
90.112, 90.741

Year 2
Choose 3 Level II Geography units
90.141, 90.161
Choose 1 Level II unit from Table 1
Choose 2 Level I *or* LevelI 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, 27.863
Choose 2 units of appropriate levels from Table 1

Biochemistry

Year 1
2.141 *or both* 2.121 & 2.131
10.001 *or* 10.011 *or both* 10.021B & 10.021C
17.031, 17.041
90.112, 90.741

Year 2
2.102B
41.101
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
41.102A
41.102B
41.102E
90.216, 90.301, 90.621
Choose 2 units of appropriate levels from Table 1

Botany

Year 1
2.141 *or both* 2.121 & 2.131
10.001 *or* 10.011 *or* 10.021B & 10.021C
17.031, 17.041
90.112, 90.741

Year 2
43.111
90.141, 90.161
Choose 3 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
2.141 *or both* 2.121 & 2.131
10.001 *or* 10.011 *or both* 10.021B & 10.021C
17.031, 17.041
90.112, 90.741

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
2.141 *or both* 2.121 & 2.131
10.001 *or* 10.011 *or both* 10.021B & 10.021C
17.031, 17.041
90.112, 90.741

Year 2
41.101
42.101
90.141, 90.161
Choose group **1.** *or* **2.** *or* **3.**
1. 44.101, 44.121
2 Level I *or* Level II units from Table 1
2. 2.102B
2 Level I *or* Level II units from Table 1
3. 2.102A, 2.102B, 2.102C *or* 2.102D

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
2.141 *or both* 2.121 & 2.131
10.001 *or* 10.011 *or both* 10.021B & 10.021C
17.031, 17.041
90.112, 90.741

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
2.141 *or both* 2.121 & 2.131
10.001 *or* 10.011 *or both* 10.021B & 10.021C
17.031, 17.041
90.112, 90.741

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 both* 10.021B & 10.021C
17.031, 17.041
90.112, 90.741
Choose one of the following:
1.001
2.141 *or both* 2.121 & 2.131
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:
2.102A
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 both* 10.021B & 10.021C
17.031, 17.041
90.112, 90.741
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.

†Progress into Year 2 of this program is by competitive entry at the end of Year 1. See entry under Course **3970** Anatomy.

Physiology and Pharmacology

Year 1
2.141 *or both* 2.121 & 2.131
10.001 *or* 10.011 *or both* 10.021B & 10.021C
17.031, 17.041
90.112, 90.741

Year 2
41.101
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 1	I	2	F	6	See Subject Descriptions later in this Handbook	10.021C, *or* 10.001, *or* 10.011	
1.021	Introductory Physics 1† (For Health and Life Scientists)	I	2	F	6		10.021B *and* 10.021C *or* 10.001 *or* 10.011	
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	Programs 0600, 6806
1.061	Computer Applications in Experimental Science 1	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

Physics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
1.012	Electromagnetism and Thermal Physics	II	1	S2	4	1.001, 10.001	10.2111	1.972, 1.992
1.022	Modern Physics	II	1	F	2	1.001, 10.001	10.2112	1.9322, 1.982
1.032	Laboratory	II	1	F	3	1.001, 10.001		1.9222
1.0522	Methods in Mathematical Physics	II	½	S2†††	2	1.001, 10.001	10.2111, 10.2112, 10.1113	
1.062	Computer Applications in Experimental Science 2	II	1	S1	5	1.061		1.042
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		2.023A, 10.222F
1.0143	Nuclear Physics	III	½	S2	2		1.0133	
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
1.0343	Advanced Optics	III	½	S2	2		1.002	
1.043	Experimental Physics A	III	1	F	4	1.032		
1.0533	Experimental Physics B1	III	½	S1	4	1.032		
1.0543	Experimental Physics B2	III	½	S2	4	1.032		
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		
1.3033	Mechanical Properties of Materials	III	½	S1	2		1.023	4.403

Physics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
1.3133	Physics of Solid State Devices	III	½	S2	2		1.023	
1.3143	Topics in Condensed Matter Physics	III	½	S2	2		1.023	
1.3533	Marine Acoustics	III	½	S1††	2			
1.5133	Classical Mechanics and Field Theory	III	½	S1	2	1.002 (*or* 10.4111) 10.1113 10.2111 10.2112		
1.5233	Electrodynamics	III	½	S2	2	1.022 10.1113 10.2111 10.2112	1.0333	10.222C
1.5333	Radiation and Matter	III	½	S2	2	1.012, 1.022 10.2111, 10.2112	1.0133 *or* 10.222F *or* 2.023A 1.0333 (*or* 10.222C)	
1.5433	Plasmas and Laser Fusion	III	½	S1	2	1.012, 1.022		
1.5533	General Relativity	III	½	S2	2	1.012, 1.022 10.1113, 10.2111 10.2112		
1.713**	Advanced Laser and Optical Applications	III	1	F	2		1.002	
1.763**	Laser and Optical Technology Laboratory 1	III	1	F	4	1.032		
1.773**	Laser and Optical Technology Laboratory 2	III	1	F	4		1.763	

†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 will be counted as 3 units.
*Where mathematics units are specified as prerequisites or as co-requisites, the higher levels of such units are acceptable and preferable. Similarly Physics 1.001 is acceptable 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.
**Students wishing to enrol in units 1.713, 1.763 or 1.773 without the stated prerequisites or corequisites should enquire from the School of Physics as to the suitability of their previous studies.
††To be offered in odd numbered years only.
†††Not offered in 1987.

Chemistry

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
2.121	Chemistry 1A	I	1	S1 *or* S2	6	See Subject Descriptions later in this Handbook		2.141
2.131	Chemistry 1B	I	1	S1 *or* S2	6	See Subject Descriptions later in this Handbook		2.141

Chemistry (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
2.141	Chemistry 1M‡	I	2	F	6	See Subject Descriptions later in this Handbook		2.121, 2.131
2.102A	Physical Chemistry	II	1	S1 *or* S2	6	2.121 and 2.131, *or* 2.141, 10.001 *or* 10.011 *or* 10.021B & 10.021C		2.002A
2.102B	Organic Chemistry	II	1	F *or* S2	6	2.131 *or* 2.141		2.002B
2.102C	Inorganic Chemistry and Structure	II	1	S1 *or* S2	6	2.121 & 2.131, *or* 2.141		2.042C
2.102D	Chemical and Spectroscopic Analysis	II	1	S1 *or* S2	6	2.121 & 2.131, *or* 2.141 10.001 *or* 10.011 *or* 10.021B & 10.021C		2.002D, 2.003H
2.103A	Physical Chemistry	III	1	S1	6	1.001, 2.102A, 2.102C		2.013A
2.103B	Organic Chemistry	III	1	S1	6	2.102B		2.003B
2.103C	Inorganic Chemistry	III	1	S1	6	2.102C		2.003C
2.103D	Analytical Chemistry	III	1	S1 *or* S2	6	2.102D		2.003D
2.113A	Kinetics and Mechanism of Chemical Change	III	1	S2	6	2.103A		2.053A
2.113B	Synthetic Organic Chemistry	III	1	S2	6	2.103B		2.013B
2.113C	Advanced Inorganic Chemistry	III	1	S2	6	2.102C	2.103C	2.013C
2.113D	Advanced Instrumental Analysis	III	1	S2	6	2.102D	2.103D	2.013D
2.113E	Nuclear & Radiation Chemistry	III	1	S1 *or* S2	6	2.102A *or* 2.102B *or* 2.102C *or* 2.102D		2.003E
2.123A	Biophysical and Interfacial Chemistry	III	1	S2	6	2.102A		2.033A
2.123B	Biological Organic Chemistry	III	1	S2	6	2.103B		2.023B
2.123E	Environmental Chemistry	III	1	S2	6	2.102A, 2.102D		2.043A
2.133B	Applied Organic Chemistry	III	1	S1	6	2.102B	2.103B	2.003L
2.1813	Quantum Chemistry and Symmetry	III	½	S1	3	2.102C, 10.111A *or* 10.031		2.023A
2.1823	Computers in Chemistry	III	½	S1 *or* S2	3	2.102A, 2.102D		
2.1833	Molecular Structure Determination	III	½	S2	3	2.102C, 2.102D		
2.1843	Organometallic Chemistry	III	½	S2	3	2.102B, 2.102C		2.003M

‡Students majoring in Chemistry may take 2.141 in lieu of 2.121 and 2.131.

Mechanical and Industrial Engineering

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
5.0011, 5.0012	Engineering M	I	1	S1 *or* S2	6			5.006
5.006	Engineering E	I	1	S1	6	See Subject Descriptions later in this Handbook		5.010, 5.020, 5.030
5.030	Engineering C‡	I	1	S1 *or* S2	6			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 1	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 2A	II	1	S1 *or* S2	5	6.611** 10.001 *or* 10.011		6.620 6.021D
6.631	Computing 2B	II	1	S1 *or* S2	5	6.621** *or* 6.620** *or* 6.021D**		6.021E
6.641	Computing 2C	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** 10.331 *or* both 10.311A and 10.311B *or* equivalent.		6.622

*Excluded for students in programs 0600, 6806.
**Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.

Mathematics

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
10.001	Mathematics 1	I	2	F	6	See Subject Descriptions later in this Handbook		10.011 10.021B 10.021C
10.011	Higher Mathematics 1	I	2	F	6	See Subject Descriptions later in this Handbook		10.001 10.021B 10.021C
10.021B	General Mathematics 1B	I	1	S1	6	See Subject Descriptions later in this Handbook		10.001 10.011
10.021C	General Mathematics 1C	I	1	S2	6	10.021B		10.001 10.011
10.081	Discrete Mathematics	I	1	S2	6	As for 10.001	10.001 *or* 10.011	
10.031‡	Mathematics	II	1	F	2	10.001 *or* 10.021C (CR)		‡
10.032§	Mathematics	III	1	F	2	10.031		§

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 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

††For any listed unit an appropriate higher unit may be substituted.

‡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 or Applied Mathematics are taken, 10.032 Mathematics will not be counted except that 10.412A may be taken with 10.032.

Mathematics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
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	½t	SS	2	***		10.1421
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	***	10.122B, 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	***		
10.1128	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 ***	***	10.1325
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		10.1128 10.1523
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* *both* 10.111A DN and 10.1111 DN		
10.1423	Topology	III	½	S1‡	2	10.1213 *or* 10.1113 DN		

Mathematics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
10.1424	Geometry	III	½	S2‡‡	2	10.121A *or* *both* 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
Applied Mathematics Level II								
10.2111	Vector Calculus	II	½	S1 *or* S2	2½	10.001		10.2211
10.2112	Mathematical Methods for Differential Equations	II	½	S1 *or* S2	2½	10.001		10.2212
10.2113	Linear Programming	II	½	S1 *or* S2	2	10.001	10.111A	10.2213
10.2115	Discrete-Time Systems	II	½	S1 *or* S2	2	10.001	10.111A	10.2215
10.2116	Continuous-Time Systems	II	½	S2	2	10.001		10.2216
10.261A	Mathematical Computing	II	1	S1	4	10.001		
Higher Applied Mathematics Level II								
10.2211	Vector Analysis	II	½	S1	2½	10.011 *or* 10.001 CR		10.2111
10.2212	Mathematical Methods for Differential Equations	II	½	S2	2½	10.011 *or* 10.001 CR		10.2112
10.2213	Linear Programming	II	½	S1 *or* S2	2	10.011 *or* 10.001 CR	10.111A	10.2113
10.2215	Discrete-Time Systems	II	½	S1 *or* S2	2	10.011 *or* 10.001 CR	10.111A	10.2115
10.2216	Continuous-Time Systems	II	½	S2	2	10.011 *or* 10.001CR		10.2116

*10.1128 is highly recommended.

†10.122B is highly recommended.

**For any listed unit, an appropriate higher unit may be substituted.

††**1.** Admission to Higher Pure Mathematics 2 traditionally requires completion of 10.011 Higher Mathematics 1; students who gain good grades in Year 1 may be allowed to take Higher Pure Mathematics 2 units subject to the approval of the Head of Department. 10.081 Discrete Mathematics is also advised.

2. Students majoring in Physics who wish to take Higher Pure Mathematics 2 should attempt 10.121A, 10.1213, 10.1214, either 10.2211 or 10.2111 and either 10.2212 or 10.2112.

3. Students considering doing Higher Pure Mathematics in years III or IV should take 10.121A, 10.1213, 10.1214 and 10.2211 or 10.2111, and 10.2212 or 10.2112; 10.1115 and 10.1116 Finite Mathematics A and B are also advised.

***Normal prerequisites for attempting Level III Pure Mathematics units are at least two Level II Mathematics units, including any course prerequisites. For any listed unit, an appropriate higher unit may be substituted.

†††Students wishing to enrol in Level III Higher Pure Mathematics units should consult with the Department before enrolling. Normal prerequisites for attempting Level III Higher Pure Mathematics units are at least two Level II Mathematics units, including any course prerequisites, at an average of distinction level, or their higher equivalents. Subject to the approval of the Head of Department, these may be relaxed.

‡These subjects are to be offered in odd numbered years.

‡‡These subjects are to be offered in even numbered years.

Mathematics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
Applied Mathematics Level III								
10.212A	Numerical Analysis	III	1	S1	4	10.2112, 10.111A		10.222A
10.212B	Fluid Dynamics	III	1	S1	4	10.2111, 10.2112		10.222B 10.422A
10.212D	Mathematical Methods	III	1	S2	4	10.2112, 10.111A, 10.1113, 10.1114		10.0331 10.033 10.222D 10.412D 10.422D 10.4331 10.2921
10.212L	Optimization Methods	III	1	S2	4	10.111A, *and* 10.2111 *or* 10.1113		10.222L
10.212M	Optimal Control	III	1	S1	4	10.1113 *and* 10.1114 10.111A		10.222M
10.212N	Dynamical Systems	III	1	S2	4	10.111A, 10.2112, 10.1125		10.222N
10.262A	Mathematical Software	III	1	S2	4	10.2112, 10.111A, *and either* 6.621 *or* 10.211E *or* 10.261A *or* equivalent		10.612
10.292A	Oceanography	III	1	S1	4	10.2111, 10.2112 *or* 10.031 1.001		10.412A
10.2921	Transform Methods	III	½	S1	2	10.1113, 10.1114, 10.2112 *or* equivalent	10.0331 10.033 10.212D 10.222D 10.412D 10.422D 10.4331	
10.2922	Applied Time Series Analysis	III	½	S2	2	10.2112 *or* 10.031 *or* 10.022	10.331 *or* equivalent, 10.2921 *or* 10.212D *or* equivalent	10.4129

Mathematics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
Higher Applied Mathematics Level III								
10.222A	Numerical Analysis	III	1	S1	4	10.2212 *or* 10.2112 CR, 10.121A *or* 10.111A CR		10.212A
10.222B	Fluid Dynamics	III	1	S1	4	10.2211 *or* 10.2111 CR, 10.2212 *or* 10.2112 CR		10.212B 10.422A
10.222C	Maxwell's Equations and Special Relativity	III	1	S2	4	10.2211 *or* 10.2111 CR, 10.2212 *or* 10.2112 CR, 10.1214 *or* 10.1114 CR, 1.001		1.033 1.0333
10.222D	Mathematical Methods	III	1	S2	4	10.2212 *or* 10.2112 CR, 10.121A *or* 10.111A CR, 10.1213 *or* 10.1113 CR, 10.1214 *or* 10.1114CR		10.0331 10.033 10.212D 10.412D 10.422D 10.4331 10.2921
10.222L	Optimization Methods	III	1	S2	4	10.121A *or* 10.111A CR, 10.2211 *or* 10.2111 CR, 10.1213 *or* 10.1113 CR		10.212L
10.222M	Optimal Control	III	1	S1	4	10.1213 *or* 10.1113 CR, 10.1214 *or* 10.1114 CR, 10.121A *or* 10.111A CR		10.212M
10.222N	Dynamical Systems	III	1	S2	4	10.121A *or* 10.111A CR, 10.1425 *or* 10.1125 CR, 10.2212 *or* 10.2112 CR		10.212N
Statistics								
Theory of Statistics Level II								
10.311A‡	Probability and Random Variables	II	1	S1‡	4	10.001 *or* 10.011 *or* 10.021C (CR)		10.321A 10.331 10.301 45.101

Mathematics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
10.311B	Basic Inference	II/III	1	S2	4	10.311A		10.321B 10.331 10.301 45.101
10.3111	Statistical Computing and Simulation	II	½	S1	2	10.001 *or* 10.011 *or* 10.021C (CR)	10.311A	
10.3112	Nonparametric Statistical Inference	II	½	S2	2	10.311A	10.311B	
10.331	Statistics SS	II	1	F	2	10.001 *or* 10.021C (CR)		10.311A 10.311B 10.321A 10.321 B 10.301 45.101
Higher Theory of Statistics Level II								
10.321A	Probability and Random Variables	II	1	S1	4	10.001 *or* 10.011		10.311A 10.331 10.301 45.101
10.321B	Basic Inference	II/III	1	S2	4	10.321A		10.311B 10.331 10.301 45.101
10.3211	Statistical Computing and Simulation	II	½	S1	2	10.001 *or* 10.011	10.321A	
10.3212	Nonparametric Statistical Inference	II	½	S2	2	10.321A	10.321B	
Theory of Statistics Level III**								
10.312A	Stochastic Processes	III	1	S1	4	10.311A, 10.111A, 10.1113		10.322A
10.312C	Linear Models	III	1	S1	4	10.311B, 10.111A, 10.1113		10.322C
10.312F	Statistical Computation	III	1	SS	4	10.311B *or* 10.321B, 10.3111 *or* 10.3211.		
10.3121	Sample Survey Theory	III	½	S1	2	10.311B		10.3321
10.3122	Design and Analysis of Experiments	III	½	S2	2	10.311B 10.312C		10.3222
10.3123	Statistical Inference	III	½	SS	2	10.311B		10.3223

Mathematics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
10.3124	Non-parametric Methods	III	½	SS	2	10.311B 10.3112		10.3224
10.3321	Regression Analysis and Experimental Design	III	½	S1	2	10.331 *or* 10.311B *or* 10.321B		10.3122 10.3222
10.3322	Applied Stochastic Processes	III	½	S2	2	10.331 *or* 10.311A *or* 10.321A		10.312A 10.322A
Higher Theory of Statistics Level III								
10.322A	Stochastic Processes	III	1	S1	4½	10.111A, 10.1113, 10.321A		10.312A
10.322C	Linear Models	III	1	S1	4½	10.321B, 10.111A, 10.1113		10.312C
10.322D	Probability Theory	III	1	S2	4	10.321A, 10.111A, 10.1113		
10.3221	Sample Survey Theory	III	½	S1	2	10.321B		10.3121
10.3222	Design and Analysis of Experiments	III	½	S2	2	10.321B 10.322C		10.3122
10.3223	Statistical Inference	III	½	S2	2	10.321B		10.3123
10.3224	Non-parametric Methods	III	½	S2	2	10.321B 10.3212		10.3124
10.3225	Statistics Project	III	½	F				

††For any listed unit an appropriate higher unit may be substituted.
† 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 higher units 10.322A, 10.322C, 10.322D, 10.3321, 10.3322, 10.3223, 10.3224, 10.312F is required to take 10.3225.
‡The evening course 10.311A will, subject to a sufficient enrolment, run at 2 hours per week throughout the year.
*At least four units from 10.322A, 10.322C, 10.3221, 10.3222, 10.3223, 10.3224, 10.322D, 10.312F.

Psychology

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
Psychology Level I								
12.100	Psychology 1	I	2	F	5			
Psychology Level II **See Notes**								
12.200	Research Methods 2	II	1	F	3	12.100*		
12.201	Biological Basis of Psychology 2	II	1	S2	4	12.100*		

Psychology (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
12.202	Social and Cognitive Psychology 2	II	1	S1	4	12.100*		
12.204	Human Relations 2	II	1	S1	4	12.100*		
12.205	Individual Differences 2	II	1	S2	4	12.100*		
Psychology Level III: Group A See Notes								
12.300	Research Methods 3A	III	1	S1	4	12.200		
12.305	Learning and Behaviour 3	III	1	S1 *or* S2	4	12.200 *and* 12.201		
Psychology Level III: Group B See Notes								
12.301	Research Methods 3B	III	1	S2	4	12.200 *and* 12.300		
12.304	Personality and Individual Differences 3	III	1	S1	4	2 Psychology Level II subjects		
12.310	Physiological Psychology 3	III	1	S2	4	12.200 *and* 12.201		
12.311	Perception 3	III	1	S1	4	12.200 *and* 12.201		
12.312	Language and Cognition 3	III	1	S2	4	12.200 *and* 12.202		
12.314	Motivation and Emotion 3	III	1	S1	4	12.200 *and* 12.201		
12.315	Theories of Associative Learning 3	III	1	S2	4	12.305		
12.316	Psychophysiology 3	III	1	S1	4	12.200 *and* 12.201		
12.320	Social Psychology 3	III	1	S2	4	12.200 *and* 12.202		
12.321	Developmental Psychology 3	III	1	S2	4	12.200 *and* 12.202		
12.322	Abnormal Psychology 3	III	1	S1	4	12.200 *and* 12.201		
12.324	Experimental Psychopathology 3	III	1	S2	4	12.322		
12.325	Social Behaviour 3	III	1	Not offered 1987	4	12.200 *and* 12.202		
12.330	Psychological Assessment 3	III	1	S1	4	12.200, *and* 1 other Psychology Level II subject		12.203

Psychology (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
12.331	Counselling Psychology 3	III	1	S2	4	2 Psychology Level II subjects		
12.332	Behavioural Change 3	III	1	Not offered 1987	4	12.200 *and* 12.201		
12.333	Ergonomics 3	III	1	S1	4	12.200		
12.334	Behaviour in Organizations 3	III	1	S2	4	2 Psychology Level II subjects		
12.335	Behavioural Evaluation and Assessment 3	III	1	S2	4	12.200		
12.340	Special Topic 3	III	1	S1	4	12.200 *and* 12.202		

*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 2 has been passed.

3. A student may not enrol in more than six Level III Psychology units unless 12.300 Research Methods 3A 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 units selected from 12.304 Personality and Individual Differences 3, 12.322 Abnormal Psychology 3, 12.324 Experimental Psychopathology 3, 12.331 Counselling Psychology 3, and 12.335 Behavioural Evaluation and Assessment 3.

6. A student may not enrol in more than two Psychology Level III units selected from 12.320 Social Psychology 3, 12.325 Social Behaviour 3 and 12.334 Behaviour in Organizations 3.

7. 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 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	1	S1	6	See Subject Descriptions later in this Handbook		
25.120	Earth Environments and Dynamics****	I	1	S2	6	25.110		

Applied Geology (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
25.211	Earth Materials 1**	II	1	S1	6	25.120		
25.221	Earth Materials 2****	II	1	S2	6	25.211		
25.212	Earth Environments 1‡	II	1	S1	6	25.120		
25.223	Earth Physics**	II	1	S2	6	25.110		
25.2261	Mathematical Geology 1	II	½	S2	3	25.120		
25.621	Marine Geology 1**	II	1	F	3	25.601 *or* 25.110 *and* 25.120		††
25.622	Hydrological and Coastal Surveying‡	II/III	1	F	3			††
25.311	Earth Materials 3	III	1	S1	6	25.221		
25.321	Earth Materials 4****	III	1	S2	6	25.221		
25.312	Earth Environments 2‡‡	III	1	S1	6	25.212†††		
25.314	Mineral and Energy Resources 1***	III	1	S1	6	25.221		
25.3162	Mathematical Geology 2	III	½	S1	3	25.2261		
25.324	Mineral and Energy Resources 2****	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 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 2500, 2503 *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
27.010	Land Studies	I	1	S1	4			27.801, 27.301, 27.818, 27.811, 27.828, 27.111.
27.030	Environmental Processes	I	1	S2	4			27.818, 27.111.
27.818	Australian Environment and Human Response**	I	1	S1	4			27.801, 27.010, 27.030, 27.111
27.819	Technology and Regional Change*	I	1	S2	4			27.802, 27.302
27.050	Geographical Data Analysis	II	1	F	4	27.111 *or both* 27.010 *and* 27.030		27.813, 27.884
27.175	Introduction to Remote Sensing	II	1	S1	4	See **Subject Descriptions** later in this Handbook		27.1711
27.193	Environmental Impact Assessment	III	S1	4				
27.813	Geographic Methods***	II	1	S2	4	27.111 *or both* 27.010 *and* 27.030 *or* 27.818 *and* 27.819 *or* 27.801 *and* 27.802		27.2813
27.828	Australian Natural Environments***	II	1	S2	4	27.818 *or* 27.801		27.811, 27.111, 27.010, 27.030
27.829	Australian Social Environments***	II	1	S1	4	27.819 *or* 27.802/302		27.812, 27.312
27.133	Pedology†	III	1	S2‡	5	27.111 *or* 27.030 *or* any 2 units from: 2.111, 2.121, 2.131, 2.141 *or* 27.828 *or* 27.811 (*or* 25.012 *or* 25.022)		
27.143	Biogeography†	III	1	S1	5	27.111, *or* 27.010 *and* 27.030, *or* 17.031 *and* 17.041, *or* 27.811, *or* 27.828		

Geography (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
27.153	Climatology	III	1	S1‡	5	1.001, *or* 27.828, *or* 25.110 *and* 25.120, *or* 17.031 *and* 17.041†, *or* 27.010 *and* 27.030, *or* 27.811		
27.176	Remote Sensing Applications	III	1	S1‡	4	27.1711 *or* 27.175		27.1712
27.183	Geomorphology†	III	1	S2‡	5	25.110 *and* 25.120, *or* 27.828, *or* 27.111, *or* 27.010 *and* 27.030, *or* 27.811,		27.860
27.432	Computer Mapping and Display	III	1	S1	4	See **Subject Descriptions** later in this Handbook		
27.652	Geographic Information Systems	III	1	S2	4	27.432 *or* 10.021B *and* 10.021C, *or* 10.001, *or* 10.011		
27.753	Social Welfare and Urban Development	III	1	S1	4	27.829 *or* 27.812		
27.824	Spatial Population Analysis	III	1	S2	4	27.829 *or* 27.812		27.834
27.825	Urban Activity Systems	III	1	S1	4	27.829 *or* 27.812		27.835
27.826	Urban and Regional Development	III	1	S2	4	27.829 *or* 27.812		27.836
27.862	Australian Environment and Natural Resources**	III	1	S1	4**	27.828 *or* 27.829 *or* 27.811 *or* 27.812, *or* 27.010 *and* 27.030		27.872
27.863	Ecosystems and Man**	III	1	S2	4**	27.828 *or* 27.829 *or* 27.811 *or* 27.812		27.363, 27.873
27.884	Advanced Geographic Methods	III	1	S1	4	27.813, *or* 27.2813 *and* 27.2814		27.880, 27.050
27.883	Special Topic	III	1	S1 or S2	4	See **Subject Descriptions** later in this Handbook		

*A field excursion, equivalent to 8 tutorial hours, is a compulsory part of the subject.
**Two field tutorials, equivalent to 16 tutorial hours, are compulsory.
***Three days fieldwork, equivalent to 24 tutorial hours, is compulsory.
†Up to 5 days fieldwork, equivalent to 40 tutorial hours, is compulsory.
‡Offered in alternate years.

Surveying

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
29.1010	Surveying 1*	I	1½	S1	5			
29.2010	Surveying 2*	I		S2	4	29.1010		

*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	F	6	17.041†, 2.121† & 2.131†, *or* 2.141†		2.003J
41.102A	Biochemistry of Macromolecules	III	2	S1	12	41.101, 2.102B		
41.102B	Physiological Biochemistry	III	2	S2	12	41.101, 2.102B		
41.102E	Molecular Biology of Higher Organisms	III	1	S2	6	41.102A		

*In exceptional circumstances a student may apply to the Head of School for variation of the prerequisite.
†Terminating pass not acceptable.

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†		
42.102C	Microbial Genetics	III	1	S1	6	41.101 *or* 44.101		43.102

*In exceptional circumstances a student may apply to the Head of School for variation of the prerequisite.
†Pass Conceded (PC) or Terminating Pass (PT) 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		
43.111	Flowering Plants	II	1	S1	6	17.031 *and* 17.041		
43.121	Environmental Physiology	II	1	S2	6	17.031, 17.041, 2.141 *or* 2.121 *and* 2.131		43.122
43.131	Fungi and Man	II	1	S1	6	17.031 *and* 17.041		
43.112	Taxonomy and Systematics	III	1	S2	6	43.111		
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		
43.172	Phycology and Marine Botany	III	1	S1	6	43.111		
43.192	Ultrastructure	III	1	S2	6	43.111 *or* 43.121 *or* 41.101 *or* 44.101 *or* 45.201 *or* 45.301		43.182

***A student may apply to the School for variation of the prerequisite.

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 1	II	1	S2	6	44.101	41.101	
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, 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, 10.321A, 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		
45.601	Introductory Genetics	II	1	S2	6	17.031 *and* 17.041, 2.131 *or* 2.141		
45.112	Marine Ecology§	III	1	S1	6	17.031 *and* 17.041, 45.201 *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 *or* 45.301)		
45.132	Ecological Physiology	III	1	S2	6	45.201 *or* 45.301		
45.142	Comparative Physiology	III	1	S1	6	45.201 *or* 45.301		
45.152	Population and Community Ecology	III	1	S1	6	17.041 *and* 10.001 *or* 10.011 *or* 10.021C		
45.302	Vertebrate Zoogeography and Evolution	III	1	S2	6	45.301		
45.402	Entomology	III	1	S1	6	17.031, 17.041, 45.201		
45.422	Economic Zoology	III	1	S2	6	45.201 *or* 45.402		

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.

§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.

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			
52.2001	The Nature of Mind	II/III	½	S1	2	Levell II status in Philosophy**		
52.2002	Contemporary Philosophy of Mind	II/III	½	S1	2	Level II status in Philosophy**		

Philosophy (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
52.2003	Issues in the Philosophy of Psychology	II/III	½	S2	2	52.2001 *or* 52.2002		
52.2010	Reasoning Skills	II/III	½	S1 or S2	2	Any Level I Subject		52.233
52.2020	Descartes	II/III	½	S1	2	Level II Status in Philosophy**		52.163
52.2021	Spinoza and Leibniz	II/III	½	S2	2	52.2020 *or* 52.163		52.303
52.2030	Predicate Logic A	II/III	½	S1	2	Any Level I Subject		52.153, 52.162, 52.1531
52.2031	Predicate Logic B	II/III	½	S2	2	52.2030 *or* 52.1531		52.153, 52.162, 52.1532
52.2040	Greek Philosophy: Thales to Plato	II/III	½	S1	2	Level II Status in Philosophy**		52.183
52.2050	Classical Political Philosophy	II/III	½	S1	2	Level II Status in Philosophy**		52.182, 52.203
52.2060	Sartre	II/III	½	S1	2	Level II Status in Philosophy**		52.213
52.2130	British Empiricism	II/III	½	S2	2	Level II Status in Philosophy**		52.173
52.2140	Scientific Method	II/III	½	S1	2	Level II Status in Philosophy**		52.193
52.2150	Philosophy of Law	II/III	½	S2	2	Level II Status in Philosophy**		52.105
52.219	Philosophical Foundations of Marx's Thought	II/III	1	S2	3	Level II Status in Philosophy**		52.373
52.2170	Hume	II/III	½	S1	2	Level II Status in Philosophy**		52.563, 52.152
52.2220	The Ethics of Plato and Aristotle	II/III	½	S1	2	Level II Status in Philosophy**		52.5231
52.2230	Theories in Moral Philosophy	II/III	½	S2	2	Level II Status in Philosophy**		52.5232
52.2240	Philosophical Study of Woman	II/III	½	S1	2	Level II Status in Philosophy**		52.283
52.2250	Plato's Theory of Forms	II/III	½	S2	2	Level II Status in Philosophy**		52.483
52:2260	Aesthetics	II/III	½	S2	2	Level II Status in Philosophy**		52.273
52.2270	Social and Political Philosophy†	II/III	½	S2	2	Level II Status in Philosophy**		52.513
52.2330	Psychoanalysis — Freud and Lacan	II/III	½	S2	2	Level II Status in Philosophy**		52.573
52.2360	Theories, Values and Education	II/III	½	S2	2	Level II Status in Philosophy**		52.583
52.2371	Plato's Later Dialogues	II/III	½	S2	2	52.2250 *or* 52.483*		52.293
52.2980	Seminar A	II/III	½	S2	2	Level II Status in Philosophy**		52.423

Philosophy (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
52.2990	Reading Option A	II/III	½	S1 *or* S2	2	Level II Status in Philosophy**		52.413
52.3010	Seminar B	II/III	½	S1	2	Level II Status in Philosophy**		52.433
52.3020	Seminar C	II/III	½	S2	2	Level II Status in Philosophy**		52.443
52.3030	Reading Option B	II/III	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.

†Not offered in 1987.

‡Due to the extra library work required in the preparation of essays a combination of three half-unit Philosophy subjects count as the equivalent of two Science units.

History and Philosophy of Science

Students undertaking subjects in History and Philosophy of Science are required to supplement the class contact hours by study in the Library.

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
62.110	Science, Technology and Social Change†	I	1	S1	3			
62.111	Man, Megalith and Cosmos†	I	1	S1	3			
62.211	The Seventeenth Century Intellectual Revolution†	I	1	S2	3			62.012
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			
62.052	Scientific Knowledge and Political Power	II/III	1	S1	3			
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	A pass in four Level I units from Table 1		
62.103	The Discovery of Time	II/III	1	S1	3			

History and Philosophy of Science (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
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 26.568, 26.2506
62.241	Relations Between Science and the Arts	II/III	1	S2	3			
62.245	The New Biotechnologies and their Social Context	II/III	1	S2	3	62.110, or by permission of the Head of School for 3rd and 4th Year students in the Biological Sciences		
62.246	Technological Development in Twentieth Century Australia	II/III	1	S2	3	62.110		
62.285	Man, Woman and Deity	II/III	1	S2	3	A pass in four Level I units from Table 1		
62.3001	Philosphical Problems in Evolutionary Biology	II/III	1	S2	2	62.104 or 62.032		
62.3005	Issues in the Philosphy of Science	II/III	1	S2	2	Completion of 3 HPS units with an average of Credit or better, or by permission of Head of School		
62.551	The Arch of Knowledge: History of the Philosophy and Methodology of Science to 1800	II/III	1	S1	2	A pass in four Level I units from Table 1		62.013
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
62.554	Computers, Brains and Minds: Foundations of the Cognitive Sciences	II/III	1	S2	3	As for 62.022		
62.570	Language and Minds: The Impact of Chomsky's Revolution in Linguistics and Philosophy	II/III	1	S1	3	As for 62.022		
62.105	Research Methods in History and Philosophy of Science	III	1	F	1½	As for 62.3005		

†Note: only two Level 1 units may be counted towards Course 3970.

Board of Studies in Science and Mathematics

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
68.302	Introductory Marine Science	II	1	S2	4			25.601
68.313	Physical Oceanography	III	1	S2	4	10.001 *or* 10.011 *and* 1.001		
68.601	Genetics of Behaviour 1	II	1	S1	5	17.031		79.402
68.602	Genetics of Behaviour 2	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 0600, 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 70.011C 73.111 *or equivalent*		

Physiology and Pharmacology

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
73.111	Physiology 1*	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		73.121
73.012	Physiology 2	III	4	F	12	73.111, *or* 73.121, 41.101		
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	73.012 *or* 41.102A *and* 41.102B *or* 2 Level III Chemistry units	

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.

*Students intending to major in Physiology should note Physiology 2 prerequisites.

Community Medicine

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
79.201	Population Genetics	III	1	S1	5	See † below		
79.202	Human Genetic Analysis	III	1	S2	5	See * below		
79.302	Biochemical Genetics of Man	III	1	S1	6	43.101, 41.101 (or their equivalents)		

†One unit of statistical methods, or theory, as approved by the Head of School.
*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
1.982	Solid State Physics (Electrical Engineering)	II	1	S1	½	1.001, 10.001	10.2111, 10.2112	1.022	Course 3681
2.111	Introductory Chemistry*	I	1	S1	6				0100, 1200, 2700
2.951	Chemistry 1 ME	I	1	S2	6	As for 2.121		2.121, 2.131, 2.141	Course 3681
2.991	Chemistry for Civil Engineers	I	1	S2	6	As for 2.121		2.121, 2.131, 2.141	Course 3730
4.442	Physical Metallurgy 1D	II	½	S2	3	1.001		1.9322	Course 3681
4.413	Physical Metallurgy 2A	III	½	S1	2½	4.412A (Unit 1)			Course 3681
4.423	Physical Metallurgy 2B	III	½	S1	4	4.412A (Unit 1)			Course 3681
4.433C	Physical Metallurgy 2C	III	½	S1	4	4.412A (Unit 1)			Course 3681
4.443	Physical Metallurgy 2D	III	½	S2	4	4.432			Course 3681
4.453	Physical Metallurgy 2E	III	½	S2	2½	4.432			Course 3681
4.633	Metallurgical Engineering 2C	III	1	F	3½	10.001 *or* 10.011		10.2111, 10.2112	Course 3681
5.0201	Engineering Dynamics 1A	I	½	S1 *or* S2	3	5.010			Course 3681
5.0721	Computing 1	I	½	S1	3		10.001	10.211E	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 1	I	½	S2	3	5.010 *or* 5.0011			Course 3681
5.4220	Mechanics of Solids 2	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 2/ Materials	II	1½	F	3 ½	5.020 *or* 5.421 *or* 8.171, 10.001	4.402 *or* 4.422	5.4220	Course 3681
5.620	Fluid Mechanics 1	II	1½	F	4	1.001, 5010,	5.0201		Course 3681
5.621	Thermodynamics 1					10.001			
6.010	Electrical Engineering	I	1	S2	6	Electrical *and* magnetism section of 1.001			0100, 0600, 6806
6.021A	Basic Circuit Theory	II	½	S1 *or* S2	4	6.010, 1.001, 10.001			0600
6.021C	Electronics	II	½	S1 *or* S2	4	6.021A, 1.982 *or equiv.*			0600
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	0600 or in the Computer Science Quota. Courses 3611 3661 3681 3701 3725 3730 4770
6.632	Operating Systems**	III	1	S1	5	6.631*** *or* 6.021E***, 6.641***		6.672	
6.633	Data Bases and Networks**	III	1	S2	5	6.641***		6.622, 14.607, 14.608	
6.642	Design and Analysis of Algorithms**	III	1	S1	5	6.641***			
6.643	Compiling Techniques and Programming Languages**	III	1	S1	5	6.641***		6.672	
6.647	Business Information Systems**	III	1	S2	5	6.641*** 14.501		14.602, 14.603 14.605	
8.2410	Mechanics of Solids 1	I	½	SS	3	5.010		5.020, 5.421	Course 3681
8.1120	Computing	I	½	SS	3			6.611	Course 3681
9.801	Genetics 1	II	1	F	2S1 3S2				6840
9.811	Biostatistics 1	III	1	S1	4	10.301 *or* 45.101			6840
9.802	Genetics 2	III	1	F	4	9.801			6840
10.022	Engineering Mathematics 2	II	1	F	4	10.001			Courses 3681, 3730
10.301	Statistics SA	II	1	F	2	10.001 *or* 10.021C CR			6832, 6833
10.351	Statistics SM	II	1	F	2	10.001		10.331, 10.311A, 10.311B, 10.321A, 10.321B	Course 3681
14.501	Accounting and Financial Management 1A****††††	I	1	S1	4½				0600, 1000, 5811, 1400, 6810 Course 3681
14.511	Accounting and Financial Management 1B	I	1	S2	4½	14.501			0600, 1000, 5811, 1400, 6810
14.522	Accounting and Financial Management 2A	II	1	S1	4½	14.511			0600, 1000, 5811, 1400, 6810
14.542	Accounting and Financial Management 2B	II	1	S2	4½	14.511			0600, 1000, 5811, 6810

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded	Specific Programs
14.563	Accounting and Financial Management 3A	III	1	S1	4½	14.542			6810
14.573	Accounting and Financial Management 3A (Honours)	III	1	S1	6	14.542			6810
14.583	Accounting and Financial Management 3B	III	1	S2	4½	14.522			1400, 6810
14.593	Accounting and Financial Management 3B (Honours)	III	1	S2	6	14.522			6810
14.602	Computer Information Systems 1	II	1	S1	3	See Subject Descriptions later in this Handbook		6.647	0600, 1000, 6810, 5811, 1400
14.603	Computer Information Systems 2	II	1	S2	3	14.602		6.647	0600, 1000, 6810, 5811, 1400
14.605	Information Systems Implementation	III	1	S2	3	14.603		6.647	0600, 1400
14.607	Distributed Computer Systems	III	1	S2	3	14.603		6.633	0600, 1400, 6810
14.608	Database Systems	III	1	S1	3	14.603		6.633	0600, 1400, 6810
14.611	Information Systems Development	III	1	S1	3	14.603 and approval from Head of Department of Information Systems			0600, 6810
14.613	Business Finance 2	II	1	S2	3				0600, 1000, 5811, 1400, 6810
14.614	Business Finance 3A	III	1	S1	3	14.613			0600, 6810
14.615	Business Finance 3B	III	1	S2	3	14.614			0600, 6810
14.774	Legal Environment of Commerce	I	1	S2	3	See Subject Descriptions later in this Handbook			6810
							HSC Exam Percentile Range Required		
15.001	Microeconomics 1	I	1	S1 *or* S2	3½	2 unit English (General) *or* 2 unit English *or* 3 unit English	31-100 21-100 11-100		0600, 1000, 1400, 6810
15.002	Microeconomics 2	II	1	S1	4	15.011 plus 15.401 *or* 15.411 *or* 10.001 *or* 10.011		15.072	0600, 1000, 6810, 5811
15.003	Macroeconomics 3	III	1	S2	4	15.042 *or* 15.052	15.412		0600
15.011	Macroeconomics 1	I	1	S1 *or* S2	3½	15.001			0600, 1000, 6810, 1400
15.042	Macroeconomics 2	II	1	S2	4	15.002 plus 15.401 *or* 15.411 *or* 10.001 *or* 10.011	15.421	15.062	0600, 1000, 6810, 5811
15.062	Applied Macroeconomics 2	II	1	S1 *or* S2	4	15.011		15.042	6810
15.072	Applied Microeconomics 2	II	1	S1 *or* S2	4	15.011		15.002	6810
15.143	Microeconomics 3	III	1	S1	4	15.002	15.412		0600, 1000

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded	Specific Programs
15.901	Australia in the International Economy in the Twentieth Century	I	1	S1 *or* S2	3½	See Subject Descriptions later in this Handbook			6810
15.902	Management Strategy and Business Development	I	1	S2	3½	See Subject Descriptions later in this Handbook			6810
25.5212	Sedimentology	II	½	S1	2	25.120		25.212	2503
25.5313	Stratigraphy	III	½	S1	2	25.5212		25.312	2503
25.631	Marine Geology 2	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
25.9314	Geological Applications	III	½	S1	4	25.120			2503
25.9321	Geophysical and Geological Applications	III	½	S2	3	25.120		25.6342	2503
48.024	Chemical Engineering Principles 1	II	1	F	3S1 2S2	1.001, 10.001			1000, 5811
48.038	Chemical Engineering Principles 2	III	1	F	4S1 2S2	48.024			1000, 5811
48.403	Polymer Science	III	1	F	3	2.102A, 2.102B, 10.031, 10.301	10.331		Course 3681
70.011A	Histology 1	II	1	F	3	17.041, 17.031***			
70.011B	Mammalian Embryology	III	1	F	3		70.011A		
70.011C	Introductory Anatomy	II	1	S1	6	17.041, 17.031***			
70.012B	Visceral Anatomy	III	1	S2	6	70.011C***			
70.012C	Neuroanatomy 1	III	1	S1	6	70.011A***, 70.011C***		70.3041§	7000 or in the Anatomy Quota. Courses 4770 (Anatomy) 3820
70.304	Histology 2	III	1	S2	6	70.011A***			
70.305	Neuroanatomy 2	III	1	S2	3	70.012C		§§	
70.306	Functional Anatomy 1	III	1	S1	6	70.011C***			
70.307	Functional Anatomy 2	III	1	S2	6	70.306***		70.304§	
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, 2.102B, 70.011A, 70.011C, 80.014			Course 3820
80.014	Human Behaviour	II	1	F	3				Course 3820

*Students who have passed 2.121 may not subsequently enrol in 2.111. Students meeting the 2.121 prerequisite are not permitted to enrol in 2.111 without the permission of the Head of the School of Chemistry. Once students enrol in 2.111 they must pass 2.111 before they can proceed to 2.121 or 2.131. Students 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 0600, 1000, 5811, 1400.

††††May be counted in Courses 3611, 3661, 3681 and 3701 in special circumstances only.

‡Excluded by 25.211.

‡‡‡May not be offered in 1987 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.

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 4 (Honours)	IV	10	F	Program 0100 Program 0161 Program 5801	7 6 6
1.304	Applied Physics 4 (Honours)	IV	10	F	Program 0100 Program 0161 Program 5801	7 6 6
1.504	Theoretical Physics 4 (Honours)	IV	10	F	Program 0100§ Program 0161 Program 5801	7 6 6
1.604	Biophysics 4 (Honours)	IV	10	F	Program 0100	6
2.004	Chemistry 4	IV	10	F	4 Level III Chemistry units Program 5820	8 7
6.606	Computer Science 4	IV	10	F	6.613, 6.632, 6.642, 6.643	8
10.123	Pure Mathematics Honours	IV	10	F	Program 1000 *Program 5811 *or* 5812	* *
10.223	Applied Mathematics Honours	IV	10	F	Program 1000 Program 5811 *or* 5812 Program 6810	6 6* 6*
10.323	Theory of Statistics Honours	IV	10	F	Program 1006 *Program 5811 *or* 5812	* 7
12.403	Psychology 4 (Thesis)	IV	10	F	Program 1200	8
12.404	Psychology 4	IV	10	F	Program 1200	8

No.	Name	Level	Unit Value	When Offered	Prerequisites in Years 1, 2, 3 or 4	Number of Level III Units Required
14.794	Honours Thesis	IV				
14.853	Advanced Systems Management	IV				
14.857	Operations Research for Management 1	IV				
14.886	Research Topics in Information Systems 1	IV	10	F	Program 1400	6
14.887	Research Topics in Information Systems 2	IV				
14.891	Decision Support Systems	IV				
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 2500 and 5825	8
25.414	Mineral Resources†	IV	2			
25.415	Engineering and Environmental Geology†	IV	2			
25.931	Geophysics†	IV	2			
25.434	Geology 4 Honours (Single Major)	IV	10	F	Programs 2500, 2503 Program 5825	8 7
27.844	Geography 4	IV	10	F	Program 2700 27.050	8
41.103	Biochemistry 4	IV	10	F	4 Level III Biochemistry units Program 5841	8 7
42.103	Biotechnology 4	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 Program 5843	7 7
44.103	Microbiology Honours	IV	10	F	44.102, 44.112 Program 5844	8 7
45.103	Zoology 4	IV	10	F	4 Level III Zoology units Program 5845	8 7
62.014	History and Philosophy of Science Honours	IV	10	F	Program 6200	7
62.024	Science Studies Honours	IV	10	F	Program 6200	7
68.304	Marine Science 4	IV	10	F	Program 6831, 6832, 6833 *or* 6834	8

Table 3: Level IV units offered by the Board of Studies in Science and Mathematics

No.	Name	Level	Unit Value	When Offered	Prerequisites in Years 1, 2, 3 or 4	Number of Level III Units Required
68.404	Genetics 4	IV	10	F	Program 6840	7
68.430	Combined Geology Physics Honours	IV	10	F	Program 0100	8
70.013	Anatomy 4	IV	10	F	4 Level III Anatomy units	6
72.304	Pathology Honours	IV	10	F	72.301	6
73.013	Physiology 4	IV	10	F	4 Level III Physiology units Program 5873	7 7
73.023	Pharmacology	IV	10	F	Program 7300(b)	7
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

*Some Higher Mathematics units should normally be included at Levels II and III in order to enter Level IV Mathematics. Students should discuss their Year 3 program with the Department concerned.

§Students entering 1.504 from the 0100 program should have demonstrated adequate mathematical ability.

∂Field work of up to 7 days duration is a compulsory part of the subject.

†Students undertaking Geology IV Honours in program 2500 or 5825 must enrol in 25.410, 25.4101, 25.420 and one of the subjects 25.412, 25.414, 25.415, or 25.931.

Undergraduate Study: 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 (**3431**). 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 3431

3431
Psychology Degree Course
— Full-time Course

Bachelor of Science (Psychology)
BSc(Psychol)

The four year course in Psychology, which leads to the award of the degree of Bachelor of Science (Psychology), 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(Psychol), 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 1 *or* 10.021B General Mathematics 1B and 10.021C General Mathematics 1C *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(Psychol) under these regulations a candidate must attend classes and satisfy the examiners in the following subjects:

(a) *Each of:*

12.100	Psychology 1
12.200	Research Methods 2
12.201	Biological Basis of Psychology 2
12.202	Social and Cognitive Psychology 2
12.203	Psychology 2A

A total of 8 Level III units of Psychology including 12.300 and 12.305 from Group A (see Table 1). Additionally, students intending to take the thesis alternative in Psychology Level IV Honours are required to include 12.301 Research Methods 3B 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 4 (Thesis — Course 3431) *or* 12.401 Psychology 4 (Course 3431) leading to the award of the degree of Bachelor of Science (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 1 *or*
10.001	Mathematics 1 *or*
10.021B	General Mathematics 1B *and* 10.021C General Mathematics 1C

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 1 *and* 15.011 Macroeconomics 1 *or* Political Science 1 (select two of 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) 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 1, 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 Basic 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)
  45.101 Biometry
  45.301 Vertebrate Zoology
  68.601 Genetics of Behaviour 1
  68.602 Genetics of Behaviour 2
  73.121 Physiology 1B (equivalent to 2 units)

- 53.001 Introduction to Sociology followed by twelve credit points value of Sociology Upper Level subjects

  15.001 Microeconomics 1 and 15.011 Macroeconomics 1 followed by twelve credit points value of Economics Upper Level subjects

  Political Science 1 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 co-requisites 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(Psychol) 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(Psychol) 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 1 or a first-year Mathematics, one of Economics 1, Sociology 1, Philosophy 1 or Political Science 1 or one other Arts 1 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 and 12.305 from Group A. Additionally, if intending to take the thesis alternative in Psychology 4 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 1
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 1A and 2.131 Chemistry 1B
Either 10.001 Mathematics 1, *or* 10.021B General Mathematics 1B and 10.021C General Mathematics 1C, *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 1B

With Zoology or Genetics as the main supporting subject

Year 1
10.001 Mathematics 1, *or* 10.021B General Mathematics 1B and 10.021 General Mathematics 1C
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* 68.601 Genetics of Behaviour 1, 68.602 Genetics of Behaviour 2 and two other units for Genetics

With Social Sciences as the main supporting subject

Year 1
10.001 Mathematics 1, *or* 10.021B General Mathematics 1B and 10.021C General Mathematics 1C, *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 Sciences 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.

Undergraduate Study: Faculty of Science

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 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 ..... Dr D. S. Alderdice
School of Optometry ..... Dr J. A. 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 ..... Professor P. S. Clezy
School of Mathematics ..... Associate Professor W. E. Smith
School of Optometry ..... Professor H. B. Collin
School of Physics ..... Professor H. G. L. Coster

Faculty of Science

Course Outlines

Optometry

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 1	6
2.121	Chemistry 1A *and*	
2.131	Chemistry 1B *or*	6
2.141	Chemistry 1M	
10.001	Mathematics 1 *or*	
10.011	Higher Mathematics 1 *or*	
10.021B	General Mathematics 1B *and*	6
10.021C	General Mathematics 1C	
17.031	Biology A *and*	
17.041	Biology B	6
		24

In special cases, students who do not meet the prerequisites for admission to 2.121 Chemistry 1A may be enrolled in 2.111 Introductory Chemistry in Session 1, 2.121 Chemistry 1A in Session 2 and be permitted to carry 2.131 Chemistry 1B into Session 1 of Year 2.

Year 2			
Full Year		S1	S2
31.851	Optics	6	4
31.852	Visual Optics	4	3
31.853	Measurement of Light and Colour	—	2
31.821	Anatomy and Physiology of the Eye and Visual System	6	7
73.011A	Principles of Physiology	6	6
	General Studies Elective	2	2
		24	24

Year 3		
12.100	Psychology	5
31.861	Optometry A	6
31.862	Diagnosis and Management of Ocular Disease	5½
31.863	Theory of Spectacle Lenses and Optical Instruments	1½
31.864	Clinical Methods	5
	Two General Studies Electives	4
		27

Year 4		
12.471	Psychology (Optometry)	2
31.871	Optometry B	6
31.841	Clinical Optometry	16
71.001	Principles of Medicine for Optometry Students	1
		25

3951
Combined Science/Optometry Course

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 or she has met all requirements for a first degree which has not yet been conferred and admission under these rules shall be no bar to the subsequent award of the first degree.

Undergraduate Study:

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 the entry for 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:

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, but which session taught is not known at time of publication)
- CCH class contact hours
- L (Lecture, followed by hours per week)
- T (Laboratory/Tutorial, followed by hours per week)
- hpw (hours per week)
- C (Credit *or* Credit units)
- CR (Credit Level)
- DN (Distinction Level)

	School, Department etc	Faculty	Page
	*Subjects also offered for courses in this handbook		
1	**School of Physics**	**Science**	**119**
2	**School of Chemistry**	**Science**	**124**
4	School of Materials Science and Engineering*	Applied Science	128
5	School of Mechanical and Industrial Engineering*	Engineering	129
6	School of Electrical Engineering and Computer Science*	Engineering	131
7	School of Mines (Mineral Processing and Extractive Metallurgy and Mining Engineering)	Applied Science	
8	School of Civil Engineering	Engineering	
9	School of Fibre Science and Technology (Wool Science)	Applied Science	
10	**School of Mathematics**	**Science**	**132**
11	School of Architecture	Architecture	
12	**School of Psychology**	**Biological Sciences**	**142**
13	School of Fibre Science and Technology (Textile Technology)	Applied Science	
14	School of Accountancy*	Commerce	145
15	School of Economics*	Commerce	147
16	School of Health Administration	Professional Studies	
17	**Biological Sciences**	**Biological Sciences**	**148**
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 Mines (Applied Geology)*	Applied Science	148
26	Department of General Studies	Board of Studies in General Education	
27	School of Geography*	Applied Science	153
28	School of Marketing	Commerce	
29	School of Surveying*	Engineering	156
30	Organizational Behaviour	Commerce	
31	**School of Optometry**	**Science**	**156**
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 Biological Technologies (Food Science)	Applied Science	
39	Graduate School of the Built Environment	Architecture	
40	Professorial Board		
41	**School of Biochemistry**	**Biological Sciences**	**158**
42	School of Biological Technologies (Biotechnology)*	Applied Sciences	158
43	**School of Botany**	**Biological Sciences**	**159**
44	**School of Microbiology**	**Biological Sciences**	**160**
45	**School of Zoology**	**Biological Sciences**	**161**
46	Faculty of Applied Science	Applied Science	
47	Faculty of Engineering (Safety Science)	Engineering	
48	School of Chemical Engineering and Industrial Chemistry*	Applied Science	162
50	School of English	Arts	
51	School of History	Arts	
52	School of Philosophy*	Arts	163
53	School of Sociology*	Arts	167
54	School of Political Science	Arts	
55	School of Librarianship	Professional Studies	
56	School of French	Arts	
57	School of Theatre Studies	Arts	
58	School of Education*	Professional Studies	167
59	Department of Russian	Arts	
60	Faculty of Arts	Arts	
61	Department of Music	Arts	
62	School of History and Philosophy of Science*	Arts	168
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**	
68	**Board of Studies in Science and Mathematics**	**Board of Studies in Science and Mathematics**	**172**
70	School of Anatomy*	Medicine	173
71	School of Medicine	Medicine	174
72	School of Pathology*	Medicine	174
73	School of Physiology and Pharmacology*	Medicine	
74	School of Surgery	Medicine	
75	School of Obstetrics and Gynaecology	Medicine	
76	School of Paediatrics	Medicine	
77	School of Psychiatry	Medicine	
78	School of Medical Education	Medicine	
79	School of Community Medicine*	Medicine	175
80	Faculty of Medicine*	Medicine	175
81	Medicine/Science/Biological Sciences	Medicine	
85	Australian Graduate School of Management	AGSM	
90	Faculty of Law	Law	

Physics

Physics Level I Units

1.001 Physics 1 — 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.

1.021 Introductory Physics 1 (For Health and Life Scientists) — F L3T3

Prerequisites: None. Co-requisites: 10.021A and 10.021B, or 10.021B and 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, geometrical optics, optical instruments, wave optics, microscopes and their uses.

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 and 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 1 — S2 L2T4

Prerequisites: 6.611. Co-requisite: 1.001, 10.001 or 10.011. Excluded: 1.041, 1.042.

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, 1.992.

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 **FL1½T½**

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.

1.0522 Methods in Mathematical Physics **S2 L1½T½**

Prerequisites: 1.001, and 10.001 or 10.011. Co-requisites: 10.2111 or 10.2211 and 10.2112 or 10.2212.

Not offered in 1987.

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.

1.062 Computer Applications in Experimental Science 2 **S1 L2T3**

Prerequisite: 1.061. Excluded: 1.042.

Interface between computer and experiment, programmed and interrupt interaction, direct and dual port memory access concepts, hardware, software and timing restraints. Real-world variables, transducers and conversion to binary representation, converters and counters, signals and noise. Data collection, reduction and storage as digital matrices. Numerical modelling, analysis and elementary control of a system.

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.

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.

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.

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.

Fresnel and Fraunhofer diffraction, Fourier transforms, filtering, coherence length and time, stellar interferometers, laser theory, non-linear optics.

1.043 Experimental Physics A **F T4**

Prerequisite: 1.032.

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

1.0533 Experimental Physics B1 **S1 T4**

Prerequisite: 1.032.

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 super-conductivity. Fourier optics, holography.

1.0543 Experimental Physics B2 **S2 T4**

Prerequisite: 1.032.

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.

Review of AC theory. Transistors. Operational amplifiers. Voltage regulators, constant current sources, switching power supplies. Field effect transistors, noise and drift. Digital electronics. Frequency dependent networks, active and passive filters, digital filters, oscillators. Communication and storage of information. Analogue-digital conversion. Transducers.

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.

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.

1.3033 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 Physics of Solid State Devices **S2 L1½T½**

Prerequisite: 1.023.

Review of electronic structure in semiconductors; p-n junctions; bipolar and field effect transistors including formation, characteristics and electrical breakdown. Optical devices including light emitting diodes and junction lasers. Integrated circuit structures.

1.3143 Topics in Condensed Matter Physics **S2 L1½T½**

Prerequisite: 1.023.

Superconductivity, Meissner-Ochsenfeld effect, entropy, thermodynamics and relevant theories, Josephson junctions. Amorphous materials, preparation, magnetic properties, bandgaps, dangling bonds and ESR, mobility edge, solar cells. Polymers, structure, bonding, relaxation phenomena, electrical breakdown, liquid crystals.

1.3533 Marine Acoustics **S2 L1½T½**

Offered in odd-numbered years only.

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 **S1 L1½T½**

Prerequisites: 1.012, 1.022.

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 **S2 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. See also Table 1.

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 1 **F L½T3½**

Prerequisite: 1.032. See also Table 1.

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 2 **F T4**

Co-requisite: 1.763. See also Table 1.

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 Subjects

All Physics honours subjects consist of lecture topics and project work. Some of the lecture topics of which quantum mechanics, statistical mechanics and solid state physics are examples, are taken by all students. Other topics 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 topics are given below under each honours subject heading. The project work forms a very significant part of each unit. 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 lecture topics and projects are then supplied. The approval of the Head of School is required for each program of study.

1.104 Physics 4 (Honours)

Examples of specific lecture topics which may be offered include: astronomy, additional topics in solid state physics, lasers, biophysics.

1.304 Applied Physics (Honours)

Examples of specific lecture topics which may be offered include: physical principles of instrumentation, applied solid state physics, physics of materials.

1.504 Theoretical Physics 4 (Honours)

Examples of specific lecture topics which may be offered include: quantum theory of solids, plasma theory, quantum electrodynamics.

1.604 Biophysics 4 (Honours)

Biophysics, statistical mechanics and solid state physics are examples of prescribed topics. Additional lecture topics may be selected from those on offer in other Physics honours units and from Biochemistry and Physiology.

Servicing Subjects

These are subjects taught within courses offered by other faculties.

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 1 (Building) — S2 L4T2

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. Convection. 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 1 (Mechanical Engineering) — F L2T2

Prerequisites: As for 1.001 Physics 1.

For students in the School of Mechanical and Industrial 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 conservation, 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, electromagnetic 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 1 (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 1 (Surveying) — F L3T3

Prerequisite: As for 1.001 Physics 1.

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 1 (Civil Engineering) — S1 L2T2 and S2 L2T1

Prerequisite: As for 1.001 Physics 1.

For students in the School of Civil Engineering.

Aims of physics and its relation to civil engineering. Mechanical concepts, properties of matter, atomic structure, elasticity, plasticity, fracture of solids; surface tension and viscosity of fluids, electrical and magnetic forces, electromagnetism, DC and AC circuits, digital electronics. Simple harmonic motion and its relation to wave motion. 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. Servo-systems. 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) — S1 or 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 or S2 L2½T2

Prerequisite: 1.961 or 1.001 or 1.011, 10.001. Co-requisites: 10.2111, 10.2112. Excluded: 1.022, 1.9322.

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.

Chemistry

Chemistry Level I Units

2.111 Introductory Chemistry — S1 L2T4

Prerequisite: Nil.

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, neutralization. Stoichiometry, the mole concept. Electron transfer reactions. Qualitative treatment of reversibility and chemical equilibrium, the pH scale. Introduction to the diversity of carbon compounds.

2.121 Chemistry 1A — 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 or	*31-100*
3 unit Science or	*31-100*
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 1B — S1 or S2 L2T4

Prerequisite: 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.

Note: Students who have passed 2.111 may be permitted to enrol in 2.131 on application to the Head of the School of Chemistry.

2.141 Chemistry 1M — F L2T4

Prerequisites:

	HSC Exam Percentile Range Required
*2 unit Mathematics**	*71-100*
3 unit Mathematics	*21-100*
4 unit Mathematics	*1-100*
and	
2 unit Science (Chemistry) or	*51-100*
4 unit Science or	*51-100*
3 unit Science	*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).

Note: As for *Note,* 2.121 Chemistry 1A.

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

2.102A Physical Chemistry — S1 or S2 L3T3

Prerequisites: 2.121 and 2.131, or 2.141; and 10.011 or 10.001 or 10.021B and 10.021C. Excluded 2.002A.

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.

2.102B Organic Chemistry — F or S2 L3T3

Prerequisite: 2.131 or 2.141. Excluded: 2.002B

Discussion of the major types of organic reaction mechanisms (eg addition, substitution, elimination, free-radical, molecular rearrangement) within context of important functional groups (eg aliphatic hydrocarbons, monocyclic aromatic hydrocarbons, halides, organometallic compounds, alcohols, phenols, aldehydes, ketones, ethers, carboxylic acids and their derivatives, nitro compounds, amines and sulfonic acids). Introduction to application of spectroscopic methods to structure determination.

2.102C Inorganic Chemistry and Structure — S1 or S2 L3T3

Prerequisites: 2.121 and 2.131, or 2.141. Excluded: 2.042C.

Fundamentals of spectroscopy as experimental basis for theories of electronic structures of atoms and molecules. Concepts and consequences of quantum theory. Molecular orbitals. Ligand field theory, magnetochemistry. Geometrical structure and chemical bonding, molecular and non-molecular structures, molecular symmetry, ionic covalent and metallic bonds. Occurrence, preparation, properties and reactions of compounds of the *p*-block elements, of transition metals and of post-transition metals. Principles of co-ordination chemistry. Thermodynamics applied to inorganic systems in solid and solution phases.

2.102D Chemical and Spectroscopic Analysis — S1 or S2 L3T3

Prerequisites: 2.121 and 2.131, or 2.141; and 10.011 or 10.001 or 10.021B and 10.021C. Excluded: 2.002D and 2.003H.

General procedures in analytical science, accuracy, propagation of errors, precision. Analytical reaction chemistry, titrimetric, and gravimetric, analysis. Solvent extraction. Electroanalytical methods. Chromatography. Instrumental aspects of all major spectroscopic methods. Optical spectroscopy, nuclear magnetic and electron spin resonances, mass spectrometry. Sample handling.

Chemistry Level III Units

Core Units

2.103A Physical Chemistry — S1 L3T3

Prerequisites: 1.001, 2.102A and 2.102C. Excluded: 2.013A.

States of matter: gases, liquids, solutions and solids. Equations of state. Intermolecular forces and condensed phases. Gas-kinetic theory theory and distribution of molecular energy. Statistical thermodynamics and prediction of properties of simple gases, liquids and solids. Structure and properties of liquids, solutions and solids. *Molecular energies and spectra.* Quantum properties of radiation and molecules. Molecular vibration (harmonic and anharmonic). Infrared and Raman spectra of gases. Molecular rotation. Rotational structure in molecular spectra. Intensity distributions in molecular spectra. Applications of molecular spectroscopy.

2.103B Organic Chemistry — S1 L3T3

Prerequisite: 2.102B. Excluded: 2.003B.

Heterocyclic Chemistry: synthesis and reactions of the following heteroaromatic systems; pyridine, quinoline, isoquinoline, pyrimidine, pyrrole, furan, thiophen, indole, imidazole; exampoles of naturally occuring alkaloids where relevant. *Alicyclic Chemistry:* stereochemistry of acyclic systems; classical and nonclassical 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 mediam rings; synthesis and reactions of fused and bridged polycyclic systems; examples of steroids and terpenes where relevant. *Structure Determination:* application of spectroscopic methods (eg nuclear magnetic resonance, mass spectroscopy) to determination of organic structures.

2.103C Inorganic Chemistry — S1 L2T4

Prerequisite: 2.102C. Excluded: 2.003C.

Transition metal chemistry: bonding theory; energies and population of d-orbitals and their correlations with stereochemistry, thermodynamic properties, spin states; theory and applications of magnetism; theory and applications of electronic spectra; stabilities of metal complexes; stabilisation of oxidation states; metal carbonyls; descriptive chemistry of transition metals; special characteristics of second and third transition series metals; *Lanthanide elements:* lanthanide contraction and its consequences: electronic configurations and oxidation states; spectral and magnetic properties; stabilities of complexes; separation. *p-block elements:* the inert pair effect; bonding, structure, and reactivity of representative compounds; halogen chemistry.

2.103D Analytical Chemistry — S1 or S2 L2T4

Prerequisite: 2.102D. Excluded: 2.003D.

Instrument design, theory and operating principles for the following instrumental areas; electrochemical, atomic and molecular spectroscopy, chromatography, mass spectrometry, automated analysis, thermal analysis.

Elective Units

2.113A Kinetics and Mechanism of Chemical Change — S2 L3T3

Prerequisite: 2.103A. Excluded: 2.053A.

Molecular collision dynamics, reactions in molecular beams, energy disposal and equilibration in chemical reactions gas phase energy transfer. Mechanisms and kinetic applications of lasers. Theories of bimolecular and unimolecular gas reactions, potential energy surfaces. Free radical reactions, chain reactions, explosions, mechanisms in pyrolysis and oxidation of hydrocarbons, polymerisation reactions, catalytic mechanisms. Experimental methods for studying fast ractions. Reactions in solution: structure—reactivity relationships.

2.113B Synthetic Organic Chemistry — S2 L2T4

Prerequisite: 2.103B. Excluded: 2.013B.

Synthetic methods. Modern functional group transformations with particular reference to positional and stereochemical control; organometallic and carbonionic reagents. *Pericyclic reactions and photochemistry.* Electrocyclic sigmatropic reactions, Diels-Alder and related cycloadditions, Woodward-Hoffman rules, ring formation and cleavage. *Synthetic strategy.* Principles of planning or organic synthesis; disconnection approach to representative syntheses of compounds of theoretical and biological interest; use of protecting groups.

2.113C Advanced Inorganic Chemistry — S2 L2T4

Prerequisite: 2.102C. Co-requisite: 2.103C. Excluded: 2.013C.

Spectroscopy and magnetism of transition metal compounds: applications of infrared, electronic and Moessbauer spectra; magentic properties of polynuclear complexes. *Inorganic reactivity:* rates and mechanisms of ligand substitution and electron transfer; molecular rearrangements; reactions of co-ordinated ligands and activation of co-ordinated molecules; excited state reactivity. *Bio-inorganic chemistry:* the occurrence and co-ordination of metals in biology; heme proteins and dioxygen co-ordination redox and proteolytic metalloenzymes; metal storage and transport proteins; *Innovations and technological developments:* accounts of current advances, including topics such as inorganic polymers, inclusion compounds, zeolites, electronically delocalised compounds, and metal clusters.

2.113D Advanced Instrument Analysis — S2 L2T4

Prerequisite: 2.102D. Corequisite: 2.103D. Excluded: 2.013D.

Advanced approaches to problem solving in analytical science using modern instrumental techniques and microcomputers for the analysis of complex organic, biological, inorganic and environmental materials. Sample selection procedures; extraction and recovery of major, minor, trace and untra-trace constituents; origins, identification and elimination of interference effects. Selection and optimisation of instrumental parameters; theory of separation strategies for identification and quantitative determinations. Networking of computer-controlled workstations for laboratory automation and management.

2.113E Nuclear and Radiation Chemistry — S1 or S2 L2T4

Prerequisite: 2.102A or 2.102B or 2.102C or 2.102D. Excluded: 2.003E.

Radioactivity, isotopes, fundamental atomic particles, nuclear structure and properties. Properties of nuclear radiations, their interaction with matter and their detection and measurement. Nuclear instrumentation. Factors to be considered when making radioactive measurements. Radioactive decay equation, half-life and radioactive equilibrium situations. Nuclear reactions initiated by neutrons. Effect of nuclear radiation on matter, ionisation, free radical formation, effect on living cells, contamination and radiation hazards, factors affecting radiotoxicity, shielding and inverse square law calculations. Applications of isotopes as tracers and radiation sources, factors associated with selection and application. Radioactive dating methods. The chemistry of the reactor fuel cycle.

2.123A Biophysical and Interfacial Chemistry **S2 L3T3**

Prerequisite: 2.102A. Excluded: 2.033A.

Interplay of interfacial, colloidal and macromolecular science. Physical properties of macromolecules. Determination of molecular size from gel permeation chromatography, diffusion, sedimentation, viscometry, osmometry and light scattering. *Spectroscopic properties:* circular dichroism, optical rotary dispersion and X-ray diffraction; conformation of macromolecules; Helix/random coil transitions. The use of modern spectroscopic techniques in surface chemistry including low energy electron diffraction, Auger electron, UV and X-ray photo-electron spectroscopy; electron energy loss, ion scattering and seocndary ion emission at the gas/solid interface. Surface free energy and related thermodynamic concepts applied to the study of solutes at interfaces; wetting behaviour, capillarity, detergency, mineral flotation, micelles and bio-physical membranes. Adsorption and its significance in resulting biological and synthetic catalytic processes.

2.123B Biological Organic Chemistry **S2 L2T4**

Prerequisite: 2.103B. Excluded: 2.023B.

Interdisciplinary aspects of selected classes of organic compounds of biological significance. *Natural polymers:* Synthesis and properties of proteins, poly-saccharides, nucleic acids. *Pharmacological chemistry:* Discussion of structural and synthetic aspects of several selected drugs; structure-activity relationships, metabolism, methods of analysis. *Herbicides, fungicides, pesticides.* Synthesis, degradation and mode of action of selected compounds.

2.123E Environmental Chemistry **S2 L3T3**

Prerequisites: 2.102A and 2.102D. Excluded: 2.043A.

Physico-chemical aspects of the environment. Factors affecting the chemistry of rivers, estuaries, oceans, surface and sub-surface waters. Photolysis reactions in the atmosphere, primary and secondary pollutants. Distribution of elements, nutrient elements, carbon and oxygen in ecological systems (chemical models of these cycles). Analysis of naturally occurring species and pollutants. Requirements, validation and performance monitoring of standard analytical procedures.

2.133B Applied Organic Chemistry **S1 L2T4**

Prerequisite: 2.102B. Corequisite: 2.103B. Excluded: 2.003L.

Discussion at advanced level of the chemistry of selected commercially important groups of organic materials with emphasis on reaction mechanisms and model systems. *Polymerization processes and synthetic polymers:* Thermal and oxidative polymerization, treatment of initiators, chain transfer agents, retarders; sulfur-olefin reactions. *Pigments and dyestuffs:* Basis of colour in organic compounds, azo, carbonyl, cationic dyes, colour photography; synthetic and natural pigments, eg phthalocyanines, carotenes, flavones, anthocyanins; fluorescent whiteners. *Oxidation and reduction processes:* Oxidation of allylic compounds, phenols, sulfur compounds etc; catalytic dehydrogenation and hydrogenation; hydride and dissolving metal reductions.

2.1813 Quantum Chemistry and Symmetry **S1 L1½T1½**

Prerequisites: 2.102C, and 10.111A or 10.031. Excluded: 2.023A.

Principles of quantum mechanics. Eigenvalue-eigenfunction problem and its representation by matrix algebra; approximate methods for quantum mechanical calculations. Molecular orbital theories (eg Huckel, *ab initio;* SCF) and properties derivable therefrom; choice of basis functions. Group theory. Symmetry operations. Reducible and irreducible representations; applications of character tables eg direct products, selection rules. Correlation diagrams for chemical reactions, and for bonding. Applications to vibrational spectroscopy.

2.1823 Computers in Chemistry **S1 or S2 L1T2**

Prerequisites: 2.102A and 2.102D.

Computing techniques introduced through specific chemical applications: simple and complex equilibria, rate equations, analysis of multicomponent mixtures, instrumental calibration curves. Treatment of transient signals. Specific case studies selected from spectroscopy, chromatography, and electrochemistry. Chemical databases and the literature, spectroscopic databases.

2.1833 Molecular Structure Determiniation **S2 L1½T1½**

Prerequisites: 2.102C and 2.102D.

The theory and practice of **1.** crystal structure determination by x-ray diffraction. **2.** multinuclear NMR spectroscopy, and **3.** mass spectrometry, in the determination of molecular structure. Experimental requirements and procedures; instrumentation. Interpretation of results; applications to contemporary chemical systems; examples from current research problems. Databases and computing. Evaluation of complementary information from these techniques about molecular structure, chemical bonding, and chemical reactivity.

2.1843 Organometallic Chemistry **S2 L1T2**

Prerequisites: 2.102B and 2.102C. Excluded: 2.003M.

Preparation, structure and reactions of transition metal and main group organometallic compounds; metal vapour syntheses. Structure and bonding of ligands; ligand stabilisation and activation; novel effects of ligand bulk and geometry. Catalytic applications of organometallic compounds.

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 program 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 3 (or completion of requirements for the pass degree).

Servicing Subjects

These are subjects taught within courses offered by other faculties.

For further information regarding the following subjects see the Faculty of Applied Science and Engineering Handbooks.

2.003J Fundamentals of Biological and Agricultural Chemistry — S1 L2T4

Prerequisites: 2.121 and 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.

2.043L Chemistry and Enzymology of Foods — L2T4

Prerequisite: 2.002B. Excluded: 2.003J, 2.043L.

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.

2.030 Organic Chemistry — S1 L2T4

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 1ME — S2 L3T3

Prerequisite: As for 2.121.

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.

2.991 Chemistry 1CE — S2 L3T3

Prerequisites: As for 2.121.

Atomic and molecular structure and bonding. Chemical equilibrium. Rates of reactions. Thermochemistry. Ionic equilibria. Metals, electro-chemistry and corrosion. Colloids and clays. Colligative properties of solutions. Organic chemistry, polymers. Applications of chemical principles to engineering.

For further information regarding the following subject see the Faculty of Medicine Handbook.

81.002 Chemistry and Biochemistry for Medical Students

Prerequisites:

	HSC Exam Percentile Range Required
2 unit Science (Chemistry) or	*31-100*
4 unit Science or	*31-100*
3 unit Science	*31-100*

Conjoint subject with the School of Biochemistry.

Materials Science and Engineering

4.413 Physical Metallurgy 2A — S1 L1 T1½

Prerequisite: 4.412A.

Metallography of non-ferrous alloys. Structure/property relationships in non-ferrous alloys. Hardening mechanisms. Metallography and properties of copper, aluminium, nickel, magnesium, lead, tin and titanium base alloys.

4.423 Physical Metallurgy 2B — S1 L2T2

Prerequisite: 4.412A.

X-ray, electron optics and texture. Principles of electron optics. Transmission and scanning electron microscopy. Energy dispersive and wavelength dispersive X-ray spectroscopy. X-ray fluorescence spectroscopy. On-stream analysis. Principles of X-ray diffraction. Powder and single crystal X-ray methods. Stereographic projections and crystal geometry, X-ray fluorescence. Scanning and transmission electron miscroscopy. Measurement and description of preferred orientations. Textures produced by deformation in wires and rolled metals. Pure metal and alloy rolling textures and annealing textures. Theories of texture development.

4.433C Physical Metallurgy 2C **S1 L2½T1½**

Prerequisite: 4.412A.

Theory of plasticity of metals. Introduction to dislocation theory and its application to mechanical properties of alloys. Strengthening mechanisms, creep, fracture, grain size dependence of strength. Introduction to generation of deformation and recrystallization textures. Measurements of age-hardening, activation energy of strain ageing.

4.442 Physical Metallurgy 1D **S2 L2½T1½**

Prerequisite: 1.001 or 1.011.

Metallurgical physics. Application of quantum mechanics to the development of models of metallic phases. Sommerfield theory, zone theory. Mechanisms of conductivity, semiconduction, magnetism. Origin of alloy structures. BASIC syntax. Programs involving Monte Carlo techniques and solution of linear and non-linear simultaneous equations; applications to diffusion and phase equilibria.

4.443 Physical Metallurgy 2D **S2 L2T2**

Prerequisite: 4.432.

Diffusion in the solid state, Kirkendall effect, mechanisms. Fick's laws, solutions. Grain boundary, surface and dislocation pipe diffusion. Precipitation, nucleation and growth of isolated precipitates. Co-operative precipitation, pearlite, discontinuous precipitation. Proposed laws governing growth rates, maximum velocity, maximum rate of entropy production. Hardenability. Effect of alloying elements on pearlite growth rates. Grossman and Jominy tests, calculation of depth of hardening. Development of stresses during quenching, retained stress, distortion, quench cracking.

4.453 Physical Metallurgy 2E **S2 L1T1½**

Prerequisite: 4.432.

Alloy steels. Ternary equilibria involving iron and carbon. Metallography and properties of alloys steels. Effect of alloying elements on austenite formation and decomposition under equilibrium and non-equilibrium conditions. Heat treatment of alloy steels. Metallography and properties of alloy cast irons.

4.633 Metallurgical Engineering 2C **F L2T1½**

Prerequisites: 10.001 or 10.011, 4.442.

Mathematical methods. **1.** 10.351 Statistics SM (see Engineering Handbook). **2.** Numerical methods. Finite difference and finite element techniques and their application to metallurgical phenomena involving diffusional transport, elasticity and plasticity.

Mechanical and Industrial Engineering

5.006 Engineering E **S1 L/T6**

Prerequisites: as for 5.010. Excluded: 5.010, 5.0201, 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 paricles. 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.

5.0011 Engineering Mechanics 1 **S1 or S2 L2T2**

Prerequisite:

	HSC Exam Percentile Range Required
Either	
2 unit Science (Physics) or	*31-100*
4 unit Science (multistrand)	*31-100*
or	
2 unit Industrial Arts or	*31-100*
3 unit Industrial Arts	*11-100*

Excluded: 5.010, 5.0101, 5.0201.

Note: Students who wish to enrol in this subject in courses other than the full-time courses in Aeronautical Engineering, Electrical 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.

Equilibrium. Friction. Systems of multiforce members, co-planar and three-dimensional. Mass centre; centroid. Fluid statics. Plane particle kinematics: rectilinear, curvilinear and relative motion. Plane particle kinetics: equations of motion; work, power, energy; impulse, momentum, impact.

5.0012 Introductory Engineering Design and Materials Science **S1 or S2 L2 T0**

Excluded: 5.0016, 5.010.

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

5.0201 Engineering Dynamics 1A **S1 or S2 L/T3**

Prerequisite: 5.010 or 5.0101. Excluded: 5.0011.

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. Virtual work. Kinetics of a system of particles: impulse and momentum; moment of momentum; equations of motion; impact. Fixed-axis rotation of a rigid body: angular momentum; equation of motion; moment of inertia; energy; centre of percussion. Steady mass flow.

5.030 Engineering C **S1 or S2 L2T4 or L/T6 or F L/T3**

Prerequisite: as for 5.0011. Excluded: 5.0016, 5.0302.

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* S2 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.

5.0721 Computing **S1 or S2 L2T1**

Co-requisite: 10.001 or 10.011.

Introduction to digital computing equipment. Flow charting. Expressions. Conditions. Input and output. Program testing. Text editing. Programming language used is Fortran 77.

5.300 Engineering Dynamics 1B **S2 L1T1**

Prerequisites: 1.001 or 1.951, 5.0201, 10.001 or 10.011.

Kinematics and kinetics of rigid bodies in planar motion: absolute motion and motion relative to translating and rotating frames of reference; constraint and degrees of freedom; friction; extensions to Newton's second law; D'Alembert's principle; differential equations of motion; gyroscopic couple; work and energy, variational principles; impulse and momentum, impact.

5.421 Mechanics of Solids 1 **S1 or S2 L2T1**

Prerequisite: 5.010 or 5.0011.

Stress and strain. Bars under axial loading. Stresses and deformation due to bending. Strain energy. Flexibility and stiffness. Stress and deformation due to torsion. Helical springs.

5.4220 Mechanics of Solids 2 **½S1S2L1½T2**

Prerequisites: 5.421 or 8.171, 10.001 or 10.011. Excluded: 5.422, 5.4221.

Statics of frames and machines. Unsymmetrical bending. Analysis of stress; analysis of strain; generalized Hooke's Law. Thin-walled pressure vessels. Combined loads. Theories of failure. Stress concentrations and fatigue. Shear stress in beams; shear centre. Stability and buckling of columns.

5.4221 Mechanics of Solids 2 **F L1½T2**

Intended for Materials Science Majors in combined BE BSc degree course.
Prerequisites: 5.421 or 8.171, 10.001 or 10.011. Excluded: 5.422, 5.4220, 5.4222.

Mechanical properties of materials: tensile and compressive behaviour; hardness; testing machines. Statics of frames and machines. Unsymmetrical bending. Analysis of stress; analysis of strain; generalized Hooke's Law. Thin-walled pressure vessels. Combined loads. Theories of failure. Stress concentrations and fatigue. Fatigue of biaxial and triaxial systems. Shear stress in beams; shear centre. Stability and buckling of columns.

5.620 Fluid Mechanics 1 **F L1T1**

Prerequisites: 1.001 or 1.951, 5.010, 10.001 or 10.011.Co-requisite: 5.300. Excluded: 5.622.

Units. Fluid properties; fluid statics. Flow fields; unsteady and compressible flow. Bernoulli's equation. Momentum equations. Ideal flow. Flow measurement. Dimensional analysis: similitude; dimensionless numbers; methods of analysis. Steady one dimensional flow in ducts: laminar and turbulent; pressure loss; friction factor; losses in bends and fittings. Elementary boundary layer flow; skin friction and drag. Pumps and turbines.

5.621 Gasdynamics 1 **C2**

Excluded: 5.653, 5.811.

One dimensional steady flow: isentropic channel flow, normal shock waves, supersonic wind tunnels and diffusers. Two dimensional steady flow: oblique shock waves, Prandtl-Meyer expansions, nozzles, airfoils. One dimensional unsteady flow: moving waves, reflections, explosions in ducts, shock tubes; method of characteristics, internal flows, piston and valve effects.

Electrical Engineering and Computer Science

6.010 Electrical Engineering 1 **S2 L2T4**

Prerequisite: Electricity and magnetism section of 1.961.

Prepares students for the various areas and disciplines of Electrical Engineering. Includes field and circuit theory; electronics; logic circuits; communications; energy conversion; automatic control. Laboratory exercises and project work are major components.

6.021A Circuit Theory 1 **S1 or S2 L2T2**

Prerequisites: 1.961 or equivalent, 6.010, 10.001.

Lumped modelling concepts used in circuit theory and their relationship to observed physical properties and behaviour. Linear circuit elements. Kirchhoff's laws. Resistive network topology and systematic derivation of network equations using node and loop methods. Network theorems. Exponentials and first order transients. Sinusoidal steady state operation including phasors, impedance and admittance concepts and systematic circuit equations. Power relations and second order systems response. Resonance, Q factor and bandwidth. Three phase circuits. Controlled sources and two port analysis.

6.021C Electronics 1 **S1 or S2 L2T2**

Prerequisite: 1.982, 6.021A (one of these to be passed, the other to be attempted at an acceptable level and to be repeated concurrently).

Principles of operation and low-frequency characteristics of PN diodes, bipolar and field effect transistors, thyristors and various optoelectronic devices. Transistor low-frequency small-signal equivalent circuits. Design and analysis of low frequency Class A transistor amplifiers. Temperature effects. Device ratings and use of data sheets.

6.606 Computing Science Honours

6.611 Computing 1 **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 L3T2**

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. Microprocessor case studies.

6.621 Computing 2A **S1 or S2 L3T2**

Prerequisites: 6.611, 10.001 or 10.011. Excluded: 6.620, 6.021D.

For those students who intend to take further subjects in computer science.

Expansion and development of material introduced in 6.611 Computing 1. Systematic program development: introduction to programming language semantics, reasoning about programs, program derivation, abstract programs, realization of abstract programs (conversion from abstract to concrete). Practice in programming in a high-level programming language. Data-structures: arrays, lists, sets, trees; recursive programming. Introduction to computer organization: a simple machine architecture. Introduction to operating systems.

6.631 Computing 2B **S1 or S2 L3T2**

Prerequisites: 6.620 or 6.621 or 6.021D, 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. 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. Excluded: 6.622, 14.608, 14.607.

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 2C **S1 or S2 L3T2**

Prerequisites: 6.620 or 6.021D or 6.621, 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.

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.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 **S2 L3T2**

Prerequisites: 6.620 or 6.021D or 6.621 or 6.600 (CR), or both of 10.311A and 10.311B, 10.331, 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 **S2 L3T2**

Prerequisites: 6.641, 14.501. Excluded: 14.602, 14.603, 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.

Mathematics

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 1. 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 1 (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 1, but in appropriate cases students who have passed in 10.021C General Mathematics 1C at a satisfactory level may be given permission to enrol.

10.001 Mathematics 1 **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 1 **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 1B **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 1C **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 Discrete Mathematics **S2 L4T2**

Co-requisites: 10.001 or 10.011.

Role of proof in mathematics, logical reasoning and implication, different types of proofs. Sets, algebras of sets, operations on sets. Mathematical logic, truth tables, syntax, induction. Graphs and directed graphs, basic graph algorithms. Counting, combinatorial identities, binomal and multinomial theorems. Binary operations and their properties, groups and semigroups, ordered structures. Recursion relations. Application to network theory, assignment problems and population growth.

Pure Mathematics

10.111A Pure Mathematics 2 — 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, generalized eigenvectors. Functions of matrices. Linear systems of differential equations including the use of Laplace transform. Inner products, orthogonalization, projections. Unitary and self-adjoint transformations. Quadratic and Hermitian forms.

10.1113 Pure Mathematics 2 — 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 2 — 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 2 — Finite Mathematics A **S1 L1½T1½**

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, factorization, interpolation, finite field. Codes, error-correcting codes, public-key cryptography.

10.1116 Pure Mathematics 2 — Finite Mathematics B **S2 L1½T1½**

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 2 — Algebra **F L2T1½**

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 2 — Multivariable Calculus **S1 L2T1½**

Prerequisite: 10.011 or 10.001 (DN). Excluded: 10.1113.

As for 10.1113 Pure Mathematics 2 — Multivariable Calculus, but in greater depth.

10.1214 Higher Pure Mathematics 2 — Complex Analysis **S2 L2T1½**

Prerequisite: 10.1213. Excluded: 10.1114.

As for 10.1114 Pure Mathematics 2 — Complex Analysis, but in greater depth.

10.1111 Pure Mathematics 3 — Group Theory **S1 L1½T1½**

Prerequisites: ***

Mathematical systems, groups, determination of small groups, homomorphisms and normal subgroups.

10.1112 Pure Mathematics 3 — Geometry **S2 L1½T1½**

Prerequisites: ***

Elementary concepts of Euclidean, affine and projective geometries.

10.1121 Pure Mathematics 3 — Number Theory **SS L1½T½**

*Prerequisites: ***. Excluded: 10,1421, 10.121C.*

Euclidean algorithm, congruences, sums of squares, diophantine equations.

10.1123 Pure Mathematics 3 — 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 3 — Combinatorial Topology **SS L1½T½**

*Prerequisites: ***.*

Elementary combinatorial topology of surfaces.

10.1125 Pure Mathematics 3 — Ordinary Differential Equations **S1 L1½T½**

*Prerequisites: 10.111A ***. Excluded: 10.1425, 10.122B.*

Systems of ordinary differential equations; variations of constants formula; stability; Poincare space; Lyapunov's direct method.

***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 10.2111.

10.1126 Pure Mathematics 3 — Partial Differential Equations **S1 L1½T½**

*Prerequisites: 10.1113, 10.1114, ***. Co-requisite: 10.1125. Excluded: 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 3 — History of Mathematics **S2 L1T1**

*Prerequisites: ***.*

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 3 — Foundations of Calculus **S1 L1½T½**

*Prerequisites: ***. Excluded: 10.122B.*

Properties of the real numbers. Convergence of sequences and series. Properties of continuous and differentiable functions of a real variable.

10.1521 Pure Mathematics 3 — 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 3 — Differential Geometry **SS L1½T½**

*Prerequisites: 10.1113, ***. Co-requisites: ***. Excluded: 10.1325, 10.112C, 10.122C.*

Curves and surfaces in space. Gaussian curvature, Gauss theorem, Gauss Bonnet theorem.

10.1523 Pure Mathematics 3 — Functional Analysis and Applications **S1 or S2 L1½T½**

*Prerequisites: 10.111A, 10.2112, ***. Co-requisite: 10.1128 (strongly recommended). Excluded: 10.122B.*

Geometry of Hilbert spaces, approximation problems, linear operators, filters, spectral methods for differential equations.

10.122B Higher Pure Mathematics 3 — Real Analysis and Functional Analysis **F L1½T½**

Prerequisites: 10.121A or 10.111A (DN), 10.1213 or 10.1113 (DN). Co-requisite: †††. Excluded: 10.1128, 10.1523.

The limit processes of analysis; introduction to Lebesgue integration; introduction to metric spaces. Hilbert spaces; linear operators; Fourier series.

10.1321 Higher Pure Mathematics 3 — Rings and Fields **S1 L1½T½**

Prerequisites: 10.121A or 10.111A (DN). Co-requisite: †††.

Rings; integral domains; factorization theory. Fields; algebraic and transcendental extensions. Introduction to algebraic number theory; quadratic reciprocity.

***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.

10.1322 Higher Pure Mathematics 3 — Galois Theory **S2 L1½T½**

Co-requisite: 10.1321, ††††.

Galois fields. Galois groups. Solution of equations by radicals. Further algebraic number theory.

10.1323 Higher Pure Mathematics 3 — 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 3 — Integration and Fourier Analysis **S2 L1½T½**

Co-requisite: 10.122B, ††††.

Lebesgue integration; measure theory. Fourier transforms.

10.1325 Higher Pure Mathematics 3 — Differential Geometry **S1 L1½T½**

Prerequisites: 10.121A or 10.111A (DN), 10.1213 or 10.1113 (DN). Co-requisite: ††††. *Excluded: 10.1522.*

Curves and surfaces in space; classification of surfaces. Curvature; geodesics.

10.1326 Higher Pure Mathematics 3 — Calculus on Manifolds **S2 L1½T½**

Co-requisites: 10.1325, ††††.

Manifolds; vector fields; flows. Introduction to Morse theory. Differential forms; Strokes' theorem; the Gauss-Bonnet theorem.

10.1421 Higher Pure Mathematics 3 — Number Theory **S1 L1½T½**

Co-requisite: ††††. *Excluded: 10.1121.*

Prime numbers; number theoretic functions; Dirichlet series; partitions. Continued fractions; diophantine approximation; p-adic numbers.

10.1422 Higher Pure Mathematics 3 — Groups and Representations **S2 L1½T½**

Prerequisites: 10.121A or 10.111A (DN) and 10.1111 (DN). Co-requisite: ††††

Abelian groups; composition series; nilpotent groups; soluble groups. Representations and characters of finite groups; induced representations.

10.1423 Higher Pure Mathematics 3 — Topology **S1 L1½T½**

Prerequisites: 10.1213 or 10.1113 (DN). Co-requistie: ††††

Naive set theory; the axiom of choice. Metric and topological spaces; compactness.

10.1424 Higher Pure Mathematics 3 — Geometry **S2 L1½T½**

Prerequisites: 10.121A or 10.111A (DN) and 10.1111 (DN). Co-requisite: ††††. *Excluded: 10.1112.*

Axioms for a geometry; affine geometry, Desargues' theorem; projective geometry.

10.1425 Higher Pure Mathematics 3 — 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. Linearization. Qualitative theory of autonomous systems.

10.1426 Higher Pure Mathematics 3 — Partial Differential Equations **S1 L1½T½**

Co-requisites: 10.1425, ††††. *Excluded: 10.1126.*

Classification, characteristics. Cauchy problem; Dirichlet and Neumann problems. Distributions.

10.123 Pure Mathematics 4

An honours program consisting of the preparation of an undergraduate thesis together with advanced lectures 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.

†††† Normal prerequisites for attempting Level III Higher Pure Mathematics units are at least two Level II Mathematics units, including any course prerequisites, at an average of distinction level, or their higher equivalents.

Applied Mathematics

10.2111 Applied Mathematics 2 — Vector Calculus **S1 or S2 L1½T½**

Prerequisite: 10.001. Excluded: 10.2211.

Properties of vectors and vector fields; divergence, gradient, curl of a vector; line, surface, and volume integrals. Gauss' and Stokes' theorems. Curvilinear co-ordinates.

10.2112 Applied Mathematics 2 — Mathematical Methods for Differential Equations **S1 or S2 L1½T½**

Prerequisite: 10.001. Excluded: 10.2212.

Mathematical methods for ordinary and partial differential equations. Series solutions, numerical methods, separation of variables. Fourier series. Besser functions.

10.2113 Applied Mathematics 2 — Linear Programming **S1 or S2 L1½T½**

Prerequisite: 10.001. Co-requisite: 10.111A. Excluded: 10.2213.

Mathematical modelling and solution techniques for linear optimization problems. Feasible regions, graphical methods, the standard problem, basic solutions, fundamental theorem, simplex and revised simplex methods, duality and the dual simplex method, sensitivity analyis, the transportation problem.

10.2115 Applied Mathematics 2 — Discrete-Time Systems **S1 or S2 L1½T½**

Prerequisite: 10.001. Excluded: 10.2215.

The study of dynamical systems whose states change at discrete points in time. 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.

10.2116 Applied Mathematics 2 — Continuous-Time Systems **S2 L1½T½**

Prerequisite: 10.001. Excluded: 10.2216.

The study of continuous dynamical systems. One-dimensional systems, kinematic waves, applications to traffic flow and waves in fluids. Momentum equation for one-dimensional fluid flow, sound waves. Dynamics of a system of particles, oscillations. An introduction to the modelling of biological and ecological systems.

10.261A Applied Mathematics 2 — Mathematical Computing **F L1½T½**

Prerequisite: 10.001.

The development of efficient and reliable software for mathematical applications using FORTRAN. Data types, input/output, structured programming, communication between sub-programs, file manipulation, portability, efficiency, accuracy, documentation, de-bugging. Examples will be chosen from the following areas: non-linear equations in one and two variables, extrapolation procedures, numerical quadrature, systems of linear equations, difference equations, ordinary differential equations.

10.2211 Higher Applied Mathematics 2 — Vector Analysis **S1 L2T½**

Prerequisite: 10.011 or 10.001 (CR). Excluded: 10.2111.

As for 10.2111 but in greater depth.

10.2212 Higher Applied Mathematics 2 — Mathematical Methods for Differential Equations **S2 L2T½**

Prerequisite: 10.011 or 10.001 (CR). Excluded: 10.2112.

As for 10.2112 but in greater depth.

10.2213 Higher Applied Mathematics 2 — Linear Programming **S1 or S2 L1½T½**

Prerequisite: 10.011 or 10.001 (CR). Excluded: 10.2113.

As for 10.2113 but in greater depth.

10.2215 Higher Applied Mathematics 2 — Discrete-Time Systems **S2 L1½T½**

Prerequisite: 10.011 or 10.001 (DN). Excluded: 10.2115.

As for 10.2115, but in greater depth.

10.2216 Higher Applied Mathematics 2 — Continuous-Time Systems **S2 L1½T½**

Prerequisite: 10.011 or 10.001 (CR). Excluded: 10.2116.

As for 10.2116 but in greater depth.

10.212A Applied Mathematics 3 — Numerical Analysis **F L1½T½**

Prerequisites: 10.2112, 10.111A. Excluded: 10.222A.

Introduction to the techniques required for the analysis of numerical methods. 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.

10.212B Higher Applied Mathematics 3 — Fluid Dynamics **S1 L3T1**

Prerequisite: 10.2111, 10.2112. Excluded: 10.222B, 10.422A.

The mathematical modelling and theory of problems arising in the flow of fluids. Cartesian tensors, kinematics, mass conservation, vorticity, Navier-Stokes equation. Topics from inviscid and viscous fluid flow, gas dynamics, sound waves, water waves.

10.212D Applied Mathematics 3 — Mathematical Methods **S2 L3T1**

Prerequisites: 10.2112, 10.111A, 10.1113, 10.1114. Excluded: 10.0331, 10.033, 10.222D, 10.412D, 10.422D, 10.4331, 10.2921.

Fundamental methods for solution of problems in applied mathematics, physics and engineering. Functions of a complex variable, contour integration, asymptotic methods. Fourier and Laplace transforms, complex inversion theorems. Orthogonal polynomials and functions, Sturm-Liouville theory, eigenfunction expansions, generalized Fourier series. Applications to the solution of boundary value problems for ordinary and partial differential equations given is for all methods.

10.212L Applied Mathematics 3 — Optimization Methods **F L1½T½**

Prerequisites: 10.111A, and 10.1113 or 10.2111. Excluded: 10.222L.

Development, analysis and application of methods for optimization problems. Theory of multivariable optimization; including necessary and sufficient optimality conditions, stationary points, Lagrange multipliers, Kuhn-Tucker conditions, convexity and duality. Numerical methods for one dimensional minimization, unconstrained multivariable minimization (including steepest descent, Newton, quasi-Newton and conjugate gradient methods) and constrained multi-variable minimization (including linear programming and quadratic programming).

10.212M Applied Mathematics 3 — Optimal Control **S1 L3T1**

Prerequisites: 10.1113 and 10.1114, 10.111A. Excluded: 10.222M.

Introduction to control of time-varying systems. 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. The Pontryagin maximum principle. Calculus of variations.

[Examples and applications are selected from physical, engineering economics, resource and financial management, social and biological systems.]

10.212N Applied Mathematics 3 — Dynamical Systems **S2 L3T1**

Prerequisites: 10.111A, 10.2112, 10.1125. Excluded: 10.222N.

Nonlinear differential equations and applications to time-dependent systems. Perturbation methods, averaging and asymptotic techniques, Floquet theory, bifurcation theory. Hamiltonian dynamics, Liouville's theorem, integral invariants, canonical transformations, action-angle variables. Applications to ecological, biological and mechanical systems.

10.222A Higher Applied Mathematics 3 — Numerical Analysis **S1 L3T1**

Prerequisites: 10.2212 or 10.2112 (CR), 10.121A or 10.111A (CR). Excluded: 10.212A.

As for 10.212A but in greater depth.

10.222B Higher Applied Mathematics 3 — Fluid Dynamics **S1 L3T1**

Prerequisites: 10.2211 or 10.2111 (CR), 10.2212 or 10.2112 (CR) Excluded: 10.212B, 10.422A.

As for 10.212B but in greater depth.

10.222C Higher Applied Mathematics 3 — Maxwell's Equations and Special Relativity **FL1½T½**

Prerequisites: 10.2211 or 10.2111 (DN), 10.2212 or 10.2112 (DN), 10.1214 or 10.1114 (DN), 1.001. Excluded: 1.033, 1.0333.

Theory and applications of electromagnetic fields and waves. 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.

10.222D Higher Applied Mathematics 3 — Mathematical Methods **S2 L3T1**

Prerequisites: 10.2212 or 10.2112 (CR), 10.1213 or 10.1113 (CR), 10.1214 or 10.1114 (CR). Excluded: 10.0331, 10.033, 10.212D, 10.412D, 10.422D, 10.4331, 10.2921.

As for 10.212D but in greater depth.

10.222L Higher Applied Mathematics 3 — Optimization Methods **S2 L3T1**

Prerequisites: 10.121A or 10.111A (CR), 10.2211 or 10.2111 (CR) or 10.1213 or 10.1113 (CR). Excluded: 10.212L.

As for 10.212L but in greater depth.

10.222M Higher Applied Mathematics 3 — Optimal Control **S1 L3T1**

Prerequisites: 10.1213 or 10.1113 (CR), 10.1214 or 10.1114 (CR), 10.121A or 10.111A (CR). Excluded: 10.212M.

As for 10.212M but in greater depth.

10.222N Higher Applied Mathematics 3 — Dynamical Systems **S2 L3T1**

Prerequisites: 10.121A or 10.111A (CR), 10.1425 or 10.1125 (CR), 10.2212 or 10.2112 (CR). Excluded: 10.212N.

As for 10.212N but in greater depth.

10.223 Applied Mathematics 4

An honours program consisting of the preparation of an undergraduate thesis together with advanced lecture courses. Lecture topics include selections from: advanced mathematical methods for applied mathematics, advanced optimization, numerical analysis, theory of linear and non-linear dynamical systems, optimal control, operations research, functional analysis and applications, mathematics of economic models and of economic prediction, fluid mechanics, oceanography, microhydrodynamics, and analytical and numerical solution of partial differential equations. 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 4 (Short Course)

6 units consisting of the preparation of an undergraduate thesis together with advanced lecture courses. Lecture topics include selections from: topics listed in 10.223 With permission of the Head of Department, the subject may also include advanced lecture courses given by other Departments or Schools.

10.262A Applied Mathematics 3 — Mathematical Software **S2 L3T1**

Prerequisites: 10.111A, 10.2112, and either 6.621 or 10.211E or 10.261A or equivalent.

Underlying methods, development, and use of mathematical software paclages; primarily of those written in FORTRAN. Numerically stable methods for matrix factorizations, solution of systems of linear equations and calculation of matrix eigenvalues and eigenvectors. Numerical quadrature, including special methods for singular, oscillatory and infinite integrals and for multiple integrals. Numerical solution of ordinary differential equations, including initial and boundary value problems. Extensive use is made of computers and software packages. A basic knowledge of Fortran is assumed.

10.292A Applied Mathematics 3 — Oceanography **S1 L3T1**

Prerequisites: 10.2111 or 10.031, 1.001. Excluded: 10.412A.

Review of basic physical features and mathematical description of oceans. Physical properties of sea water. Elementary hydrodynamics. An elementary discussion of turbulence. Geostrophy, dynamic heights and the inference of heights from hydrographic measurements. Ekman layers. Wind-driven ocean circulation, western boundary currents. Surface and internal waves, tides. Thermohaline process: mixing, entrainment, double-diffusive phenomena, mixed layers and gravity currents.

10.2921 Applied Mathematics 3 — Transform Methods **S1 L1½T½**

Prerequisites: 10.1113, 10.1114, 10.2112 or equivalent. Excluded: 10.0331, 10.033, 10.212D, 10.222D, 10.412D, 10.422D, 10.4331.

Theory and use of transform methods in communications, circuit theory and solution of partial differential equations. Fourier and Laplace transforms, generalized functions, solution of partial differential equations.

10.2922 Applied Mathematics 3 — Applied Time Series Analysis **S2 L1½T½**

Prerequisites: 10.2112 or 10.031 or 10.022. Corequisites: 10.331 or equivalent, 10.2921 or 10.212D or equivalent. Excluded: 10.4129.

Techniques for analyzing time-varying data. 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.

Statistics

10.311A Theory of Statistics 2 — Probability and Random Variables **S1 L3T1**

Prerequisite: 10.001 or 10.011 or 10.021C (CR). Excluded: 10.321A, 10.301, 10.331, 45.101.

Probability, random variables, standard discrete and continuous distributions, multivariate distributions, transformations, random sampling, sampling distributions, limit theorems.

10.311B Theory of Statistics 2 — Basic Inference **S2 L3T1**

Prerequisite: 10.311A. Excluded: 10.321B, 10.301, 10.331, 45.101.

Point estimation: general theory, estimation by moments, maximum likelihood, interval estimation with general theory and application, hypothesis testing using Neyman-Pearson theory, linear regression and prediction, analysis of variance.

10.321A Higher Theory of Statistics 2 — Probability and Random Variables **S1 L3T1**

Prerequisite: 10.001 or 10.011. Excluded: 10.311A, 10.301, 10.331, 45.101.

As for 10.311A but in greater depth.

10.321B Higher Theory of Statistics 2 — Basic Inference **S2 L3T1**

Prerequisite: 10.321A. Excluded: 10.311B, 10.301, 10.331, 45.101.

As for 10.311B but in greater depth.

10.3111 Theory of Statistics 2 — Statistical Computing and Simulation **S1 L1½T½**

Prerequisite: 10.001 or 10.011 or 10.021C(CR). Co-requisite: 10.311A.

Introduction to APL, random variables, univariate transformation, simulation of random variables, APL programming, integer value random variables, random walks — theory and simulation, introduction to Markov chains.

10.3211 Higher Theory of Statistics 2 — Statistical Computing and Simulation **S1 L1½T½**

Prerequisite: 10.001 or 10.011. Co-requisite: 10.321A.

As for 10.3111 but in greater depth.

10.3112 Theory of Statistics 2 — Nonparametric Statistical Inference **S2 L1½T½**

Prerequsite: 10.311A. Co-requisite: 10.311B.

Order statistics, exact and approximate distributions, multinomial distributions, goodness of fit, contingency tables, one-sample and two-sample estimation and inference problems.

10.3212 Higher Theory of Statistics 2 — Nonparametric Statistical Inference **S2 L1½T½**

Prerequisite: 10.321A. Co-requisite: 10.321B.

As for 10.3112 but in greater depth.

10.312A Theory of Statistics 3 — Stochastic Processes **S1 L3T1**

Prerequisites: 10.311A, 10.111A, 10.1113. Excluded: 10.322A.

Probability spaces, generating functions, convolutions. Poisson process, renewal processes. Branching processes. Recurrent events, Markov chains. Birth-and-death processes, queueing models. Inference for stochastic processes.

10.312C Theory of Statistics 3 — Linear Models **S1 L3T1**

Prerequisites: 10.311B, 10.111A, 10.1113. Excluded: 10.322C.

Matrix theory. Multivariate normal distribution. Quadratic forms (distributions and independence). The general linear hypothesis, Gauss-Markov theorem. Hypothesis testing. Selection of variables. Analysis of residuals. Analysis of variance.

10.312F Theory of Statistics 3 — Statistical Computation **S2 L2T2**

Prerequisites: 10.311B or 10.321B, 10.3111 or 10.3211.

Array and sequential processing in APL. Standard statistical operations and their efficient coding. Simulation of random variables and stochastic processes. Efficient coding of survey data. Modular package construction, and the use of packages (eg STATAPL, IDAP, INSTAPAK, SPSS, GLIM, GENSTAT, MINITAB, SAS, BMD). A project, to construct a small package consistent with general specifications and with safeguards against common errors.

10.3121 Theory of Statistics 3 — Sample Survey Theory **S1 L1½T½**

Prerequisite: 10.311B. Excluded: 10.3221.

Finite population sampling theory illustrated by mean estimation; simple random, stratified, cluster, systematic, multistage and ratio sampling, sampling proportional to size.

10.3122 Theory of Statistics 3 — Design and Analysis of Experiments **S2 L1½T½**

Prerequisites: 10.311B, 10.312C. Excluded: 10.3222.

Principles of good experimental design. Completely randomized experiment, randomized complete block design. Latin square design. Contrasts and multiple comparisons. Analysis of factorial experiments. Random effects models.

10.3123 Theory of Statistics 3 — Statistical Inference **SS L1½T½**

Prerequisite: 10.311B. Excluded: 10.3223.

Uniformly minimum variance unbiased estimation, Cramer-Rao inequality, Lehman-Scheffe theorem. Monotone likelihood ratio distributions and uniformly most powerful unbiased tests. Generalized likelihood ratio test, exact test and large samples tests. Bayesian point estimation, interval estimation and hypothesis testing.

10.3124 Theory of Statistics 3 — Nonparametric Methods **SS L½T½**

Prerequisites: 10.311B, 10.3112. Excluded: 10.3224.

One sample and two sample problems. Tests for association. Contingency tables. Nonparametric analysis of variance and regression.

10.3321 Regression Analysis and Experimental Design **S1 L1½T½**

Prerequisite: 10.331 or 10.311B or approved equivalent. Excluded: 10.3122, 10.3222.

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 3 — Stochastic Processes **S1 L3½T1**

Prerequisites: 10.321A, 10.111A, 10.1113. Excluded: 10.312A.

As for 10.312A but in greater depth.

10.322C Higher Theory of Statistics 3 — Linear Models **S1 L3½T1**

Prerequisites: 10.321B, 10.111A, 10.1113. Excluded: 10.312C.

As for 10.312C but in greater depth.

10.322D Higher Theory of Statistics 3 — Probability Theory **S2 L3T1**

Prerequisites: 10.321A, 10.111A, 10.1113.

Probability spaces, generating functions. Weak convergence, convergence in probability, weak law of large numbers, central limit theorem. Extreme value distributions. Borel-Cantelli lemma, almost sure convergence, strong law of large numbers. Stable and infinitely divisible distributions.

10.3221 Higher Theory of Statistics 3 — Sample Survey Theory **S1 L1½T½**

Prerequisite: 10.321B. Excluded: 10.3121.

As for 10.3121 but in greater depth.

10.3222 Higher Theory of Statistics 3 — Design and Analysis of Experiments **S2 L1½T½**

Prerequisites: 10.321B, 10.322C. Excluded: 10.3122.

As for 10.3122 but in greater depth.

10.3223 Higher Theory of Statistics 3 — Statistical Inference **SS L1½T½**

Prerequisite: 10.321B. Excluded: 10.3123.

As for 10.3123 but in greater depth.

10.3224 Higher Theory of Statistics 3 — Nonparametric Methods **SS L1½T½**

Prerequisites: 10.321B, 10.3212. Excluded: 10.3124.

As for 10.3124 but in greater depth.

10.3225 Higher Theory of Statistics 3 — Statistic Project **F**

Prerequisites: 10.321A, 10.3218. Co-requisites: At least four units from 10.322A, 10.322C, 10.3221, 10.3222, 10.3223, 10.3224, 10.322D, 10.312F.

10.323 Theory of Statistics 4

Specialized 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 χ^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.

Servicing Subjects

These are subjects taught within courses offered by other faculties.

For Further information regarding the following subjects see the Faculty of Applied Science and Engineering Handbooks.

10.022 Engineering Mathematics 2 **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.

10.0331 Electrical Engineering Mathematics 3 — Transform Methods **S1 L1½T½**

Prerequisites: 10.111A, 10.1113, 10.1114, 10.2112. Exclusions: 10.412D, 10.422D and 10.4331.

The mathematics of signals and linear systems. General Fourier series. Fourier, Laplace and related transforms. Delta-distributions and others and their transforms. Discrete Fourier and Z-transforms. Applications to spectral analysis, autocorrelation, uncertainty and sampling, linear analog and digital filters, partial differential equations.

10.0332 Electrical Engineering Mathematics 3 — Numerical Methods **S2 L1½T½**

Prerequisites: 10.111A, 10.1113, 10.1114, 10.2111, 10.2112. Exclusions 10.212A, 10.222A.

Numerical approximation of solutions to linear and non-linear equations. Interpolation and extrapolation. Approximation of definite integrals. Approximate solution of differential equations. Optimization. Approximate solution of matrix eigenvalue and eigenvector problems.

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, χ^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 L1½T½**

Prerequisite: 10.001 or 10.011.

For students in Aeronautical, Industrial and Mechanical Engineering and Naval Architecture.

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, χ^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 χ^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 L1½T½**

Introduction to probability. Random variables. Elementary distribution. Statistical inference. Point estimation. Confidence intervals.

Psychology

Psychology Level I Unit

12.100 Psychology 1 **F L3T2**

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 2 **F L2T1**

Prerequisite: 12.100. (Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.)

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 Biological Basis of Psychology 2 **S2 L2T2**

Prerequisite: 12.100. (Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.)

Two strands: one emphasises basic biological structures and mechanisms, with particular emphasis on specific sensory systems (eg pain) and behaviour (eg aggression); the other strand emphasises structure and function of sensory systems, evaluates neurological concepts and models, and examines the sensory interaction of people with their environment.

12.202 Social and Cognitive Psychology 2 **S1 L2T2**

Prerequisite: 12.100. (Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.)

Two strands: one provides a consideration of the content, methods and models of social psychology and evaluates effects of social factors on behaviour of individuals and groups; the other strand is concerned with cognitive behaviour of humans, particularly in relation to speech, pattern recognition, memory and thinking.

12.203 Psychology 2A **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: 12.330.

Available to Course 3431 students only.

Computing, assessment and introduction to clinical practice.

12.204 Human Relations 2 **S1 L2T2**

Prerequisite: 12.100. (Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.)

Social and personality development of the individual; human relations in the family group. Interpersonal relationships and, in particular, the handling of anxiety, aggression and communication.

12.205 Individual Differences 2 **S2 L2T2**

Prerequisite: 12.100. (Pass Conceded (PC) awarded prior to Session 2, 1983 is not acceptable.)

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 3A **S1 L2T2**

Prerequisite: 12.200.

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.

12.305 Learning and Behaviour 3 **S1 or S2 L2T2**

Prerequisites: 12.200 and 12.201.

The establishment and elimination of extended sequences of behaviour in complex environments. Implications of the theories and research for applied work.

Psychology Level III Units: Group B

12.301 Research Methods 3B **S2 L2T2**

Prerequisites: 12.200 and 12.300.

Multivariate statistics and computing. Data analysis using the SPSS and PSY computer programs; their statistical basis.

12.304 Personality and Individual Differences 3 **S1 L2T2**

Prerequisites: 2 Psychology Level II subjects.

Personality dynamics and structure and differences in ability and intelligence.

12.310 Physiological Psychology 3 **S2 L2T2**

Prerequisites: 12.200 and 12.201.

Elementary neuropharmacology and neuroanatomy. Brain control of eating, drinking, aggression, copulation, pain perception, memory, language and functional disorders.

12.311 Perception 3 **S1 L2T2**

Prerequisites: 12.200 and 12.201.

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 3 **S2 L2T2**

Prerequisites: 12.200 and 12.202.

Stages involved in reception of stimulus information from environment, its analysis, storage, and transmission into responses. Stress on processing of language.

12.314 Motivation and Emotion 3 **S1 L2T2**

Prerequisites: 12.200 and 12.201.

An examination of contemporary research regarding 'drives', 'incentives' and 'emotions' as determinants of animal and human action. Theoretical perspectives cover biological and social influences.

12.315 Theories of Associative Learning 3 **S2 L2T2**

Prerequisite: 12.305.

Contemporary theoretical approaches to instrumental and classical conditioning. Topics may include: traditional behaviour theories, information processing theory, cybernetic theory, and neurophysiological approaches.

12.316 Psychophysiology 3 **S1 L2T2**

Prerequisites: 12.200 and 12.201

The major theoretical, methodological, and applied issues in psychophysiology. Topics may include: arousal, attention, habituation, lie detection, clinical assessment, and biofeedback.

12.320 Social Psychology 3 **S2 L2T2**

Prerequisites: 12.200 and 12.202.

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 3 **S2 L2T2**

Prerequisite: 12.200 and 12.202.

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.

12.322 Abnormal Psychology 3 **S1 L2T2**

Prerequisites: 12.200 and 12.201.

Descriptive psychopathology: symptomatology and diagnostic features of schizophrenia, organic brain syndromes, affective disorders, neurotic disorders, psychopathy, sexual aberrations, and addictions.

12.324 Experimental Psychopathology 3 **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 3

Prerequisites: 12.200 and 12.202.

Not offered in 1987.

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 3 **S1 L2T2**

Prerequisites: 12.200, and 1 other Psychology Level II subject. Excluded: 12.203.

Principles and techniques of psychological assessment. Types of tests and their application in selection and allocation procedures.

12.331 Counselling Psychology 3 **S2 L2T2**

Prerequisites: 2 Psychology Level II subjects.

Principles and techniques of counselling in a variety of contexts. Interviewing, group process and structure, and interpersonal relations.

12.332 Behavioural Change 3

Prerequisites: 12.200 and 12.201.

Not offered in 1987.

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 3 **S1 L2T2**

Prerequisite: 12.200.

Aspects of human performance relevant to work design. The principles involved in designing the environment in general, and work in particular, to suit humans' capabilities.

12.334 Behaviour in Organizations 3 **S2 L2T2**

Prerequisites: 2 Psychology Level II subjects.

Theories and research methods for understanding behaviour in organizations and in the environment.

12.335 Behavioural Evaluation and Assessment 3 **S2 L2T2**

Prerequisite: 12.200.

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 3 **S1 L2T2**

Prerequisites: 12.200 and 12.202.

An occasional elective dealing with a special field of psychology.

Psychology Level IV Units

12.400 Psychology 4 (Thesis — Course 3431) **F**

Prerequisite: All requirements for Years 1-3 of the course.

Psychology 4 in the BSc(Psychol) degree course. A supervized research thesis and course work to be determined in consultation with the Head of School.

12.401 Psychology 4 (Course 3431) **F**

Prerequisite: All requirements for Years 1-3 of the course.

Psychology 4 in the BSc(Psychol) degree course. Course work and a supervized group research project to be determined in consultation with the Head of School.

12.403 Psychology 4 (Thesis) **F**

Prerequisites: 12.100, 12.200. 12.201, 12.202 and 8 Psychology Level III units, including 12.300 and 12.305 from Group A and 12.301 from Group B, with a weighted average of at least 68%, and at the discretion of the Head of School.

Psychology 4 in the Arts, and Science and Mathematics degree courses. A supervized research thesis and course work to be determined in consultation with the Head of School.

12.404 Psychology 4 **F**

Prerequisites: 12.100, 12.200, 12.201, 12.202 and 8 Psychology Level III units, including 12.300 and 12.305 from Group A, with a weighted average of at least 68%, and at the discretion of the Head of School.

Psychology 4 in the Arts, and Science and Mathematics degree courses. Course work and a supervized group research project to be determined in consultation with the Head of School.

Psychology Servicing Subjects

These are subjects taught within courses offered by other faculties.

For further information regarding the following subject see the Faculty of Commerce Handbook.

12.651 Psychology (Industrial Relations)

Prerequisite: Nil.

Not offered in 1987.

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 subject see the Faculty of Science section in this Handbook.

12.741 Psychology (Optometry) **F L2**

Prerequisite: 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.

Accountancy

14.501 Accounting and Financial Management 1A **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 auditing.

14.511 Accounting and Financial Management 1B **S1 or S2 L2T2½**

Prerequisite: 14.501.

Development of basic concepts introduced in 14.501 Accounting and Financial Management 1A, including corporate reporting, business finance, system design, elementary computer applications.

14.522 Accounting and Financial Management 2A **S1 or S2 L2T2½**

Prerequisites: 14.511 plus

		HSC minimum mark required
2 unit Mathematics *or*		60
3 unit Mathematics	2 unit	60
	3 unit *or*	1
4 unit Mathematics	3 unit	1
	4 unit	1

The design, production and use of accounting and other quantitative information in the planning and control of organizations, with particular reference to manufacturing activities.

14.542 Accounting and Financial Management 2B **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 3A **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 3A (Honours) **S1 LT6**

Prerequisite: 14.542.

Includes 14.563 Accounting and Financial Management 3A 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 3B **S1 or S2 L2T2½**

Prerequisite: 14.522.

Management Accounting: advanced treatment of management accounting theory and applications including statistical cost analysis, budgetary and strategic planning and decision models.

14.593 Accounting and Financial Management 3B (Honours) **S2 LT6**

Prerequisite: 14.522.

Includes 14.583 Accounting and Financial Management 3B, as well as more advanced work dealing with theoretical and research issues in management accounting.

14.602 Computer Information Systems 1 **S1 or S2 L2T1**

Prerequisite: 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 2 **S2 L2T1**

Prerequisite: 14.602. Excluded: 14.606.

Systems design: physical design of business systems, specifications and updating of VSAM files, man-machine dialogue procedures, top-down structured design and evolutionary design methodologies. Introduction to communications networks. Operating systems concepts: processor, storage, device and process management, segmentation and paging systems. 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 or 14.606.

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 2 **S1 or S2 LT3**

Prerequisites: 14.511, 15.011 and 15.421.

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 3A **S1 L3**

Prerequisite: 14.613.

Financial decision making within the framework of capital market theory. Includes diversification, risk and return, determinants of risk, efficient market hypothesis with emphasis on Australian evidence, capitalization changes and performance measures, takeovers and mergers.

14.615 Business Finance 3B **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.

14.774 Legal Environment of Commerce **S1 or S2 L2T1**

Prerequisite:

	HSC minimum mark required
2 unit English (General) or	*60*
2 unit English or	*53*
3 unit English	*1*

The Australian legal system and areas of substantive law relevant to commerce including contract, business organization, employment, commercial arbitration, advertising, trade regulation, civil compensation, discrimination.

14.794 Honours Thesis

14.853 Advanced Systems Management

Prerequisite: Admission to BCom degree course at Honours level.

As for 14.953G. See Graduate Study: Subject Descriptions.

14.857 Operations Research for Management 1

Entry approval by Head of Department of Information Systems.

As for 14.957G. See Graduate Study: Subject Descriptions.

14.886 Research Topics in Information Systems 1

Entry approval by Head of Department of Information Systems.

As for 14.986G. See Graduate Study: Subject Descriptions.

14.887 Research Topics in Information Systems 2

Entry approval by Head of Department of Information Systems.

As for 14.987G. See Graduate Study: Subject Descriptions.

14.891 Decision Support Systems

Prerequisite: 14.603

As for 14.991G. See Graduate Study: Subject Descriptions.

Economics

15.001 Microeconomics 1 **S1 or S2 L2T1½**

Commerce/Arts/Applied Science/Sciences prerequisite:

	HSC minimum mark required
2 unit English (General) or	*60*
2 unit English or	*53*
3 unit English	*1*

Economics as a social science, the central role of scarcity and opportunity cost. Australian industrial structure. Efficiency concepts. Relative prices and their change through time. Demand, revenue and elasticity. Theory of exchange. Property rights, externalities and distortions. Gains from specialization and international trade. Marginal productivity, input demand. The price taking firm, profit maximization in short and long run. Taxation, protection, stabilization of markets. Imperfect markets, competition policy. Investment decisions and economic growth.

15.002 Microeconomics 2 **S1 L2T2**

Commerce prerequisite: 15.011.

Applied Science/Sciences prerequisites: 15.011 plus 15.401 or 15.411 or 10.001 or 10.011.

Arts prerequisite: 15.011. Co-requisites: 15.401 or 15.411 or 10.001 or 10.011.

Excluded: 15.012, 15.072.

Consumer behaviour. Theory of the firm, production theory. Competition, monopoly, oligopoly. Factor markets. General equilibrium analysis: efficiency and equity, welfare maximisation, gains from trade. Externalities, market distortions. Intertemporal economics, investment criteria.

15.003 Macroeconomics 3 **S2 L2T2**

Commerce prerequisite: 15.042 or 15.052.
Arts/Applied Science/Sciences prerequisite: 15.042 or 15.052. Co-requisite: 15.412.
Excluded: 15.013.

Macroeconomic theory and policy including an introduction to the theory of economic policy, the structure and dynamic characteristics of macro-models, fiscal policy, monetary theory and policy, inflation and unemployment. Rational expectations. Macroeconomic policy in Australia.

15.011 Macroeconomics 1 **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.

15.042 Macroeconomics 2 **S2 L2T2**

Commerce prerequisite: 15.011.

Arts/Applied Science/Sciences prerequisites: 15.002 plus 15.401 or 15.411 or 10.001 or 10.011. Co-requisite 15.421.
Excluded: 15.052, 15.062.

Extensions to the Keynesian model of income determination. Consumption and investment theories. Money demand and supply. Balance of payments and exchange rate analysis. Inflation and unemployment. Introduction to dynamic analysis. Labour markets. Growth and cycles.

15.062 Applied Macroeconomics **S1 or S2 L2T1½**

Commerce/Arts/Applied Science/Sciences prerequisite: 15.011.
Excluded: 15.052 and 15.042.

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.

15.072 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.

15.143 Microeconomics 3 **S1 L2T2**

Commerce prerequisite: 15.002 or 15.012.
Arts/Applied Science/Sciences prerequisite: 15.002 or 15.012. Co-requisite: 15.412.
Excluded: 15.153.

Input-output analysis, applications to Australia. General equilibrium analysis: industry protection and taxation. Income distribution. Market failure, property rights and public goods. Introduction to analysis of uncertainty. Deregulation of industry. Public enterprise pricing and investment.

15.901 Australia in the International Economy in the 20th Century **S1 or S2 L2T1½**

Commerce/Applied Science/Arts/Sciences prerequisite:

	HSC minimum mark required
2 unit English (General) or	*60*
2 unit English or	*53*
3 unit English	*1*

The international economy at the end of the 19th 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.

15.902 Management Strategy and Business Development **S2 L2T1½**

Commerce prerequisite: 15.901.
Applied Science/Arts/Sciences prerequisite:

	HSC minimum mark required
2 unit English (General) or	*60*
2 unit English or	*53*
3 unit English	*1*

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 multi-national corporations. The external business environment. Case studies of managerial hierarchies, investment strategy and diversification of firms in transport, mass retailing and mass production.

Biological Sciences

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 and 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

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 1 — 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 crystallization and differentiation. Partial melting. Simple binary melting diagrams. Igneous petrology relating to plate tectonics. *Practical:* Macroscopic and microscopic examination of rock forming and ore minerals and igneous rocks in the field and the laboratory. *Field work* of five days is a compulsory part of the subject.

25.212 Earth Environments 1 — 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 2 — 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 non-clastic sedimentary rocks including phosphates, 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 four 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 1 — 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 3 — 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:* Accuracy, precision and quality of geochemical data. Graphical display of analyses. Norms. The distribution of elements in terrestrial rocks. Nature and origin of meteorites and tektites. *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 4 — 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. Industrial uses of clays and bauxite. *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 as 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 2 — 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, Nd/Sm, U/Th/Pb 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 seven days is a compulsory part of the subject.

25.314 Mineral and Energy Resources 1 — S1 L3T3

Co-requisite: 25.221 or 25.311.

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 specimens, 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 three days is a compulsory part of the subject.

25.3162 Mathematical Geology 2 — 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 2 — S2 L3T3

Prerequisite: 25.212 or 25.5212.

Coal Geology: Nature and properties of coal. Methods of testing and analysis. Introduction to coal petrology. Origin of coal seams and coal-bearing sequences. Coalfield exploration and coal mining geology. Geological factors in coal preparation and use. Geology of oil shale. *Petroleum Geology:* Geological factors critical to the occurrence of oil and natural gas. Geochemistry of hydrocarbons and formation fluids; techniques of petroleum exploration. Assessment and development of reserves. Typical petroleum occurrences in Australia and overseas. *Nonmetallic Minerals:* Occurrence and economic use of non-metallic and industrial minerals including limestone, silica, asbestos and construction materials. *Sedimentary Basin Analysis:* Techniques of analysis and data presentation using information from outcrops, boreholes (including geophysical logs) and seismic sections. Construction and interpretation of structural, isopachous and lithofacies maps. Seismic stratigraphy. Styles of sedimentation within and structural development of basins in different tectonic regimes. Evolution of sedimentary basins. *Field work* of four days 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 **S2 L1T1**

Prerequisite: 25.311.

Sampling and sample preparation. Modern destructive methods of rock and mineral analysis. Non-destructive methods; X-ray fluorescence spectroscopy and electron probe microanalysers.

25.3271 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 four 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 2500, 5825.

25.414 Mineral Resources

See Mineral Resources strand in Applied Science Course 3000 Applied Geology Year 4. Available only to programs 2500, 5825.

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 2500, 5825.

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 Department.

25.434 Geology Honours (Single Major)

25.5212 Sedimentology **S1 L1T1**

Prerequisite: 25.120. Excluded: 25.212.

As for *Sedimentology* in 25.212 Earth Environments 1. Available only to Course 3145.

25.5313 Stratigraphy **S1 L2**

Prerequisite: 25.5212. Excluded: 25.312.

As for *Stratigraphy,* in 25.312 Earth Environments 2.

25.621 Marine Geology 1 **F L1T2**

Prerequisites: 25.601 or both 25.110 and 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. *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. *Mineralogy and Petrology:* Igneous and sedimentary rock types of the ocean floor and their significance.
Field work of five days is a compulsory part of the subject.

25.622 Hydrological and Coastal Surveying **F L1T2**

Prerequisites: Nil.

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 2 **F L1T2**

Prerequisite: 25.621.

Clay Mineralogy: Structure and properties of the clay mineral groups including the kaolinites, illites, smectites, chlorites, mixed layered and fibrous clay minerals. Techniques for identification of the clay minerals. Clay-water systems and ion exchange. Chemical weathering and the origin of the clay minerals. *Sedimentary Basin Analysis:* Technique 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. *Stratigraphy:* 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. *Field work* not exceeding two days is a compulsory part of the subject.

25.632 Estuarine Geology **F L1T2**

Prerequisite: Nil.

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. 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.

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.

25.931 Geophysics

See Geophysics strand of Applied Science Course 3000 Applied Geology Year 4. Available only to programs 2500, 5825.

25.9311 Gravity and Magnetic Methods **S1 L2T1**

Prerequisites: 1.001 and 10.001. It is desirable that students taking this unit have a background in geology.

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. Physical/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.

Geography

27.010 Land Studies **S1 L2T2**

Concepts, significance and problems of land. Land as territory and land as resource in Australia. Constraints imposed by the physical environment on human occupancy and settlement patterns, the variety of conflicts that result and management strategies. Practical work involves study of the ways in which the attributes and characteristics of land are displayed on maps, air photos and satellite imagery, and introduces these as basic information sources and research tools in applied geography.

27.030 Environmental Processes **S2 L2T2**

Essential and continuing links between components of the physical environment. Movement of energy and matter in the physical environment, including consideration of Earth's energy balance, the hydrological cycle, nutrient cycles in vegetation and soil, imbalances leading to land degradation and instability, alternatives to and movement of materials.

27.050 Geographical Data Analysis **F L2T2**

Prerequisites: 27.111 or 27.010 and 27.030. Excluded: 27.162, 27.632, 27.813, 27.884.

Inferential statistics and hypothesis testing in the analysis of spatial data. Methods of analysing categorical data, identifying spatial correlation and associations, and multivariate methods applicable to topics in physical and economic geography.

27.133 Pedology **S2 L2T3**

Prerequisites: 27.010 and 27.030 or 27.111 or any two units from 2.111, 2.121, 2.131, 2.141, and 27.811, 27.828 or 27.311 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 **S1 L2T3**

Prerequisites: 27.010 and 27.030 or 27.811 or 27.828 or 17.031 and 17.041 or 27.111 or 27.172.

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 or 27.811 or 27.828 or 25.110 and 25.120 or 17.031 and 17.041 or 27.111.

Physical bases for 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.

27.172 Environmental Measurements **F L2T4**

Prerequisites: 27.111; or 27.818 and 27.819; or 27.801 and 27.802; or 27.301 and 27.302.

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 humans on ecosystems.

27.175 Introduction to Remote Sensing **S1 L2T2**

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.

27.176 Remote Sensing Applications **S2 L2T2**

Prerequisite: 27.175 or 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.

27.183 Geomorphology **S2 L2T3**

Prerequisites: 25.110 and 25.120 or 27.010 and 27.030 or 27.811 or 27.828 or 27.111 or 27.172. 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 humans' 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.

27.193 Environmental Impact Assessment **S1 L2T1**

Rationale and basic objectives; standardized types of environmental impact assessment (EIA), including matrix approach, adopted methods of EIA in Australia. Frequently used assessment and predictive techniques for meteorological, hydrological, biological, socio-economic impact. Techniques of impact evaluation in terms of socio-economic criteria. Environmental decision making and planning under conditions of uncertainty. Case studies exemplifying procedures, techniques and issues. Trends, changes and possible future developments in EIA. Practical exercises representing components of typical EIAs.

27.432 Computer Mapping and Data Display **S1 L1T3**

Prerequisites: Successful completion of a Year 1 program in Applied Science, Science or Arts (or equivalent) as approved by Head of School.

Principles of graphic information processing. Introduction to thematic mapping and automated cartography; theoretical and practical problems in displaying and mapping data by computer. Review and application of computer mapping packages including SYMAP, SYMVU, CALFORM, GIMMS and SURFACE II.

27.652 Geographic Information Systems **S2 L2T2**

Prerequisites: 10.021B and 10.021C, or 10.001 or 10.011 or 27.432.

An introduction to information systems of particular relevance for economic geography with special reference to computer-based systems for resource evaluation. Problems of data structures, geocoding, and spatial identifiers. Model-based information systems. Project work: case study evaluation and the development of information systems for monitoring spatial change.

27.753 Social Welfare and Urban Development **S2 L2T3**

Prerequisite: 27.829 or 27.812. Note: This prerequisite does not necessarily apply to students enrolled in the Faculty of Applied Science.

A consideration of welfare aspects of urban development, including social policies and urban structure; social costs and benefits of urban renewal especially in the inner city; growth centres and new towns; distributional aspects of social services; and spatial disparities in social well-being.

27.813 Geographic Methods **S2 L2T2**

Prerequisites: 27.010 and 27.030, or 27.111 or 27.050, 27.801 and 27.802, or 27.818 and 27.819. Excluded: 27.050, 27.2813.

Statistical procedures and field methods used in both human and physical geography. Includes: measures of dispersion; measures of spatial distribution; samples and estimates; correlation and regression; tests for distribution in space; data collection and analysis; field observations.

27.818 Australian Environment and Human Response **S1 L2T2**

Prerequisite: Nil. Excluded: 27.010, 27.030 27.801, 27.295, 27.111.

Themes selected from the mechanisms of the physical environment with particular reference to Australia and the Sydney region. *Landscape as an expression of dynamic response:* land capability and land use problems, humans as agents of landscape change. *Energy and Atmospheric Circulation over Australia:* local weather patterns and weather extremes, human responses to fire, flood, and drought hazards. *Development and Stability of Hillslopes:* soil, vegetation and drainage relationships, problems of soil erosion. *Coastal Ecosystems:* problems of demand, risk and management in the coastal zone. Lectures are supplemented with tutorials, workshops, and field tutorials. Students are required to provide some materials for workshop exercises and to contribute to the cost of field tutorials.

27.819 Technology and Regional Change **S2 L2T2**

Prerequisite: Nil. Excluded: 27.802.

The impact of technological change on the spatial organization of human activities and regional development and disparities. The implications of technological change on population distribution, resource utilization, and settlement patterns are examined at different scales emphasizing the social consequences at the community and regional level. Examples are taken from Third World and modernized countries, with particular reference to Australian case studies.

27.824 Spatial Population Analysis **S2 L2T2**

Prerequisite: 27.812, or 27.829. Excluded: 27.834.

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.

27.825 Urban Activity Systems **S1 L2T2**

Prerequisite: 27.812, 27.829. 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.

27.826 Urban and Regional Development **S2 L2T2**

Prerequisite: 27.812, or 27.829. Excluded: 27.836.

Theories of urban and regional change leading to assessment of the role of planning. Emphasis on resource allocation, conflict resolution and evaluation techniques including cost-benefit analysis and environmental impact assessment. *Lectures* accompanied by seminars and workshop sessions which concentrate on methodology.

27.828 Australian Natural Environments **S2 L2T2**

Prerequisite: 27.801 or 27.818. Excluded: 27.111, 27.811.

Emphasizing interdependencies of climate, hydrology, landforms, soils and vegetation. Consideration of the development of landform, soil and vegetation patterns. Classification of climates. Case studies of selected zones in Australia and comparison with neighbouring areas. Climatic analysis and mapping, and analysis of natural landscapes.

27.829 Australian Social Environments **S1 L2T2**

Prerequisite: 27.802 or 27.819. Excluded: 27.010, 27.030, 27.812.

Focus is on the interaction between human communities and the built environment in Australia: the effects of the natural environment on the evolution of settlement patterns; detailed analysis of rural and metropolitan social environments. Emphasis on inner city, suburbia, behavioural and social area approaches, and to managerialist and structural theories of social change on areas and their communities.

27.844 Honours Geography **F**

Prerequisites: Arts students must satisfy Faculty requirements for entry to the Honours Level program and must have obtained at least 54 credit points in Geography subjects, including 12 Level 1 credit points. A minimum cumulative average at Credit level is required for all Upper Level subjects taken which must include 27.884.

Details of Honours Geography for science students are available from the School of Geography office.

Students are required: **1.** To undertake an original piece of work extending throughout the year and to submit a thesis based upon it. **2.** To participate in seminars and fieldwork (usually undertaken prior to Session 1) as notified by the School of Geography.

27.862 Australian Environment and Natural Resources **S1 L2T2**

Prerequisite: 27.010 and 27.030 or 27.811 or 27.812 or 27.828 or 27.829. Excluded: 27.872.

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.

27.863 Ecosystems and Man **S2 L2T2**

Prerequisite: 27.010 and 27.030, or 27.111 or 27.311/811 or 27.312/812 or 27.828 or 27.829. Excluded: 27.873, 27.363.

The structure and functioning of ecosystems, humans' interaction with ecosystems; Australian case studies of ecosystem management, including pastoral, cropping, forestry, coastal and urban ecosystems.

27.883 Special Topic **S1 or S2 L4**

Prerequisite: Nil.

Admission by permission to suitable students with good Passes in at least four subjects at Upper Level. A course of individually supervised reading and assignments as an approved topic in Geography not otherwise offered.

27.884 Advanced Geographic Methods **S1 L2T2**

Prerequisites: 27.813 or both 27.2813 and 27.2814. Excluded: 27.050, 27.880.

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.

Surveying

29.1010 Surveying 1 **S1 L2½T2½**

Introduction to surveying. Revision of plane trigonometric formulae. Co-ordinate systems. Magnetic compass. Plane table surveys. Introduction to distance measurement. Tape measurement. Minor instruments. Detail surveys. Areas of regular and irregular figures.

29.2010 Surveying 2 **S2 L1½T2½**

Principles of levelling. Methods, recording. Levelling instruments; testing and adjustment. Theodolites; principles and construction. Horizontal and vertical angle measurement.

29.441 Surveying for Engineers **S1 or S2 L2T4**

Co-ordinate systems. Levelling. Theodolite and angular measurements. Distance measurements: steel band, electronic. Traversing. Tacheometry. Contour and detail surveys. Horizontal and vertical curves. Area and volume computations. Control, engineering and underground surveys. Outline of photogrammetry.

29.491 Survey Camp

A one-week field camp for students studying 29.441 Surveying for Engineers.

Optometry

31.821 Anatomy and Physiology of Eye and Visual System **S1 L4T2 S2 L5T2**

Prerequisites: 17.031, 17.041. Co-requisite: 73.011A

Histology, Anatomy and Embryology of the Eye and Associated Structures: Anatomy and histology of the eye and associated tissues. Fibrous, vascular and neural tunics of the eye. 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 bases 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. Psychophysics and physiology of bleaching and background adaptation. Physiology, psychophysics and perception of colour. Functions of the visual cells in the pretectum. Theories of parallel and hierarachical 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. *Comparative Anatomy and Physiology of the Eye and Visual System:* Vertebrate and invertebrate. *Visual Perception:* Perception of form. Space perception. Visual illusions. General theories of light and form.

31.851 Optics **S1 L2T4 S2 L1T3**

Prerequisites: 1.001 or 1.021, 10.001 or 10.021B and 10.021C or 10.011.

Physical Optics: Extension of Physics I content on the nature of light, interference, diffraction, polarisation. *Geometrical Optics:* Reflection, refraction, thin lenses, lens systems, thick lenses, optical instruments. *Mechanical Optics and Optical Dispensing:* Manufacture and properties of spectacle lens materials. Optical properties of spherical, cylindrical, sphero-cylindrical, and prismatic spectacle lenses. Bifocal and multifocal lenses. Protective lenses. Frame measurements. Optical dispensing. Magnifying spectacles, and magnifying glasses. Lens aberrations and spectacle lens design. Lens measuring and lens testing instruments.

31.852 Visual Optics **S1 L3T1 S2 L2T1**

Prerequisites: 1.001 or 1.021, 10.001 or 10.021B and 10.021C or 10.011.

Optical Systems of the Eye: Schematic eye, reduced eye, emmetropia, spherical ametropia, astigmatic ametropia, correction of ametropia, elementary magnification effects, aphakia. Accommodation, presbyopia, correction of presbyopia. Accommodation and convergence. Aberrations of the eye. Phorias, measurement of phorias. Modulation transfer function. Gradient index optics.

31.853 Measurement of Light and Colour **S2 L1T1**

Prerequisite: Nil.

Sources of radiant energy, detection and measurement of radiant energy. Distribution temperature. Colour temperature. The eye as a photoreceptor. Luminous energy. Relative luminous efficacy. Photometric measures and units. Reflection and transmission of light. Spectrophotometry. Colour mixture. Colorimetric equations. Grassman's Laws. Geometrical representation of colour. Transformation of primaries. CIE System. CIE Standard Observers. Uniform colour space. Colour differences. Colour rendering. Correlated colour temperature. Colour order systems.

31.841 Clinical Optometry **F L1T15½**

Prerequisites: 31.861, 31.862, 31.863, 31.864.

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.

31.861 Optometry A **FL5½T½**

Prerequisites: 31.821, 31.851, 31.852, 31.853.

Refraction: Theory and practice of keratometry, aetiology of ametropia, objective and subjective refraction, prescribing special visual aids. *Orthoptics and binocular vision:* Convergence/accommodation anomalies, strabismus, amblyopia. *Contact lenses:* Corneal anatomy and physiology, contact lens design and manufacture, fitting techniques. *Low vision:* Examination of the low vision patient, selection of aids.

31.862 Diagnosis and Management of Ocular Disease **FL5T½**

Prerequisites: 31.821.

Microbiology: Cell structure, genetics, metabolism and classification of microbes. Special environments. Host-parasite relations. Introductory chemotherapy and immunology. Pathogenic micro-organisms and parasites. Viruses. *Pathology:* Acute inflammation, chronic inflammation, repair, regeneration, haemorrhage, thrombosis, embolism, ischaemia, infraction, hyperplasia, hypertophy, atrophy, metaplasia, neoplasia, carcinogenesis. *Diseases of the eye:* Aetiology, pathology, diagnosis, prognosis of diseases of the eyelids, cornea, conjunctiva, iris, ciliary body, choroid, retina, optic nerve, lacrimal apparatus, sclera, orbit, lens and vitreous. Glaucoma. Lesions of the visual pathways. Ocular manifestations of systemic disease. *Diagnostic examination:* History taking and symptomatology, internal and external examination, ophthalmoscopy, slit-lamp biomicroscopy, tonometry, gonioscopy, visual field examination, colour vision tests.

31.863 Theory of Spectacle Lenses and Optical Instruments **FL1½**

Prerequisite: 31.851, 31.852.

Advanced geometrical optics and spectacle lens design. Aberrations and their control. The elements of microscopic and macroscopic systems.

31.864 Clinical Methods **FT5**

Prerequisites: 31.821, 31.851, 31.852, 31.853. Co-requisites: 31.861, 31.862.

Practical assignments in ophthalmoloscopy, biomicroscopy, tonometry, gonioscopy, visual fields, colour vision tests, refraction, assessment of binocular vision, strabismus.

31.871 Optometry B **FL6**

Prerequisites: 31.861, 31.862, 31.863, 31.864.

Public Health Optometry: Visual task analysis, visual standards vision screening. Industrial hazards; identification assessment and prescription of protective measures. Ergonomics and visual ergonomics. Illuminating engineering. Fatigue and visual fatigue. Epidemiology. *Contact Lenses:* Materials. Fitting. Residual astigmatism. Care, maintainance and solutions. Continuing patient care. Extended wear and special applications. *Pharmacology and Drugs Used in Refraction:* Classification. Pharmaceutical aspects: administration, absorption, elimination, accumulation, sterilisation. Preservatives. Chemotherapy. Toxicity. Ocular drugs and complications. Mydriatics, Miotics, Cycloplegics, Anaesthetics, Staining agents and contact lens solutions. *Paediatric Optometry:* Visual and perceptual maturation. Juvenile ocular pathology. Clinical procedures. Vision screening. *Colour vision:* Normal and abnormal. Features and mechanisms. Genetics. *Advanced Physiological Optics and Optometry:* Current issues and research. *History of Optometry:* Development of optics, optometry and ophthalmology. *Legal aspects of Optometry. Projects.*

Biochemistry

41.101 Biochemistry — F L2½T3½

Prerequisites: 17.041, and 2.121 and 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 relationship between structure and function of enzymes, other proteins, hormones and biological membranes, metabolic networks and control mechanisms. The molecular mechanism of gene expression and protein synthesis. Photosynthesis. *Practical work* to amplify the lectures.

41.102A Biochemistry of Macromolecules — S1 L3T9

Prerequisites: 41.101, 2.102B.

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, 2.102B

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.

41.102E 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 •- and O-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 faculties.

For further information regarding the following subjects see the Faculty of Medicine Handbook.

80.112 Human Structure and Function 2

In conjunction with School of Anatomy and School of Physiology and Pharmacology.

81.002 Chemistry and Biochemistry for Medical Students

Biotechnology

42.101 Introduction to Biotechnology — S2 L2T4

Prerequisites: 2.121 and 2.131, or 2.141; 17.041; 10.011 or 10.001 or 10.021B and 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.

42.102C Microbial Genetics **S1 L2T4**

Prerequisites: 41.101 or 44.101. Excluded: 43.102.

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.

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.

Botany

43.111 Flowering Plants **S1 L2T4**

Prerequisites: 17.031 and 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 short field excursion is part of the subject.

43.131 Fungi and Man **S1 L2T4**

Prerequisites: 17.031 and 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.

The assessment, analysis and presentation of data for classifying organisms both at the specific and supra-specific level.

43.121 Environmental Physiology **S2 L2T4**

Prerequisites: 17.031, 17.041, 2.121 and 2.131, or 2.141.

How plants function in relation to the constraints imposed on them by soil and atmospheric environments. Includes: germination, growth and development, particularly photosynthesis, respiration, inorganic nutrition, water relations, transport processes and reproductive physiology. Important practical applications of various physiological mechanisms.

43.132 Mycology and Plant Pathology **S2 L2T4**

Prerequisite: 43.131.

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 and 17.041.

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.

43.152 Plant Community Ecology **S2 L2T4**

Prerequisites: 43.111 and 17.012 or 27.111.

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 is an integral part of this course.

43.172 Phycology and Marine Botany **S1 L2T4**

Prerequisite: 43.111.

The biology of freshwater, marine and soil algae with particular emphasis on the marine flora of SE Australia. Field work is part of the subject.

43.192 Ultrastructure **S2 L2T4**

Prerequisite: 43.111 or 43.121 or 41.101 or 44.101 or 45.201 or 45.301. Excluded: 43.182.

The impact of the study of ultrastructure in biological research and teaches techniques currently used in ultrastructural research. While covering the basic ultrastructure of prokaryotes and of eukaryote cells and organelles, emphasis also on areas where ultrastructural research is at present making an important contribution to understand ing 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, ultra-microtomy 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

These are subjects taught within courses offered by other faculties.

43.202 Botany for Landscape Architects **S1 L2T3**

Prerequisite: Nil.

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.

Microbiology

Level II Units

44.101 Introductory Microbiology **S1 L2T4**

Prerequisites: 17.031 and 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 1 **S2 L2T4**

Prerequisites: 44.101 and 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 humans), their industrial applications including manufacture, preservation and spoilage of food and dairy products. The nature of bacterial and fungal diseases of humans, their cultural and serological diagnosis, epidemiology, treatment and prevention will be discussed in some detail.

44.122 Immunology **S2 L2T4**

Prerequisites: 17.031 and 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 faculties.

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.

Zoology

Students are not 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.

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, χ^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 χ^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 **S1 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 and 10.001 or 10.011 or both 10.021B and 10.021C.

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 L3T3**

Prerequisites: 17.031 and 17.021, or 17.041.

A comparative study of the Chordata, with particular reference to the vertebrates, including morphology, systematics, evolution and natural history, with reference to selected aspects of physiology and reproduction. Practical work to supplement the lecture course. Field excursions as arranged.

45.302 Vertebrate Zoogeography and Evolution **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 humans. Field excursions as arranged.

45.402 Entomology **S1 L2T4**

Prerequisites: 17.031, 17.041, 45.201.

Classification, external morphology and internal anatomy of insects, studies on environmental sensory physiology and behaviour—especially reproductive behaviour, social organization, pheromones and rhythms. Practical work to illustrate the lectures.

45.422 Economic Zoology **S2 L2T4**

Prerequisite: 45.201 or 45.402.

A study of the biology, ecology and control of vertebrate and invertebrate animals which harm humans and their possessions. Human and domestic animal parasitology, pests on plants, diseases caused or spread by animals, chemical, biological and physical control, and side effects.

45.601 Introductory Genetics **S2 L2T4**

Prerequisites: 2.131 or 2.141, 17.031, 17.041. Excluded: 9.801.

Structure, function and organization of DNA in prokaryotyes and eukaryotes. Genetic bases of life cycles in prokaryotes and eukaryotes. Recombination in prokaryotes and eukaryotes. Genetic aspects of development. Gene control. Genetic engineering. Mutation, gene interaction and linkage analysis in prokaryotes and eukaryotes. Binomial Square Law and extensions. Effects of population size on levels of genetic variation. Selection in natural populations. Molecular evolution and levels of selection. Cytogenetics, gene mapping, levels of variation and selection in human populations.

Chemical Engineering and Industrial Chemistry

48.023 Chemical Engineering Science 1 **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 1:* 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 1:* A review of the fundamentals of FORTRAN, with extension to formating, dimensioned variables and sub-routines. Application to the solution of selected problems involving heat and mass balances, fluid flow and pumping.

48.024 Chemical Engineering Principles 1 **S1 L2T1 S2 L1T1**

Prerequisites: 1.001, 10.001.

The following topics, from 48.023: Flow of Fluids, Heat Transfer 1, Dimensions.

48.037 Chemical Engineering Science 2 **F L5T2**

Prerequisites: 2.102A, 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 2 (Theory):* An extension of the work covered in Heat Transfer 1, 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 2: 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 2 **S1 L3T1 S2 L1T1**

Prerequisite: 48.024.

The following topics, from 48.037; Mass Transfer (Theory), Heat Transfer 2 (Theory), Fluid-particle Systems, Surface Separation Processes.

48.403 Polymer Science **S1 or S2 L2T1**

Prerequisites: 2.102A, 2.102B, 10.031, 10.301. Co- or prerequisites: 48.001, 48.113.

Polymerization processes; stepgrowth and chain growth (free radical and ionic), stereospecific catalysts. Methods of polymerization: bulk suspension, emulsion, solution, high pressure. Industrial examples. Principles of analysis of polymers using chemical and instrumental methods. Molecular weight applied to macromolecules: number-, weight-, viscosity- and z-average weights. Molecular weight distribution. Thermodynamics of polymer solutions, theta solvent. Measurement of molecular weight. Fractionation methods. Conformation of a polymer chain. The crystalline state. The amorphous state. Stress/strain behaviour. Creep. Impact. Rubber elasticity. Dynamic mechanical properties. Principles of operation of polymer processing equipment; safety procedures. Polymer compound design.

Philosophy

Philosophy is a wide-ranging discipline, catering for a great diversity of interests, for instance, in science, reasoning, persons, and social issues, and encouraging critical and imaginative thought about the foundations of other subjects. Apart from providing considerable choices for students majoring in Philosophy, the diversity of Upper Level subjects makes it possible for students majoring in other disciplines to select subjects complementing their main interest.

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, and a student can gain Upper Level status in Philosophy (qualify to enrol in Upper Level subjects) by passing in only one. However, students enrolling in one will normally enrol in both, and students wishing to major in Philosophy must do so.

Value of Upper Level Subjects in Philosophy

With the exception of two which count as *full units*, all upper level subjects in Philosophy are *part units*, of which three together have the value of two full units; otherwise, each one counts as a half-unit.

Major in Philosophy

Students majoring in Philosophy must take the equivalent of two full Upper Level (II/III) units in Year 2, and the equivalent of 4 full Upper Level (II/III) units in Year 3.

Level II/III

Some Upper Level subjects deal with particular philosophical topics; others can be taken in sequence to give more sustained treatments of larger areas. Students may select freely among these, subject to stipulations regarding prerequisites. They are welcome to seek advice and further information from the School.

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.

52.103 Introductory Philosophy A **S1 L3T1 C6**

Prerequisites: Nil.

The general topic of Persons, with reference to some at least of the following: Freud's theory of mental processes; Sartre's account of human existence; the mind-body problem.

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 L3T1 C6**

Prerequisites: Nil.

Topics normally 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 **S2 L3 C6**

Neil Harpley, Barbara Roxon

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.

52.2001 The Nature of Mind **S1 L2 C4**

Dr Philip Cam

Prerequisite: Upper Level status in Philosophy.

A philosphical study of some conceptions of mind from Descartes to the present day, including: Descartes and Huxley on dualism and mechanism, James' naturalism, Freud's psychodynamics, Skinner's behaviourisms, Piaget's developmental psychology, neo-cognitivism.

52.2002 Contemporary Philosophy of Mind **S1 L2 C4**

Dr Philip Cam

Prerequisite: Upper Level status in Philosophy.

General introduction to current issues in the Philosophy of Mind: intentionality and the theory of intentional systems; computational models and their physical basis; the nature of mental representation; theories of consciousness; philosophy and artificial intelligence; the concept of a person; mechanism, freedom and responsibility.

52.2003 Issues in the Philosophy of Psychology **S2 L2 C4**

Dr Philip Cam

Prerequisite: Either 52.2001 or 52.2002.

Philosophical investigation of some theoretical issues in psychology and related sciences; folk theories and psychological science, behaviourism and its critics, some limits of cognitive psychology, relations between psychological and physiological explanation, the computer as a model of the mind, perceptions as hypotheses, the character and status of mental images.

52.2010 Reasoning Skills **S1 or S2 L2 C4**

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 L2 C4**

Ray Walters

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 L2 C4**

Ray Walters

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 L2 C4**

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. 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 L2 C4**

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 L2 C4**

Peter Gibbons

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 L2 C4**

Dr Stephen Cohen

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: Two short essays and an examination.

52.2060 Sartre **S1 L2 C4**

Barbara Roxon

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 L2 C4**

Neil Harpley

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 L2 C4**

Ray Walters

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 L2 C4**

Dr Stephen Cohen

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, possibly an examination.

52.2170 Hume **S1 L2 C4**

Neil Harpley

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 and free will.

Assessment: Essay and exercises or examination.

52.2220 The Ethics of Plato and Aristotle **S1 L2 C4**

Dr Stephen Cohen

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: Two short essays and an examination.

52.2230 Theories in Moral Philosophy **S2 L2 C4**

Dr Stephen Cohen

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: Two short essays and an examination.

52.2240 Philosophical Study of Woman **S1 L2 C4**

Neil Harpley, Barbara Roxon

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 L2 C4**

Peter Gibbons

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 L2 C4**

Ray Walters

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 **L2 C4**

Dr Stephen Cohen

Prerequisites: Upper Level status in Philosophy. Excluded: 52.513.

Not offered in 1987.

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 L2 C4**

Barbara Roxon

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 **S2 L2 C4**

Martin Bibby

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 L2 C4**

Peter Gibbons

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.

52.2980 Seminar A **S2 T2 C4**

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 C4**

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 T2 C4**

Excluded: 52.433.

As for 52.2980 Seminar A.

52.3020 Seminar C **S2 T2 C4**

Excluded: 52.443.

As for 52.2980 Seminar A.

52.3030 Reading Option B **S1 or S2 C4**

Excluded: 52.453.

As for 52.2990 Reading Option A.

Sociology

53.001 Introduction to Sociology **F 3CCH C12**

An introduction to a critical and reflexive sociology by examination of contemporary Australian society. *Major topics include:* Thinking about Australian society; political economy of Australian society; social movements, social philosophies and State responses; and culture and resistance. *Specific topics:* the analysis of every day life; social class; gender; political party formation; popular culture; media moral panics. Provides a sound basis for further studies in the social sciences.

Assessment: On the basis of performance in essays, written assignments, and tutorial classes.

Education

58.704 Theory of Education 3 **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.

58.714 Teaching Practice 3 **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 15 days and works in close association with a teacher.

58.734 Science Curriculum and Instruction 3 **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.

58.744 Mathematics Curriculum and Instruction 3 **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 3, 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 1 **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 2 **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 3 **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

Students undertaking subjects in History and Philosophy of Science are required to supplement the class contact hours by study in the Library.

Level I

62.110 Science, Technology and Social Change — S1 L2T1 C6

Dr D. P. Miller

Prerequisite: Nil.

Relations between science, technology and society which have evolved in the 20th century. **1.** Topics which illustrate the effects of scientific and technological development on society — especially those, such as pollution and unemployment, which are apparently unintended; and **2.** Selected theories which have been proposed to explain and evaluate the nature of technological change. Topics include: the use of pesticides; the implications of microprocessor technology; the development of nuclear energy and the debate about recombinant DNA research. Theories of Galbraith, Commoner, Dickson and others — particularly in relation to the question as to whether unintended consequences of scientific and technological development can be eliminated by 'technological fixes' or whether they are inevitable in modern industrial society.

Assessment: Essay (40 percent); tutorials (30 percent); class tests (30 percent).

62.111 Man, Megalith and Cosmos — S1 L2T1 C6

Dr G. A. Freeland

Prerequisite: Nil.

The roots of scientific thinking in antiquity, and the development of the central traditions which were to form the foundations of modern science, stressing origins of geometry, astronomy, astrology and cosmology. Emphasis on the interpretation of evidence from archaeology, particularly that relating to the megalithic cultures, and on the assessment of the relevance of anthropological studies, particularly of Australasia and the Pacific region. Topics include: evidence for archaeoastronomical interpretations of prehistoric sites; theories of the origins of geometry; inter-relationships of science and religion; traditional Pacific navigation; patterns of reasoning in early times, and in primitive cultures today; the evolution of mythology; cosmology and astronomy in mythology; the scientific and philosophical legacy of Greek science, particularly of Aristotle, Euclid and Ptolemy; a comparative study of the astronomy and cosmology of Mesopotamia, Egypt, Greece, America, etc; the background to the Copernican Revolution; the Von Daniken phenomenon; the mystery of the Dogons; an appraisal of astrology.

Assessment: 2 short essays (33⅓percent); 2 tests (33⅓ percent); tutorials (33⅓ percent).

62.211 The Seventeenth Century Intellectual Revolution — S2 L2T1 C6

A/Professor D. R. Oldroyd

Prerequisite: Nil.

The intellectual revolution, centred upon science of the 17th and early 18th centuries, which led on to the Enlightenment. The Mediaeval and Renaissance background. Bacon and Baconianism; empiricism; experimentation and the virtuosi; the idea of progress. The mechanization of the world picture; Descartes and Cartesianism; rationalism; the revival of atomism, materialism. The Copernican Revolution. Locke. Hobbes.

Assessment: Essay (40 percent), tutorials (30 percent); examination (30 percent).

Level II/III

62.022 Materials, Machines and Men — SS L2T1 C6

Prerequisite: Completion of Arts subjects carrying at least 24 credit points, or a Pass in four Level I Science units. Excluded: 26.564, 26.251, 62.253.

Not offered in 1987.

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: Tutorial paper (30 percent); performance in class (40 percent); class test (10 percent); examination (20 percent).

62.032 The Scientific Theory — S2 L2T1 C6

A/Professor W. R. Albury

Prerequisite: As for 62.022. Excluded: 62.505, 62.232.

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).

62.052 Scientific Knowledge and Political Power **S1 L2T1 C6**

Mr G. H. Bindon

Prerequisite: As for 62.022. Excluded: 62.252.

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 C6**

Mr G. H. Bindon

Prerequisite: As for 62.022. Excluded: 62.262.

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.

Assessment: Essays and tutorial work.

62.072 Historical Origins of the American Scientific Estate **S1 L2T1 C6**

Dr D. P. Miller

Prerequisite: As for 62.022. Excluded: 62.272.

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).

62.082 Science, Technology and Developing Countries **S1 L2T1 C6**

Mr G. H. Bindon

Prerequisite: As for 62.022. Excluded: 62.282.

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 periphery 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 C6**

Dr G.A. Freeland

Prerequisite: As for 62.022. Excluded: 62.223.

The history of time, from the Ancient World through the Twentieth Century. The principal strands studied are: clocks and other instruments for the measurement of time, civil and religious calendars, concepts of time, philosophy and theology of time, conceptions of history and of progress, the cognition of time, the age of the Earth and the antiquity of humanity, time and the development of modern science. Throughout, attention will be paid to the historical context within which specific episodes and developments occurred and to cultural consequences of changes in the cognition of time.

Assessment: 2 essays (30 percent each); tutorials (20 percent); class tests (20 percent).

62.104 The Darwinian Revolution **S2 L1T1 C6**

A/Professor D. R. Oldroyd

Prerequisite: As for 62.022. Excluded: 62.243.

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: Examination (30 percent); tutorial exercises (40 percent); essay (30 percent).

62.106 Mind, Mechanism and Life — S1 L2T1 C6

Dr P. Slezak

Prerequisite: As for 62.022. Excluded: 62.302.

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).

62.109 The History of Medical Theory and Practice — S1 L2T1 C6

A/Professor W. R. Albury

Prerequisite: As for 62.022. Excluded: 62.273, 62.309, 26.568, 26.2506.

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 examination.

62.241 Relations Between Science and the Arts — SS L2T1 C6

Prerequisite: As for 62.022.

Not offered in 1987.

The relationships between science, literature, painting and music in the history of Western culture. 'Art' and 'Science' in the ancient world. Pythagoreanism and its cultural influences. Science, painting and architecture in the Renaissance. The Scientific Revolution and its influences on English literature. Optical theories of Newton and Goethe and their effect on literature and painting. Science, philosophy, technology and their influence on painting, literature and music in the 19th and 20th centuries. Creativity in science and the arts. Scientific and humanistic cultures in the modern world. The 'two-cultures' debate.

Assessment: Tutorial exercises (40 percent); essay (30 percent); examination (30 percent).

62.245 The New Biotechnologies and Their Social Context — S2 L2T1 C6

Dr D. Bartels

Prerequisite: 62.110 or by permission of the Head of School for Biological Sciences students in Years 3 and 4.

The social implications of the new biotechnologies, including recombinant DNA techniques, genetic manipulation of animals and test tube babies. The present achievements and likely future developments of the new genetic and reproductive technologies, together with detailed discussions of the social, ethical and political implications of these developments. *Topics include;* the debate on the safety of genetic engineering; *in vitro* fertilization and related reproductive technologies; the ethics of human genetic engineering; university-industry interactions in biotechnology; the release into the environment of engineered organisms; mechanisms for public participation in the control of biotechnology.

62.246 Technological Development in 20th Century Australia — S2 L2T1 C6

Ms J. Buckley-Moran

Prerequisite: 62.110.

The historical development of technology in Australia during the 20th century, with an analytic focus on three key dimensions: linkages between scientific research, industrial development and economic growth, technological change and its impact on Australian society: the distinctive features of Australia's geopolitical situation. *Topics include:* The origin, expansion and transformation of the CSIRO, the maturation and professionalization of the Australian research community; the politicization of science and the post-war legacy; the failure of Australian research to serve an industrialized economy; science policy and technological change in the 1970s and 1980s; comparison with the Canadian situation and the experience of newly industrializing countries.

62.285 Man, Woman and Deity — SS L2T1 C6

Prerequisite: As for 62.022.

Not offered in 1987.

Conceptions of deity, from earliest times to the present, in relation to changing notions of sexuality and generation; the place of human beings in relation to their environment and the cosmos; the roles of the sexes within different cultures. Topics: Archaeological evidence for early ideas concerning generation and for the relations of man to the cosmos; the Earth Mother Goddess; biology, religion and mythology; feng-shui and geomancy; the symbolism of city, temple and dwelling; religion, sexuality and generation in ancient civilizations and primitive societies, with special reference to the Australian Aborigines; the Medieval and Renaissance world views; the tyranny of the machine; conservation and stewardship in the Middle Ages; the *cultus* of the Virgin Mary in relation to scientific and social change; theories of biological generation; concepts of Deity and Nature in relation to science and the environmentalist movement; the Gaia hypothesis.

Assessment: 1 essay (33⅓ percent); 2 tests (33⅓ percent); tutorials (33⅓ percent).

62.551 The Arch of Knowledge: History of the Philosophy and Methodology of Science to 1800 **S2 L2T1 C6**

A/Professor D. R. Oldroyd

Prerequisite: As for 62.022. Excluded: 62.561.

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.

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 **SS L2T1 C6**

Prerequisite: 62.551 or by permission of the Head of School. Excluded: 62.543, 62.562.

Not offered in 1987.

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.

Assessment: 2 essays (50 percent); 2 seminar presentations (50 percent).

62.554 Computers, Brains and Minds: Foundations of the Cognitive Sciences **S2 L2T1 C6**

Dr P. Slezak

Prerequisite: As for 62.022. Excluded: 52.564.

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 neuro-sciences, 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).

62.570 Language and Mind: The Impact of Chomsky's Revolution **S1 L2T1 C6**

Dr P. Slezak

Prerequisites: As for 62.022

Chomsky's theories of language and mind which have revolutionised linguistics, psychology and philosophy. History of linguistics and psychology, especially the Behaviourist approach of Skinner. Chomsky's impact on traditional philosophical debate between Rationalists and Empiricists concerning innate ideas.

Level III

62.105 Research Methods in History and Philosophy of Science **S1 T2 C6**

Dr D. Bartels

Arts prerequisite: Completion of Arts or other approved subjects, carrying at least 72 credit points; including at least 12 credit points gained in HPS subjects completed with an average grade of Credit or better. For approved subjects see under Summary of Subjects, History and Philosophy of Science. Excluded: 62.520.

Sciences prerequisite: 4 HPS subjects with an average of Credit or better or by permission of the Head of School. Excluded: 62.520.

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.

62.3001 Philosphical Problems in Evolutionary Biology **S2 L2 C4**

A/Professor D. R. Oldroyd

Arts prerequisite: Completion of Arts or other approved subjects, carrying at least 72 credit points. Co-requisite: 62.032 or 62.104. Sciences prerequisites: Third year standing. Co-requisite: 62.032 or 62.104.

Current controversies in evolutionary theory, with consideration of topics such as essentialism and population thinking, falsifiability of the principle of natural selection, the group selection controversy, sociobiology, problems in classification and cladism, the neutral theory of evolution and the role of chance, punctuated equilibrium theory, the origin of life, neo-Lamarckism, and creationism.

62.3005 Issues in the Philosophy of Science **S2 L2 C4**

Dr P. Slezak

Prerequisite: As for 62.105.

Selected topics in contemporary philosophy of science chosen from among the following: Scientific Laws, Theories and Explanations, Observation, Evidence, Confirmation, Induction, Models and Metaphors, Realism and Instrumentalism, Verification and Falsification, Scientific Discovery and Scientific Revolutions, Theoretical Reduction, Methodological Problems of Social Sciences, Teleological and Purposive Explanation, Rationality and Scientific Method, Science and Pseudo-Science Demarcation.

Level IV Honours Programs

62.014 History and Philosophy of Science Honours

Prerequisite: Completion of years 1-3 of program 6200, with marks that result in an average of Credit or better in the eight HPS units included in that program.

Candidates are required to undertake an advanced program of study in the intellectual history and/or philosophy of science. The program includes 62.105 (unless this unit has previously been completed), a seminar in Advanced Philosophy of Science, the presentation of a thesis, and such other course work as may be 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

Prerequisite: Completion of years 1-3 of program 6200 (including 62.052, 62.062, 62.072 and 62.082), with marks that result in an average of Credit or better in the eight HPS units included in that program.

Candidates are required to undertake an advanced program of study in the social history of science and/or sociology of science and/or science policy. The program includes 62.105 (unless this unit has previously been completed), a seminar in Advanced Social Studies of Science, the presentation of a thesis, and such other course work as may be 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.

Board of Studies in Science and Mathematics

68.302 Introductory Marine Science **S2 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.

The physical properties and motions 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 0600, 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 0100, made by arrangement with the Heads of the two Schools.

68.601 Genetics of Behaviour 1 **S2 L2T3**

Prerequisite: 17.031. Excluded: 79.402.

Introductory behaviour genetics with most examples coming from human genetics. Single gene, polygene and chromosomal genetics which illuminate normal and abnormal behaviour; mathematical treatment of data; non-human mammalian behaviour. Practical classes and limited clinical contact.

68.602 Genetics of Behaviour 2 **S2 L2T3**

Prerequisite: 68.601 or 79.402. Excluded: 79.403.

The topics of 68.601 at a more advanced level. Continued emphasis on human behaviour with essential consideration of microbial and invertebrate studies. Extended mathematical treatment of data. Projects involving community contact replace some of the practical sessions.

Anatomy

70.011A Histology 1 — F L1T2

Prerequisites: 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). 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. One lecture per week followed by a 2-hour practical-tutorial class.

70.011B Mammalian Embryology — F L1T2

Co-requisite: 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 fetus. Characteristics of external form. Teratology. Human organogenesis. 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.

70.012B Visceral Anatomy — S2 L2T4

Prerequisite: 70.011C.

The topographical and cross-sectional anatomy of the great visceral systems — gastrointestinal, respiratory, cardiovascular, and genitourinary. Clinical, living and radiological anatomy.

70.012C Neuroanatomy 1 — 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 4 — F

Prerequisite: Completion of the first three years of any Science program with a major in Anatomy (see Table 3 of Combined Sciences Handbook).

An honours program consisting of the preparation of an undergraduate thesis and participation in School seminars.

70.304 Histology 2 — S2 L2T4

Prerequisite: 70.011A. Excluded: 70.3041. (If 70.304 is taken after 70.3041, total counts only 1 unit.)

May not be offered in 1987.

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 either 41.101 or 45.301 or 70.011A. Excluded: 70.304.

Practical histological procedures: fixation, section preparation, staining. Microscopy. Theoretical, practical and applied histochemistry.

70.305 Neuroanatomy 2 — S2 L1T2

Prerequisite: 70.012C.

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 1 — S1 L2T4

Prerequisite: 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 study of musculoskeletal components of head and neck and upper limb. Emphasis on modern analytical techniques and findings. Tutorials include limb and joint dissections plus study of surface and radiological anatomy.

70.307 Functional Anatomy 2 — S2 L2T4

Prerequisite: 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

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. Coverage of the processes of healing and regeneration with specific reference to healing of skin wounds and the healing of fractures. Aberrations of cell growth 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. Correlation of pathological processes with development of specific clinical syndromes.

Physiology and Pharmacology

73.111 Physiology 1A **F L2T4**

Prerequisites: 17.031 & 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 principles, 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 1B **F L2T4**

Prerequisites: As for Physiology 1A except that 2.131 may be accepted as a co-requisite. Excluded: 73.111.

Covers the same general areas of physiology as Physiology 1A but in less detail and with less intensive practical courses. Physiology 1B may be taken by students not intending to study physiology at Level III.

73.011A Principles of Physiology (Optometry) **F L2T4**

Prerequisites: As for Physiology 1A except that 2.131 may be accepted as a co-requisite. Excluded: 73.111.

Covers the same general areas of physiology as Physiology 1A 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 2 **F L4T8**

Prerequisites: 73.111, 41.101, 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 T3**

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 2. 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 3 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**

Prerequisite: 73.111 or 73.121. Co-requisites: 73.012 or 41.102A & 41.102B or two Level III Chemistry units.

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.

73.023 Honours

Honours 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 or she wishes to work from those being studied in the School. Within this research area the student is given a specific project by the supervisor.

Community Medicine

79.201 Population Genetics **S1 L2T3**

Prerequisite: one unit of statistical methods, or theory, as approved by the Head of School.

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 Human Genetic Analysis **S2 L2T3**

Prerequisites: one unit of genetics and one unit of statistical methods, or theory, as approved by the Head of School.

Principles and methods of human genetics: 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**

Prerequisites: 41.101, 43.101.

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

80.014 Human Behaviour **F L3**

Prerequisites: No formal prerequisites. Students may take the subject in Year 2 or Year 3 of Course 3820.

As for 80.012.

Graduate Study:
Faculty of Biological Sciences
Faculty of Science

Faculty of Biological Sciences and Faculty of Science Enrolment Procedures

All students re-enrolling in 1986 or enrolling in graduate courses should obtain a copy of the free booklet *Enrolment Procedures 1986* 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 4 (Thesis)
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

5014
Biochemical Engineering Graduate Diploma Course

Graduate Diploma
GradDip

The Department 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

5015
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 1		6

Master of Science (Biotechnology)

The Department 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 supervized 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.

8041
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
Dr K. R. Llewellyn
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;

2. completion of a research thesis or research project in the Honours fourth year;

and

3. 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, supervized 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 supervized 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			
12.230G	Developmental Disabilities and Disorders	3	3
12.231G	Professional Practice: 250 hours		
12.237G	Biological and Environmental Bases of Behavioural Disturbance	2	2
12.239G	Research and Evaluation Methods	2	

Year 1 subjects continued overleaf

		Hpw S1	S2
12.241G	Graduate Colloquium	1	1
12.242G	Research Thesis*		
12.243G	Experimental Clinical Psychology	5	5
12.244G	Psychological Assessment	2	2
12.249G	Child Clinical Psychology	2	
12.250G	Psychological Assessment 1	3	
12.251G	Human Neuropsychology		3
12.245G	Behavioural Health Management	2	2
Year 2			
Full Year			
12.230G	Developmental Disabilities and Disorders	3	
12.231G	Professional Practice: 180 hours in Session 1 250 hours in Session 2		
12.235G	Community Psychology	3	
12.240G	Graduate and Clinical Seminars	2	2
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)

		Hours per week S1	S2
Year 1			
12.230G	Developmental Disabilities and Disorders		3
12.231G	Professional Practice: 250 hours		
12.237G	Biological and Environmental Bases of Behavioural Disturbance	2	2
12.239G	Research and Evaluation Methods	2	
12.240G	Graduate and Clinical Seminars	2	2
12.241G	Graduate Colloquium	1	1
12.243G	Experimental Clinical Psychology	5	5
12.244G	Psychological Assessment	2	2
12.245G	Behavioural Health Management	2	2
12.249G	Child Clinical Psychology	2	
12.250G	Psychological Assessment 1	3	
12.251G	Human Neuropsychology		3
Year 2			
12.231G	Professional Practice: 430 hours		
12.235G	Community Psychology	3	
12.241G	Graduate Colloquium	1	
12.243G	Experimental Clinical 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 Graduate Diploma in Food and Drug Analysis
School of Mathematics	Master of Mathematics 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 P. J. Derrick
Executive Assistant to Head of School
Dr D. S. Alderdice

8770
Master of Chemistry Graduate Course

Master of Chemistry
MChem

Three programs are available, emphasizing 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 1
(2) Treatment of Analytical Data
(3) Instrumental Techniques in Food and Drug Analysis
(4) Food and Drugs 2
(5) Toxicology, Occupotional and Public Health
(6) Introductory Microbiology

The lecture time for the whole course is 160 hours. An additional 392 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 1	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 2	4
2.251G	Toxicology, Occupational and Public Health	4
44.101	Introductory Microbiology	3†
		11

*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
Associate Professor W. R. Albury

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:

62.709G	The Scientific Community
62.710G	Science, Philosophy and Social Values
62.714G	Knowledge, Power and Public Policy
62.718G	Science in National Cultures: Comparative Historical Perspectives
62.719G	Science Policy: The International Dimension
62.720G	Philosophy of Science and the Sociology of Knowledge
62.721G	Science, Politics and the Media
15.716G	Science, Technology and Economic Development
26.568G	Technology and Alternative Development
30.960G	Technology and Organisations
53.576G	Social and Technological Forecasting (2 units)
53.571G	Technology and Working Life

Selected candidates may undertake a third-year MScSoc honours degree program of advanced study which includes a dissertation based on supervized research into particular aspects of the relationships between science and technology and science and its institutions.

*2 units.

Mathematics

Head of School
Professor I. Sloan

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 supervized 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 supervized 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 1	2
10.383G	Stochastic Processes	2
10.385G	Multivariate Analysis 1	2
10.390G	Statistical Inference	2
10.392G	Project	2
Elective Subjects		
10.382G	Experimental Design 2	2
10.384G	Time Series	2
10.386G	Multivariate Analysis 2	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 **2.** Advanced Contact Lens Practice **3.** Clinical Photography
Occupational Optometry	**1.** Occupational Optometry **2.** Pleorthoptics and Binocular Vision **3.** Advanced Physiological Optics
Orthoptics	**1.** Pleorthoptics and Binocular Vision **2.** Clinical Photography

Physics

Head of School
Associate Professor J. C. Kelly

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.

Graduate Study:

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 the entry for 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, but which session taught is not known at time of publication)
- CCH (class contact hours)
- L (Lecture, followed by hours per week)
- T (Laboratory/Tutorial, followed by hours per week)
- hpw (hours per week)
- C (Credit *or* Credit units)
- CR (Credit Level)
- DN (Distinction Level)

	School, Department etc *Subjects also offered for courses in this handbook	Faculty	Page
1	**School of Physics**	**Science**	**186**
2	**School of Chemistry**	**Science**	**186**
4	School of Materials Science and Engineering	Applied Science	
5	School of Mechanical and Industrial Engineering	Engineering	
6	School of Electrical Engineering and Computer Science	Engineering	
7	School of Mines (Mineral Processing and Extractive Metallurgy and Mining Engineering)	Applied Science	
8	School of Civil Engineering	Engineering	
9	School of Fibre Science and Technology (Wool Science)	Applied Science	
10	**School of Mathematics**	**Science**	**187**
11	School of Architecture	Architecture	
12	**School of Psychology**	**Biological Sciences**	**189**
13	School of Fibre Science and Technology (Textile Technology)	Applied Science	
14	School of Accountancy	Commerce	
15	School of Economics*	Commerce	190
16	School of Health Administration	Professional Studies	
17	**Biological Sciences**	**Biological Sciences**	
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 Mines (Applied Geology)	Applied Science	
26	Department of General Studies	Board of Studies in General Education	
27	School of Geography	Applied Science	
28	School of Marketing	Commerce	
29	School of Surveying	Engineering	
30	Organizational Behaviour*	Commerce	190
31	**School of Optometry**	**Science**	**190**
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 Biological Technologies (Food Science)	Applied Science	
39	Graduate School of the Built Environment	Architecture	
40	Professorial Board		
41	**School of Biochemistry**	**Biological Sciences**	

	School, Department etc *Subjects also offered for courses in this handbook	Faculty	Page
42	School of Biological Technologies (Biotechnology)*	Applied Sciences	191
43	**School of Botany**	**Biological Sciences**	
44	**School of Microbiology**	**Biological Sciences**	**192**
45	**School of Zoology**	**Biological Sciences**	**192**
46	Faculty of Applied Science	Applied Science	
47	Faculty of Engineering (Safety Science)	Engineering	
48	School of Chemical Engineering and Industrial Chemistry*	Applied Science	193
50	School of English	Arts	
51	School of History	Arts	
52	School of Philosophy	Arts	
53	School of Sociology*	Arts	193
54	School of Political Science	Arts	
55	School of Librarianship	Professional Studies	
56	School of French	Arts	
57	School of Theatre Studies	Arts	
58	School of Education	Professional Studies	
59	Department of Russian	Arts	
60	Faculty of Arts	Arts	
61	Department of Music	Arts	
62	School of History and Philosophy of Science*	Arts	193
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**	**194**
68	**Board of Studies in Science and Mathematics**	**Board of Studies in Science and Mathematics**	
70	School of Anatomy	Medicine	
71	School of Medicine	Medicine	
72	School of Pathology	Medicine	194
73	School of Physiology and Pharmacology*	Medicine	
74	School of Surgery	Medicine	
75	School of Obstetrics and Gynaecology	Medicine	
76	School of Paediatrics	Medicine	
77	School of Psychiatry	Medicine	
78	School of Medical Education	Medicine	
79	School of Community Medicine	Medicine	
80	Faculty of Medicine	Medicine	
81	Medicine/Science/Biological Sciences	Medicine	
85	Australian Graduate School of Management	AGSM	
90	Faculty of Law	Law	

Physics

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.

Response functions and Green's functions. Symmetry and group theory. Many particle systems. Tensor calculus and variational techniques.

1.128G Methods of Experimental Physics

For PhD degree, MSc and MPhysics degree course students.

Signal processing and retrieval. Resonance spectroscopy techniques. Diffraction and scattering techniques. 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

These are subjects taught within courses offered by other faculties.

For further information regarding the following subject see the Faculty of Architecture handbook.

1.927G Acoustic Theory — S2 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

2.231G Food and Drugs 1 — F L1T3
and
2.242G Food and Drugs 2 — F L1T3

These two units contain common subject material but are subdivided to enable them to be taken over one or 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.

2.251G Toxicology, Occupational and Public Health — F L1T3

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, fluorescence 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 techniques.

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.*

Mathematics

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; advances numerical analysis; theory of functions; finite mathematics; number theory; logic; theoretical astrophysics; history of mathematics; recent advances 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 randomization; 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 randomized 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 1

Modified designs for fixed effects models. Incomplete and balanced incomplete block designs. Confounding and fractional replication. Randomization theory. Multiple comparisons.

10.382G Experimental Design 2

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 1

Likelihood ratio tests for means, variances and structure. Discriminant, principal component, canonical and factor analysis.

10.386G Multivariate Analysis 2

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 faculties.

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 distribution 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 **SS L2½T1½ 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

12.230G Developmental Disabilities and Disorders

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

A range of basic theoretical issues, community problems and intervention strategies using recent concepts in behavioural community psychology as a framework. Development of community psychology and relationships with other areas of psychology and other disciplines, theoretical systems and models, factors related to community problems, values and intervention, intervention strategies at different systems levels, prevention, health promotion, institutional change, service delivery systems, needs assessment, planning and evaluation or programmes, and psychologists' current and likely future roles in the community.

12.237G Biological and Environmental Bases 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

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 standards 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

A research thesis involving an investigation into some aspect of clinical or community psychology.

12.243G Experimental Clinical Psychology

The theoretical basis of clinical practice in individual, group, institutional, and community settings. The application of the principles of experimental psychology to the analysis of both adaptive and maladaptive patterns of behaviour. The study of a wide range of techniques of behavioural intervention.

12.244G Psychological and Behavioural Assessment

Prerequisite: 12.250G.

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 supervized 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.

12.249G Child Clinical Psychology

Description, assessment and treatment of child psychopathology. Role of environmental factors in maintenance of maladaptive behaviour, practical implications for assessment and treatment. Theoretical bases of behavioural, cognitive, medical and family treatment approaches.

12.250G Psychological Assessment

A theoretical basis, background information and practical skills in methods of assessment typically used in clinical psychology. Theory and research on interviewing, introduction to DSM III, clinical assessment interviewing, assessment of intellectual functioning (including in children), test access and use and computerised testing, neuropsychological and organicity assessment, personality assessment and its clinical use, assessment and goal attainment scaling, and ethical, legal and professional issues.

12.251G Human Neuropsychology

Neural bases of human behaviour, with particular emphasis on clinical applications. Issues in assessment and rehabilitation, functional analysis of each cerebral lobe, and particular disorders such as the dementias and aphasias.

Economics

15.001 Microeconomics 1 **S1 or S2 L2T1½**

Commerce/Arts/Applied Science/Sciences prerequisite:

	HSC minimum mark required
2 unit English (General) or	*60*
2 unit English or	*53*
3 unit English	*1*

Economics as a social science, the central role of scarcity and opportunity cost. Australian industrial structure. Efficiency concepts. Relative prices and their change through time. Demand, revenue and elasticity. Theory of exchange. Property rights, externalities and distortions. Gains from specialization and international trade. Marginal productivity, input demand. The price taking firm, profit maximization in short and long run. Taxation, protection, stabilization of markets. Imperfect markets, competition policy. Investment decisions and economic growth.

Organizational Behaviour

30.960G Technological Change and Organizational Participation **S1 and S2 L3**

Prerequisite: 30.942G or 14.956G.

The complex relationships between technological change and organizational participation in societies using advanced technology, with particular reference to Australia, California, Japan, Germany and the Nordic nations. Key issues include: the relationship between technological change and sociotechnical systems, skill formation, organizational learning, industrial relations, humanization of work, organizational equity, participation, and power.

Optometry

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 people-machine systems. Information theory, channel capacity. Visual aspects of people-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

Biotechnology

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, O-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 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 microorganism 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 T2**

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 T7**

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.

Microbiology

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

45.900G Ecological Studies in Arid Lands Management **S2 L2T4**

Prerequisite: Degree with background in bioscience or 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

48.283G Bioprocess Unit Operations and Equipment Design

Prerequisite or co-requisite: 48.284G or equivalent.

Engineering design and operating characteristics of plant and processes normally used, eg sterilization and air purification, dehydration drying at reduced pressure, reduced temperature preservation, radiation, product isolation, sedimentation, filtration, centrifugation, extraction, absorption, chromatography and ion exchange, absorption with reaction, electrophoresis and dialysis, aseptic design, materials of construction, effluent disposal.

48.284G Heat, Mass and Momentum Transport

A bridging subject designed to provide an introductory understanding of the mechanisms of transport processes. This subject would not be offered to a graduate with a background in chemical engineering principles. Mechanisms of molecular and turbulent transport. Heat, mass and momentum transport as rate processes. Boundary layer theory. Lift and drag coefficients. Introduction to non-Newtonian flow.

Sociology

Graduate Study

53.309G Social and Technological Forecasting

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. The course examines a number of commonly held views about the future and their connection with theories about relations between science, technology and society.

53.571G Technology and Working Life

Dr Judy Wajcman

Technology as a social and political phenomenon. Responses to technology both in the present (eg the microprocessor, nuclear energy debates) and in the past (eg Luddism). The way particular schools of social theory have conceived of technology: Marx, Weber, Frankfurt school and other relevant theoretical perspectives. Other topics include: microelectronic technology and the labour process; nuclear energy; technology and sexism; weapons technology; and alternative technology.

History and Philosophy of Science

62.709G The Scientific Community

A 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 extenal 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

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 judgements. 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. The social responsibility in science movement and its problems.

62.713G Project

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

An introduction to the relationship between science and politics in the 20th century; the nature and consequences of government support for research and development; the freedom *vs* planning debate in science policy, decision-making frameworks and the attempts to establish criteria of choice in a no-growth situation; science and technology policy — international perspectives.

62.716G Science and Society in the 20th Century

The key issues raised by the interaction between science and society in the 20th century. The subject 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.* Fundamental concepts concerning the imperatives of technology, the technostructure, 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, stressing the role of science and technology.

3. *Technology and Social Change.* A case study of the social impact of (1) energy technologies on Australia and/or the developing world; or (2) 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 (1) scientific change and progress; (2) scienfitic community relations, and (3) science, ideology and responsibility. **5.** *The Philosophy of Science.* Contemporary issues in the philosophical analysis of science. Stress on (1) the dynamics of conceptual change; (2) theories of progress; (3) models of scientific reasoning and method; and (4) external relations of scientific theory and practice. **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

Historical and contemporary aspects of the comparative development of scientific institutions and research styles in different national contexts. Other themes: 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.

62.719G Science Policy: The International Dimension

A detailed consideration of the justification for, and the arguments against government intervention in systems of research and development. Theoretical discussions of this problem are given concrete focus by appraisals of the policy machinery evolved in various developed countries, including the United States, Great Britain, Australia, Canada, France, West Germany, Holland and Israel.

62.720G Philosophy of Science and the Sociology of Knowledge

Recent philosophical and sociological theories concerning the nature of scientific knowledge and the role which social conditions play in its production and acceptance. Topics include: post-Kuhnian philosophies of science; neo-Marxist theories of science and ideology; the 'strong program' for the sociology of knowledge; 'field' theories and the analysis of power relations in science; and epistemological problems raised by commercial and governmental direction of scientific research.

Faculty of Science

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.

Physiology and Pharmacology

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 the award of 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 or she 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 the award of a MSc or PhD degree may also be undertaken by selected students.

Graduate Study

Conditions for the Award of Higher Degrees

First Degrees

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

For the list of undergraduate courses and degrees offered see **Disciplines of the University: Faculty (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.

Title	Abbreviation	Calendar/Handbook
Doctor of Science	DSc	Calendar
Doctor of Letters	DLitt	Calendar
Doctor of Laws	LLD	Calendar
Doctor of Medicine	MD	Calendar Medicine
Doctor of Philosophy	**PhD**	Calendar **and all handbooks**
Master of Applied Science	MAppSc	Applied Science
Master of Architectural Design	MArchDes	Architecture
Master of Architecture	MArch	Architecture
Master of Archives Administration	MArchivAdmin	Professional Studies

Higher Degrees (continued)

Title	Abbreviation	Calendar/Handbook
Master of Arts	MA	Arts Military Studies
Master of Biomedical Engineering	MBiomedE	Engineering
Master of Building	MBuild	Architecture
Master of the Built Environment 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 Master of Engineering *without supervision*	ME	Applied Science Engineering Military Studies
Master of Engineering Science	MEngSc	Engineering 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 Music	MMus	Arts
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 Safety Science	MSafetySc	Engineering
Master of Science **Master of Science** *without supervision*	**MSc**	Applied Science Architecture Engineering Medicine Military Studies **Sciences*§**
Master of Science (Acoustics)	MSc(Acoustics)	Architecture

Title	Abbreviation	Calendar/Handbook	
Master of Science and Society	MScSoc	Sciences*	**Higher Degrees (continued)**
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 Science and Society	MScSoc	Sciences*	
Master of Social Work	MSW	Professional Studies	
Master of Statistics	MStats	Sciences*	
Master of Surgery	MS	Medicine	
Master of Surveying Master of Surveying *without supervision*	MSurv	Engineering	
Master of Surveying Science	MSurvSc	Engineering	
Master of Town Planning	MTP	Architecture	
Master of Welfare Policy	MWP	Professional Studies	
Graduate Diploma	GradDip	Applied Science Architecture Engineering Sciences*§	**Graduate Diplomas**
	DipPaed	Medicine	
	DipEd	Professional Studies	
	DiplM-ArchivAdmin DiplM-Lib		
	DipFDA	Sciences*	

*Faculty of Science.
§Faculty of Biological Sciences.

Higher Degrees

Doctor of Philosophy (PhD)

1. The degree of Doctor of Philosophy may be awarded by the Council on the recommendation of the Higher Degree Committee of the appropriate faculty or board (hereinafter referred to as the Committee) to a candidate who has made an original and significant contribution to knowledge.

Qualifications

2. (1) A candidate for the degree shall have been awarded an appropriate degree of Bachelor with Honours from the University of New South Wales or a qualification considered equivalent from another university or tertiary institution at a level acceptable to the Committee.

(2) In exceptional cases an applicant who submits evidence of such other academic and professional qualifications as may be approved by the Committee may be permitted to enrol for the degree.

(3) If the Committee is not satisfied with the qualifications submitted by an applicant the Committee may require the applicant to undergo such assessment or carry out such work as the Committee may prescribe, before permitting enrolment as a candidate for the degree.

Enrolment and Progression

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

(2) In every case, before permitting a candidate to enrol, the head of the school* in which the candidate intends to enrol shall be satisfied that adequate supervision and facilities are available.

(3) An approved candidate shall be enrolled in one of the following categories:
(a) full-time attendance at the University;
(b) part-time attendance at the University.

(4) A full-time candidate shall be fully engaged in advanced study and research except that the candidate may undertake not more than five hours per week or a total of 240 hours per year on work which is not related to the advanced study and research.

(5) Before permitting a part-time candidate to enrol, the Committee shall be satisfied that the candidate can devote at least 20 hours each week to advanced study and research for the degree which (subject to (8)) shall include regular attendance at the school* on an average of at least one day per week for 48 weeks each year.

(6) A candidate shall be required to undertake an original investigation on an approved topic. The candidate may also be required to undergo such assessment and perform such other work as may be prescribed by the Committee.

(7) The work shall be carried out under the direction of a supervisor appointed from the full-time academic members of the University staff.

(8) The work, other than field work, shall be carried out in a school* of the University except that the Committee:

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

(b) may permit a candidate to conduct the work at other places where special facilities not possessed by the University may be available provided the direction of the work remains wholly under the control of the supervisor;

(c) may permit a full-time candidate, who has been enrolled as a full-time candidate for at least six academic sessions, who has completed the research work and who is writing the thesis, to transfer to part-time candidature provided the candidate devotes at least 20 hours each week to work for the degree and maintains adequate contact with the supervisor.

(9) The progress of a candidate shall be reviewed annually by the Committee following a report by the candidate, the supervisor and the head of the school* in which the candidate is enrolled and as a result of such review the Committee may cancel enrolment or take such other action as it considers appropriate.

(10) No candidate shall be awarded the degree until the lapse of six academic sessions from the date of enrolment in the case of a full-time candidate or eight academic sessions in the case of a part-time candidate. In the case of a candidate who has had previous research experience the committee may approve remission of up to two sessions for a full-time candidate and four sessions for a part-time candidate.

(11) A full-time candidate for the degree shall present for examination not later than ten academic sessions from the date of enrolment. A part-time candidate for the degree shall present for examination not later than twelve academic sessions from the date of enrolment. In special cases an extension of these times may be granted by the Committee.

Thesis

4. (1) On completing the program of study a candidate shall submit a thesis embodying the results of the investigation.

(2) The candidate shall give in writing to the Registrar two months notice of intention to submit the thesis.

(3) The thesis shall comply with the following requirements:

(a) it must be an original and significant contribution to knowledge of the subject;

(b) the greater proportion of the work described must have been completed subsequent to enrolment for the degree;

(c) it must be written in English except that a candidate in the Faculty of Arts may be required by the Committee to write a thesis in an appropriate foreign language;

(d) it must reach a satisfactory standard of expression and presentation;
(e) it must consist of an account of the candidate's own research but in special cases work done conjointly with other persons may be accepted provided the Committee is satisified about the extent of the candidate's part in the joint research.

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

(4) The 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 but may submit any work previously published whether or not such work is related to the thesis.

(5) 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 theses for higher degrees.

(6) 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.

5. (1) There shall be not fewer than 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. Examination

(2) At the conclusion of the examination each examiner shall submit to the Committee a concise report on the thesis and shall recommend to the Committee that:

(a) the candidate be awarded the degree without further examination; or

(b) 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

(c) 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

(d) 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

(e) the candidate be not awarded the degree and be not permitted to resubmit the thesis.

(3) If the performance at the further examination recommended under (2)(c) above is not to the satisfaction of the Committee, the Committee may permit the candidate to re-present the same thesis and submit to further examination as determined by the Committee within a period specified by it but not exceeding eighteen months.

(4) The Committee shall, after consideration of the examiners' reports and the results of any further examination, recommend whether or not the candidate may be awarded the degree. If it is decided that the candidate be not awarded the degree the Committee shall determine whether or not the candidate be permitted to resubmit the thesis after a further period of study and/or research.

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

1. The degree of Master of Chemistry or Master of Mathematics or Master of Optometry or Master of Physics by formal course work may be awarded by the Council to a candidate who has satisfactorily completed a program of advanced study. **Master of Chemistry (MChem), Master of Mathematics (MMath), Master of Optometry (MOptom) and Master of Physics (MPhysics)**

2. (1) A candidate for the degree shall have been awarded an appropriate four-year degree of Bachelor from the University of New South Wales or a qualification considered equivalent from another university or tertiary institution at a level acceptable to the Higher Degree Committee of the Faculty of Science (hereinafter referred to as the Committee). Qualifications

(2) In exceptional cases an applicant who submits evidence of such other academic and professional qualifications as may be approved by the Committee may be permitted to enrol for the degree.

(3) If the Committee is not satisfied with the qualifications submitted by an applicant the Committee may require the applicant to undergo such assessment or carry out such work as the Committee may prescribe, before permitting enrolment.

3. (1) An application to enrol as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Registrar two calendar months before the commencement of the session in which enrolment is to begin. Enrolment and Progression

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

(2) A candidate for the degree shall be required to undertake such formal subjects and pass such assessment as prescribed.

(3) The progress of a candidate shall be reviewed at least once annually by the Committee and as a result of its review the Committee may cancel enrolment or take such other action as it considers appropriate.

(4) No candidate shall be awarded the degree until the lapse of two academic sessions from the date of enrolment in the case of a full-time candidate or four sessions in the case of a part-time candidate. The maximum period of candidature shall be four academic sessions from the date of enrolment for a full-time candidate and eight sessions for a part-time candidate. In special cases an extension of these times may be granted by the Committee.

Fees

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

Master of Engineering (ME) and Master of Science (MSc)

1. The degree of Master of Engineering or Master of Science by research may be awarded by the Council on the recommendation of the Higher Degree Committee of the appropriate faculty (hereinafter referred to as the Committee) to a candidate who has demonstrated ability to undertake research by the submission of a thesis embodying the results of an original investigation.

Qualifications

2. (1) A candidate for the degree shall have been awarded an appropriate degree of Bachelor from the University of New South Wales or a qualification considered equivalent from another university or tertiary institution at a level acceptable to the Committee.

(2) An applicant who submits evidence of such other academic or professional attainments as may be approved by the Committee may be permitted to enrol for the degree.

(3) When the Committee is not satisfied with the qualifications submitted by an applicant the Committee may require the applicant, before being permitted to enrol, to undergo such examination or carry out such work as the Committee may prescribe.

Enrolment and Progression

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

(2) In every case, before permitting a candidate to enrol, the head of the school* in which the candidate intends to enrol shall be satisfied that adequate supervision and facilities are available.

(3) An approved candidate shall be enrolled in one of the following categories:

(a) full-time attendance at the University;

(b) part-time attendance at the University;

(c) external — not in regular attendance at the University and using research facilities external to the University.

(4) A candidate shall be required to undertake an original investigation on an approved topic. The candidate may also be required to undergo such examination and perform such other work as may be prescribed by the Committee.

(5) The work shall be carried out under the direction of a supervisor appointed from the full-time members of the University staff.

(6) The progress of a candidate shall be reviewed annually by the Committee following a report by the candidate, the supervisor and the head of the school* in which the candidate is enrolled and as a result of such review the Committee may cancel enrolment or take such other action as it considers appropriate.

(7) No candidate shall be granted the degree until the lapse of three academic sessions in the case of a full-time candidate or four academic sessions in the case of a part-time or external candidate from the date of enrolment. In the case of a candidate who has been awarded the degree of Bachelor with Honours or who has had previous research experience the Committee may approve remission of up to one session for a full-time candidate and two sessions for a part-time or external candidate.

(8) A full-time candidate for the degree shall present for examination not later than six academic sessions from the date of enrolment. A part-time or external candidate for the degree shall present for examination not later than ten academic sessions from the date of enrolment. In special cases an extension of these times may be granted by the Committee.

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

Thesis

4. (1) On completing the program of study a candidate shall submit a thesis embodying the results of the original investigation.

(2) The candidate shall give in writing two months notice of intention to submit the thesis.

(3) The thesis shall present an account of the candidate's own research. In special cases work done conjointly with other persons may be accepted, provided the Committee is satisfied about the extent of the candidate's part in the joint research.

(4) The candidate may also submit any work previously published whether or not such work is related to the thesis.

(5) Three 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.

(6) 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.

Examination

5. (1) There shall be not fewer than two examiners of the thesis, appointed by the Professorial Board on the recommendation of the Committee, at least one of whom shall be external to the University unless the Committee is satisfied that this is not practicable.

(2) 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:

(a) the candidate be awarded the degree without further examination; or

(b) 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

(c) 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

(d) 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

(e) the candidate be not awarded the degree and be not permitted to resubmit the thesis.

(3) If the performance at the further examination recommended under (2)(c) above 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 it but not exceeding eighteen months.

(4) 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 awarded the degree. If it is decided that the candidate be not awarded the degree the Committee shall determine whether or not the candidate may resubmit the thesis after a further period of study and/or research.

Fees

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

Master of Engineering (ME), Master of Science (MSc) and Master of Surveying (MSurv) *without supervision*

1. The degree of Master of Engineering or Master of Science or Master of Surveying without supervision may be awarded by the Council on the recommendation of the Higher Degree Committee of the appropriate faculty (hereinafter referred to as the Committee) to a candidate who has demonstrated ability to undertake research by the submission of a thesis embodying the results of an original investigation.

Qualifications

2. A candidate for the degree shall have been awarded an appropriate degree of Bachelor from the University of New South Wales with at least three years relevant standing in the case of Honours graduates and four years relevant standing in the case of Pass graduates, and at a level acceptable to the Committee.

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

Enrolment

3. An application to enrol as a candidate for the degree without supervision shall be made on the prescribed form which shall be lodged with the Registrar not less than six months before the intended date of submission of the thesis. A graduate who intends to apply in this way should, in his or her own interest, seek at an early stage the advice of the appropriate head of school* with regard to the adequacy of the subject matter and its presentation for the degree. A synopsis of the work should be available.

Thesis

4. (1) A candidate shall submit a thesis embodying the results of the investigation.

(2) The candidate shall give in writing to the Registrar two months notice of intention to submit the thesis.

(3) The thesis shall present an account of the candidate's own research. In special cases work done conjointly with other persons may be accepted, provided the Committee is satisfied about the extent of the candidate's part in the joint research.

(4) The candidate may also submit any work previously published whether or not such work is related to the thesis.

(5) Three copies of the thesis shall be presented in a form which complies with the requirements of the University for the preparation and submission of theses for higher degrees.

(6) 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.

Examination

5. (1) There shall be not fewer than two examiners of the thesis, appointed by the Professorial Board on the recommendation of the Committee, at least one of whom shall be external to the University unless the Committee is satisfied that this is not practicable.

(2) Before the thesis is submitted to the examiners the head of the school* in which the candidate is enrolled shall certify that it is *prima facie* worthy of examination.

(3) At the conclusion of the examination each examiner shall submit to the Committee a concise report on the thesis and shall recommend to the Committee that:

(a) the candidate be awarded the degree without further examination; or

(b) 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

(c) 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

(d) 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

(e) the candidate be not awarded the degree and be not permitted to resubmit the thesis.

(4) If the performance at the further examination recommended under (3)(c) above is not to the satisfaction of the Committee, the Committee may permit the candidate to re-present the same thesis and submit to further examination as determined by the Committee within a period specified by it but not exceeding eighteen months.

(5) The Committee shall, after consideration of the examiners' reports and the results of any further examination, recommend whether or not the candidate may be awarded the degree. If it is decided that the candidate be not awarded the degree the Committee shall determine whether or not the candidate may resubmit the thesis after a further period of study and/or research.

Fees.

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

Master of Mathematics (MMath)

See Master of Chemistry above.

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

See Master of Chemistry above.

Master of Optometry (MOptom)

See Master of Chemistry above.

Master of Physics (MPhysics)

Master of Psychology (MPsychol)

1. The degree of Master of Psychology by formal course work may be awarded by the Council to a candidate who has satisfactorily completed a program of advanced study. The degree shall be awarded at the Pass level or with the grade of Honours Class 1 or with the grade of Honours Class 2.

Qualifications

2. (1) A candidate for the degree shall have been awarded a degree of Bachelor with Honours in psychology from the University of New South Wales or a qualification considered equivalent from another university or tertiary institution, at a level acceptable to the Higher Degree Committee of the Faculty of Biological Sciences (hereinafter referred to as the Committee).

(2) In exceptional cases an applicant who submits evidence of such other academic and professional qualifications as may be approved by the Committee may be permitted to enrol for the degree.

(3) If the Committee is not satisfied with the qualifications submitted by an applicant the Committee may require the applicant to undergo such assessment or carry out such work as the Committee may prescribe, before permitting enrolment.

Enrolment and Progression

3. (1) An application to enrol as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least two calendar months before the commencement of the academic year.

(2) A candidate for the degree shall be required to undertake such formal subjects and, except in exceptional circumstances, pass at the first attempt such assessment as prescribed.

(3) The progress of a candidate shall be reviewed at least once annually by the Committee and as a result of its review the Committee may cancel enrolment or take such other action as it considers appropriate.

(4) No candidate shall be awarded the degree until the lapse of four academic sessions from the date of enrolment in the case of a full-time candidate or six sessions in the case of a part-time candidate. The maximum period of candidature shall be six academic sessions from the date of enrolment for a full-time candidate and ten sessions for a part-time candidate. In special cases an extension of these times may be granted by the Committee.

Fees

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

See Master of Engineering above.

Master of Science (MSc)

See Master of Engineering above.

Master of Science (MSc) ***without supervision***

Master of Science (Biotechnology) (MSc(Biotech))

1. The degree of Master of Science (Biotechnology) by formal course work may be awarded by the Council to a candidate who has satisfactorily completed a program of advanced study.

Qualifications

2. (1) A candidate for the degree shall have been awarded an appropriate degree of Bachelor with Honours from the University of New South Wales or a qualification considered equivalent from another university or tertiary institution, at a level acceptable to the Higher Degree Committee of the Faculty of Biological Sciences (hereinafter referred to as the Committee).

(2) In exceptional cases an applicant who submits evidence of such other academic and/or professional qualifications as may be approved by the Committee may be permitted to enrol for the degree.

(3) If the Committee is not satisfied with the qualifications submitted by an applicant the Committee may require the applicant to undergo such assessment or carry out such work as the Committee may prescribe, before permitting enrolment.

Enrolment and Progression

3. (1) An application to enrol as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least two calendar months before the commencement of the session in which enrolment is to begin.

(2) A candidate for the degree shall be required to undertake such formal subjects and pass such assessment as prescribed.

(3) The progress of a candidate shall be reviewed at least once annually by the Committee and as a result of its review the Committee may cancel enrolment or take such other action as it considers appropriate.

(4) No candidate shall be awarded the degree until the lapse of two academic sessions from the date of enrolment in the case of a full-time candidate or four sessions in the case of a part-time candidate. The maximum period of candidature shall be four academic sessions from the date of enrolment for a full-time candidate and eight sessions for a part-time candidate. In special cases an extension of these times may be granted by the Committee.

Fees

4. A 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 to a candidate who has satisfactorily completed a program of advanced study.

Qualifications

2. (1) A candidate for the degree shall have been awarded the degree of Doctor of Philosophy from the University of New South Wales or a qualification considered equivalent from another university or tertiary institution, in an area of psychology acceptable to the Higher Degree Committee of the Faculty of Biological Sciences (hereinafter referred to as the Committee).
(2) If the Committee is not satisfied with the qualifications submitted by an applicant the Committee may require the applicant to undergo such assessment or carry out such work as the Committee may prescribe, before permitting enrolment.

Enrolment and Progression

3. (1) An application to enrol as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least two calendar months before the commencement of the academic year.

(2) A candidate for the degree shall be required to undertake such formal subjects and, except in exceptional circumstances, pass at the first attempt such assessment as prescribed.

(3) The progress of a candidate shall be reviewed at least once annually by the Committee and as a result of its review the Committee may cancel enrolment or take such other action as it considers appropriate.

(4) No candidate shall be awarded the degree until the lapse of three academic sessions from the date of enrolment in the case of a full-time candidate or six sessions in the case of a part-time candidate. A candidate who has been granted exemptions may have the minimum period reduced by up to one third. The maximum period of candidature shall be four academic sessions from the date of enrolment for a full-time candidate and eight sessions for a part-time candidate. In special cases an extension of these times may be granted by the Committee.

Fees

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

Master of Science and Society (MScSoc) at Honours Level

1. The degree of Master of Science and Society at Honours level 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 demonstrated ability to undertake research by the submission of a thesis embodying the results of an original investigation. The degree shall be awarded with the grade of Honours Class 1 or with the grade of Honours Class 2.

Qualifications

2. (1) A candidate for the degree shall:

(a) have been awarded an appropriate degree of Bachelor from the University of New South Wales or a qualification considered equivalent from another university or tertiary institution at a level acceptable to the Committee, and

(b) have completed the requirements for the award of the degree at Pass level.

(2) In exceptional cases an applicant who submits evidence of such other academic and professional qualifications as may be approved by the Committee may be permitted to enrol for the degree.

(3) If the Committee is not satisfied with the qualifications submitted by an applicant the Committee may require the applicant to undergo such assessment or carry out such work as the Committee may prescribe, before permitting enrolment.

Enrolment and Progression

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

(2) In every case, before permitting a candidate to enrol, the Head of the School of History and Philosophy of Science (hereinafter referred to as the head of the school) shall be satisfied that adequate supervision and facilities are available.

(3) An approved candidate shall be enrolled in one of the following categories:

(a) full-time attendance at the University;

(b) part-time attendance at the University;

(c) external — not in regular attendance at the University and using research facilities external to the University.

(4) A candidate shall be required to undertake an original investigation on an approved topic. The candidate may also be required to undergo such assessment and perform such other work as may be prescribed by the Committee.

(5) The work shall be carried out under the direction of a supervisor appointed from the full-time academic members of the University staff.

(6) The progress of a candidate shall be reviewed annually by the Committee following a report by the candidate, the supervisor and the head of the school and as a result of such review the Committee may cancel enrolment or take such other action as it considers appropriate.

(7) No candidate shall be awarded the degree until the lapse of two academic sessions from the date of enrolment in the case of a full-time candidate or four academic sessions in the case of a part-time or external candidate. In the case of a candidate who has been awarded the degree of Bachelor with Honours or who has had previous research experience the Committee may approve remission of up to one session for a full-time candidate and two sessions for a part-time or external candidate.

(8) A full-time candidate for the degree shall present for examination not later than four academic sessions from the date of enrolment. A part-time or external candidate for the degree shall present for examination not later than eight academic sessions from the date of enrolment. In special cases an extension of these times may be granted by the Committee.

Thesis

4. (1) On completing the program of study a candidate shall submit a thesis embodying the results of the investigation.

(2) The candidate shall give in writing to the Registrar two months notice of intention to submit the thesis.

(3) The thesis shall present an account of the candidate's own research. In special cases work done conjointly with other persons may be accepted, provided the Committee is satisfied about the extent of the candidate's part in the joint research.

(4) The candidate may also submit any work previously published whether or not such work is related to the thesis.

(5) Three copies of the thesis shall be presented in a form which complies with the requirements of the University for the preparation and submission of theses for higher degrees.

(6) 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.

Examination

5. (1) There shall be not fewer than two examiners of the thesis, appointed by the Professorial Board on the recommendation of the Committee, at least one of whom shall be external to the University unless the Committee is satisfied that this is not practicable.

(2) At the conclusion of the examination each examiner shall submit to the Committee a concise report on the thesis and shall recommend to the Committee that:

(a) the candidate be awarded the degree either with Honours Class 1 or with Honours Class 2 without further examination; or

(b) the candidate be awarded the degree either with Honours Class 1 or with Honours Class 2 without further examination subject to minor corrections as listed being made to the satisfaction of the head of the school; or

(c) the candidate be awarded the degree either with Honours Class 1 or with Honours Class 2 subject to a further examination on questions posed in the report, performance in this further examination being to the satisfaction of the Committee; or

(d) 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

(e) the candidate be not awarded the degree and be not permitted to resubmit the thesis.

(3) If the performance at the further examination recommended under (2)(c) above is not to the satisfaction of the Committee, the Committee may permit the candidate to re-present the same thesis and submit to further examination as determined by the Committee within a period specified by it but not exceeding eighteen months.

(4) The Committee shall, after consideration of the examiners' reports and the results of any further examination, recommend whether or not the candidate may be awarded the degree. If it is decided that the candidate be not awarded the degree the Committee shall determine whether or not the candidate may resubmit the thesis after a further period of study and/or research.

Fees

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

Master of Science and Society (MScSoc) at Pass Level

1. The degree of Master of Science and Society at Pass level may be awarded by the Council to a candidate who has satisfactorily completed a program of advanced study.

Qualifications

2. (1) A candidate for the degree shall have been awarded an appropriate degree of Bachelor from the University of New South Wales or a qualification considered equivalent from another university or tertiary institution at a level acceptable to the Higher Degree Committee of the Faculty of Science (hereinafter referred to as the Committee).

(2) In exceptional cases an applicant who submits evidence of such other academic and professional qualifications as may be approved by the Committee may be permitted to enrol for the degree.

(3) If the Committee is not satisfied with the qualifications submitted by an applicant the Committee may require the applicant to undergo such assessment or carry out such work as the Committee may prescribe, before permitting enrolment.

Enrolment and Progression

3. (1) An application to enrol as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least two calendar months before the commencement of the session in which enrolment is to begin.

(2) A candidate for the degree shall be required to undertake such formal subjects and pass such assessment as prescribed.

(3) The progress of a candidate shall be reviewed at least once annually by the Committee and as a result of its review the Committee may cancel enrolment or take such other action as it considers appropriate.

(4) No candidate shall be awarded the degree until the lapse of four academic sessions from the date of enrolment. The maximum period of candidature shall be eight academic sessions from the date of enrolment. In special cases an extension of time may be granted by the Committee.

Fees

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

Master of Statistics (MStats)

1. The degree of Master of Statistics by formal course work may be awarded by the Council to a candidate who has satisfactorily completed a program of advanced study.

Qualifications

2. (1) A candidate for the degree shall have been awarded a degree of Bachelor with major studies in statistics from the University of New South Wales or a qualification considered equivalent from another university or tertiary institution at a level acceptable to the Higher Degree Committee of the Faculty of Science (hereinafter referred to as the Committee).

(2) In exceptional cases an applicant who submits evidence of such other academic and professional qualifications as may be approved by the Committee may be permitted to enrol for the degree.

(3) If the Committee is not satisfied with the qualifications submitted by an applicant the Committee may require the applicant to undergo such assessment or carry out such work as the Committee may prescribe, before permitting enrolment.

Enrolment and Progression

3. (1) An application to enrol as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least two calendar months before the commencement of the session in which enrolment is to begin.

(2) A candidate for the degree shall be required to undertake such formal subjects and pass such assessment as prescribed.

(3) The progress of a candidate shall be reviewed at least once annually by the Committee and as a result of its review the Committee may cancel enrolment or take such other action as it considers appropriate.

(4) No candidate shall be awarded the degree until the lapse of four academic sessions from the date of enrolment in the case of a full-time candidate or eight sessions in the case of a part-time candidate. In the case of a candidate who has been awarded a degree of Bachelor with Honours in statistics the Committee may approve remission of up to two sessions for a full-time candidate and four sessions for a part-time candidate. The maximum period of candidature shall be six academic sessions from the date of enrolment for a full-time candidate and ten sessions for a part-time candidate. In special cases an extension of these times may be granted by the Committee.

Fees

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

Graduate Diploma

Graduate Diploma (GradDip or DipFDA)

1. A Graduate Diploma may be awarded by the Council to a candidate who has satisfactorily completed a program of advanced study.

Qualifications

2. (1) A candidate for the diploma shall have been awarded an appropriate degree of Bachelor from the University of New South Wales or a qualification considered equivalent from another university or tertiary institution at a level acceptable to the Higher Degree Committee of the appropriate faculty (hereinafter referred to as the Committee).

(2) An applicant who submits evidence of such other academic or professional attainments as may be approved by the Committee may be permitted to enrol for the diploma.

(3) If the Committee is not satisfied with the qualifications submitted by an applicant the Committee may require the applicant to undergo such assessment or carry out such work as the Committee may prescribe, before permitting enrolment.

Enrolment and Progression

3. (1) An application to enrol as a candidate for the diploma shall be made on the prescribed form which shall be lodged with the Registrar at least two calendar months before the commencement of the session in which enrolment is to begin.

(2) A candidate for the diploma shall be required to undertake such formal subjects and pass such assessment as prescribed.

(3) The progress of a candidate shall be reviewed at least once annually by the Committee and as a result of its review the Committee may cancel enrolment or take such other action as it considers appropriate.

(4) No candidate shall be awarded the diploma until the lapse of two academic sessions from the date of enrolment in the case of a full-time candidate or four sessions in the case of a part-time candidate. The maximum period of candidature shall be four academic sessions from the date of enrolment for a full-time candidate and six sessions for a part-time candidate. In special cases an extension of these times may be granted by the Committee.

Fees

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

Scholarships and Prizes

The scholarships and prizes listed below are available to students whose courses are listed in this handbook. Each faculty handbook contains in its Scholarships and Prizes section the scholarships and prizes available with that faculty. The General Information section of the Calendar contains a comprehensive list of scholarships and prizes offered throughout the University.

Scholarships

Undergraduate Scholarships

Listed below is an outline only of a number of scholarships available to students. 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*	$200 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

*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)			
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 who are permanent residents of Australia enrolling in any year of a full-time undergraduate course on the basis of academic merit and financial need
W. S. and L. B. Robinson**	Up to $4200 pa	1 year renewable for the duration of the course subject to satisfactory progress	Available only to students who have completed their schooling in Broken Hill or whose parents reside in Broken Hill; for a course related to the mining industry. Includes courses in mining engineering, geology, electrical and mechanical engineering, metallurgical process engineering, chemical engineering and science.
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 of more than one year's standing 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 a full-time degree course in Chemistry
Mathematics			
George Szekeres Award	$200 pa	1 year	Open to students entering the final year of the honours degree course in Pure 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
Optometry			
Gibb and Beeman	Up to $750 pa	1 year renewable for the duration of the course, subject to satisfactory progress	Available to students under 21 years of age who are permanent residents of Australia enrolling in Year 1 of the full-time degree course in Optometry

**Applications close 30 September each year.

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.

Donor	Value	Year/s of Tenure	Conditions
General			
University of New South Wales Postgraduate Scholarships	Living allowance of $7000 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 $8126 pa. Other allowances may also be paid.	1-2 years; minimum duration of course	Applicants must be graduates or scholars who will graduate in current academic year, and who have not previously held a Commonwealth Post-graduate Award. Preference is given to applicants with employment experience. 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 Scholarships	Six State awards of $5000 each	1 year	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 late September.
	One National award valued at $22,000 pa for study at an approved overseas institution.	2 years	

*Available for reference in the University Library.
*Application forms are available from The Secretary, Department of Education and Youth Affairs, AAEF Travel Grants, PO Box 826, Woden, ACT 2606.

Graduate Scholarships (continued)

Donor	Value	Year/s of Tenure	Conditions
General (continued)			
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 Australian citizens and who are not older than 35 years of age. Applications close with Registrar in September or October each year.
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. Applications close mid-April.
Frank Knox Memorial Fellowships at Harvard University	Stipend of US$6500 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. Applications close with the Registrar, mid-October.
Gowrie Scholarship Trust Fund	$4000 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 31 October.
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 31 August.
The Rhodes Scholarship*	Approximately £3600 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 mid-September each year.

**Application forms must be obtained from the Australian representative of the Fund, Mr J. T. Larkin, Department of Trade, Edmund Barton Building, Kings Avenue, Barton, ACT 2600. These must be submitted to the Registrar by 15 August.

*Applications to The Honorary Secretary of the NSW Committee, University of Sydney, NSW 2006.

Graduate Scholarships (continued)

Donor	Value	Year/s of Tenure	Conditions
General (continued)			
Rothmans Fellowships Award††	$20000 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.
Sam Cracknell Memorial	Up to $3000 pa		See above under **Undergraduate Scholarships, *General***
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			
Australian Telecommunications and Electronics Research Board	$11,500 pa if only scholarship held or $5000 if additional to another scholarship	1 year for a Masters and up to 3 years for a PhD degree	Applicants must be first class honours graduates (or equivalent) or scholars who will graduate with honours in the current academic year, who are Australian citizens or permanent residents and who are aged under 25 years at 1 January. Applications close late September.
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 Associate Professor B. Holden, School of Optometry.
Gordon Godfrey Scholarship in Theoretical Physics	$1500 pa	1-3 years	To enable a suitable graduate to undertake a research degree in Theoretical Physics. May be held concurrently with another award.
The Rutherford Scholarship	Travel, fees, etc. A stipend which, if held in the UK, is approx. £4090 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	£4090 stg pa	Normally tenable 3 years	To enable graduates under 26 years of age to undertake research in some branch of pure or applied science, or engineering, at an overseas university. Applicants must be British Commonwealth citizens or citizens of the Republics of Ireland, Pakistan or South Africa. Applications close mid-February.

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

Graduate Scholarships (continued)

Donor	Value	Year/s of Tenure	Conditions
Science (continued)			
Shell Scholarship in Science or Engineering	Adequate funds for living allowance, tuition and travel 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 attend a British university to pursue a higher degree. Applications close by 26 September.

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
Faculties of Applied Science and Engineering		
Institution of Engineers, Australia	Medal and 200.00	The most proficient final year (or last 2 years part-time) student in the Bachelor of Engineering (or Bachelor of Science (Engineering)) degree courses offered by the following Schools: Civil Engineering Electrical Engineering and Computer Science Mechanical and Industrial Engineering Chemical Engineering and Industrial Chemistry Mining Engineering Textile Technology (Engineering option only)
Board of Studies in Science and Mathematics		
Logica Pty Limited	200.00	Best performance by a graduand in the Computer Science Honours degree course

Undergraduate University Prizes (continued)

Donor/Name of Prize	Value $	Awarded for
School of Accountancy		
Australian Society of Accountants	100.00 100.00 100.00	14.501 Accounting and Financial Management 1A 14.522 Accounting and Financial Management 2A 14.563 Accounting and Financial Management 3A and 14.583 Accounting and Financial Management 3B
Chamber of Manufactures of New South Wales	250.00	14.703 Advanced Auditing
Coopers and Lybrand	250.00	14.542 Accounting and Financial Management 2B
Corporate Affairs Commission	100.00	14.803/14.903G Regulation of Accounting
Datec Pty Ltd	200.00	14.605 Information Systems 3B
	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 1A, 14.511 Accounting and Financial Management 1B, 14.522 Accounting and Financial Management 2A, 14.542 Accounting and Financial Management 2B
Greenwood, Challoner & Co	100.00	14.777 Legal Organisation of Commerce
K. M. G. Hungerford	100.00	14.563 Accounting and Financial Management 3A
IBM	150.00	Highest aggregate mark in any two of the following subjects: 14.603 Computer Information Systems 2 14.605 Information Systems Implementation 14.606 Management Information Systems Design 14.607 Distributed Computer Systems 14.608 Database Systems
Law Book Co Ltd	75.00 Books	14.511 Accounting and Financial Management 1B
Peat, Marwick, Mitchell and Company	200.00	14.805/14.905G EDP Auditing
Price Waterhouse	250.00	General Proficiency in Accounting and Financial Management subjects
Schroders Australia Limited	200.00	14.613 Business Finance 2
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	200.00	14.563 Accounting and Financial Management 3A
Arthur Young & Co	80.00	14.613 Business Finance 2
School of Anatomy		
The Gray's Point Prize in Anatomy	50.00	Highest aggregate mark in Year 1 of Anatomy
Jane Skillen in Anatomy	40.00	Outstanding merit in all branches of Anatomy
The Prize in Practical Anatomy	100.00	Practical Anatomy (including Radiological Anatomy) – Year 2 of the medical course

Undergraduate University Prizes (continued)

Donor/Name of Prize	Value $	Awarded for
School of Biological Technologies		
Department of Biotechnology		
Mauri Foods	175.00	Best result in 42.101 Introduction to Biotechnology
	175.00	Best result in one of the Level 3 Biotechnology subjects
	175.00	Best result in the Biotechnology honours degree program
Department of Food Science and Technology		
Cottees General Foods	120.00	38.141 Food Regulation and Control
Nestle Australia Pty Ltd	200.00	Best performance in 38.140 Food Technology project in the Bachelor of Science degree course in Food Technology
Wilfred B. S. Bishop	75.00	General proficiency throughout Bachelor of Science degree course in Food Technology by a student who has made a significant contribution to staff and student activities
School of Chemical Engineering and Industrial Chemistry		
Abbott Laboratories Pty Ltd	150.00	Bachelor of Engineering degree course in Chemical Engineering - Year 4
Australasian Corrosion Association (NSW Branch)	150.00 and one year's membership of the Association	Best performance in 48.121 Corrosion in the Chemical Industry
The Australian Gas Light Company's in Chemical Engineering	200.00	Subject selected by Head of School
Australian Paper Manufacturers Ltd	100.00	48.163 Instrumentation and Process Control in Industrial Chemistry
	100.00	48.163 Instrumentation and Process Control in Chemical Engineering
Chemical Technology Society	25.00	Best graduate in Bachelor of Science degree in Industrial Chemistry
	25.00	Best graduate in 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 Year 2 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 Year 3 or its part-time equivalent in either the Chemical Engineering course or the Industrial Chemistry course
	100.00	General proficiency in Year 4 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	48.135 Thermodynamics
Stauffer Australia Limited	100.00	Subject selected by Head of School
Western Mining Corporation Ltd	150.00	48.036 Chemical Engineering Laboratory 1
	150.00	48.044 Chemical Engineering Laboratory 2
Department of Fuel Technology		
Australian Institute of Energy	50.00	For a fuel subject or allied subject project
Fuel Technology Staff	200.00	Best performance in Year 3 or 4 Fuel Technology subject in the Bachelor of Engineering degree course in Chemical Engineering
Shell	150.00	Subject selected by Head of School
School of Chemistry		
ACI Australia Limited	60.00	Subject selected by Head of School
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
UNSW Chemical Society Parke-Pope	100.00	Subject selected by Head of School
UNSW Chemical Society George Wright	100.00	Best performance in 2.121 and 2.131 Year 1 Chemistry
June Griffith Memorial	60.00	

Undergraduate University Prizes (continued)

Donor/Name of Prize	Value $	Awarded for
School of Economics		
Australian Finance Conference	75.00	15.083 Public Finance
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)	70.00	General proficiency throughout the Bachelor of Commerce degree course in Econometrics
Department of Industrial Relations		
Industrial Relations Society of NSW	Books to the value of 100.00	Best performance in 15.511 Industrial Relations 1A in the Bachelor of Commerce or Bachelor of Arts degree course
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
Electricity Supply Engineers Association of New South Wales	100.00	Overall performance including proficiency in Electric Power Distribution in Year 3 full-time or equivalent part-time degree course
IBM	150.00	Best performance in 6.611 Computing 1
J. Douglas Maclurcan	50.00 Book order	Outstanding performance in the field of control systems
School of Geography		
Jack Mabbutt Medal	Medal	Best performance in Fourth Year Project in Applied Geography by a student proceeding to Bachelor of Science
Jack Mabbutt Prize	150.00	Best performance by a third year student proceeding to Honours in Geography

Undergraduate University Prizes (continued)

Donor/Name of Prize	Value $	Awarded for
School of Mathematics		
Applied Mathematics	50.00	Excellence in Level III Applied Mathematics subjects
C. H. Peck	50.00	Best performance in Year 2 Mathematics proceeding to Year 3 in the School of Mathematics
Head of School's	50.00	Excellence in 4 or more Mathematics units in Year 2
IBM	150.00	Final year of an honours degree course
ICI Theory of Statistics IV	100.00	Best performance in 10.323 Theory of Statistics 4
I. P. Sharp Associates	75.00	Excellence in Higher Theory of Statistics 2
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
Michael Mihailavitch Erihman	750.00	Best performance by a student enrolled in a Mathematics Program, in examinations conducted by the School of Mathematics in any one year
Pure Mathematics	50.00	Best performance in Level III Pure Mathematics subjects
School of Mathematics	50.00	Best performance in 10.011 Higher Mathematics 1
	50.00	Best performance in basic Year 2 Higher Mathematics units
	50.00	Excellence in 4 or more Mathematics units in Year 2
Statistical Society of Australia (New South Wales Branch)	70.00	General proficiency – Theory of Statistics subjects
W. D. & H. O. Wills (Aust) Ltd Theory of Statistics 3	200.00	Best performance in Theory of Statistics 3 or Higher Theory of Statistics 3
School of Mechanical and Industrial Engineering		
Ansett Airlines of Australia	200.00 and bronze medal	Best overall performance in the Bachelor of Engineering degree course in Aeronautical Engineering
Atlas Copco	125.00	General proficiency in Bachelor of Engineering degree course in Mechanical Engineering
Austral Crane	75.00	General proficiency in full-time Year 3 Mechanical Engineering
Australian Institute of Refrigeration, Air Conditioning and Heating	Student membership of the Institute for 1 year plus Design Aid and Data Book	Best performance in subject selected by Head of School in field of refrigeration and air conditioning
Babcock Aust Ltd	100.00	Subject selected by Head of School

Undergraduate University Prizes (continued)

Donor/Name of Prize	Value $	Awarded for
School of Materials Science and Engineering		
Alcan Australia Ltd	100.00	
Austral Crane	150.00	
Australian Institute of Metals	100.00 and one year's membership of the Institute	Subject selected by Head of School
Australian Welding Institute	30.00 Book order	
The Broken Hill Proprietary Co Ltd	150.00	
The Max Hatherly	275.00	Best performance in the final year practical examination *or* an outstanding effort in Metallography
The Hugh Muir	275.00	Best performance in the final year seminar class *or*, as judged by the Head of School, the contribution by a student most of all to the corporate life of the School of Materials Science and Engineering
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	200.00	Subject selected by Head of School
School of Optometry		
Australian Optometrical Association	200.00	Best performance in Year 3 of the Optometry degree course
Bausch & Lomb Soflens	Diagnostic set of contact lenses valued at 700.00	31.841 Clinical Optometry
Bryan Powell	100.00	Colour vision section of 31.841 Clinical Optometry
Contavue	Trial fitting set of contact lenses	Best essay or project on contact lenses
G. Nissel & Co Aust Pty Ltd	Trial fitting set of contact lenses	31.813 Optometry 3 and 31.841 Clinical Optometry — Contact Lenses sections
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	100.00	31.813 Optometry 3
	100.00	Optometry Year 4
The Keith Woodland Memorial	100.00	Binocular vision component of 31.813 Optometry 3 and 31.841 Clinical Optometry
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
Optical Products Pty Ltd	100.00	Subject selected by Head of School
Optometric Vision Research Foundation	100.00	Research project in the final year
Optometrists' Association of NSW	50.00	Subject selected by Head of School
Optyl (Australia) Pty Ltd	100.00	31.812 Optometry 2 — practical work
Safilo Australia	100.00	Subject selected by Head of School
Theo Kannis	250.00	31.841 Clinical Optometry
School of Physics		
Australian Institute of Physics	100.00 and one year's membership of the Institute	Highest aggregate in any 3 units chosen from 1.0133 Quantum Mechanics, 1.0143 Nuclear Physics, 1.023 Statistical Mechanics and Solid State Physics, 1.0333 Electromagnetism, 1.0343 Advanced Optics, and 1.043 Experimental Physics A in the Bachelor of Science
Bodal in Microcomputers	100.00	Best performance in a competition based on the use of microcomputers in 1.061 Computer Applications in Experimental Science 1
ETP-Oxford	200.00	Most meritorious design study of an optical system in the subject 1.713 Advanced Laser and Optical Applications
Gordon and Mabel Godfrey in Theoretical Physics 3	100.00	Best performance in a selection of Year 3 Theoretical Physics subjects chosen from 1.5133, 1.5233, 1.5333, 1.5433 and 1.5533
Gordon and Mabel Godfrey in Theoretical Physics 4	100.00	Excellence in the subject 1.504 Theoretical Physics 4 in the Bachelor of Science degree course with Honours in Physics
Gordon and Mabel Godfrey	300.00	Best performance by a student who has completed third year and is entering the final year of the Honours Degree course in Theoretical Physics

Undergraduate University Prizes (continued)

Donor/Name of Prize	Value $	Awarded for
School of Physics (continued)		
Head of School's in Physics	50.00	Best Year 4 Honours Thesis in Physics in the Bachelor of Science degree course
Laser Electronics	200.00	Excellence in the laboratory work of 1.763 Laser and Optical Technology Laboratory 1
Monaro Research	200.00	Excellence in the subject 1.713 Advanced Laser and Optical Applications
Parameters in Electronics	200.00	Excellence in 1.133 Electronics, or, if no student of sufficient merit 1.043 Experimental Physics A and 1.763 Laser and Optical Technology Laboratory 1
Physics Staff for Physics 1	100.00	Best performance in 1.001 Physics 1
Physics Staff for Physics 2	100.00	Highest aggregate in 1.002 Mechanics, Waves and Optics, 1.012 Electromagnetism and Thermal Physics, 1.022 Physics and 1.032 Modern Laboratory in the Bachelor of Science degree course
Physics Staff for Physics Honours	100.00	Best performance in the Physics Honours Year of the Bachelor of Science degree course
Radiation Research	200.00	Excellence in the laboratory work in 1.773 Laser and Optical Technology Laboratory 2
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	Psychology Year 2

Graduate University Prizes

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

Donor/Name of Prize	Value $	Awarded for
School of Biotechnology		
Mauri Foods	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 in Food and Drug Analysis graduate diploma course

Graduate University Prizes (continued)

Donor/Name of Prize	Value $	Awarded for
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*

Staff

Comprises Schools of Chemistry, Mathematics, Optometry and Physics.

Dean

Professor V. T. Buchwald

Chairman

Associate Professor J. C. Kelly

Senior Administrative Officer

Patricia Shaw, BCom *N.S.W.*

School of Chemistry

Professor of Physical Chemistry, Head of School and Head of Department of Physical Chemistry

Peter John Derrick, BSc PhD *Lond.*, CChem, FRSC, FRACI

Professor†

Peter Steele Clezy, BSc PhD *Tas.*, DSc *N.S.W.*, ARACI

Professor of Organic Chemistry and Head of Department of Organic Chemistry

David St Clair Black, MSc *Syd.*, PhD *Camb.*, AMusA, FRACI

Professor of Inorganic Chemistry and Head of Department of Inorganic and Nuclear Chemistry

Ian Gordon Dance, MSc *Syd.*, PhD *Manc.*, ARACI

*For Board of Studies in Science and Mathematics, see later in this section.

†In the field of organic chemistry.

Professor of Analytical Chemistry and Head of Department of Analytical Chemistry

Vacant

Executive Assistant to Head of School

Dr D. S. Alderdice

Administrative Officer

Charmaine Carmel Poole, BSc *N.S.W.*

Honorary Associates

Edward Ritchie Cole, MSc *Syd.*, PhD *N.S.W.*, FRACI
Douglas Peter Graddon, MSc PhD *Manc.*, DSc *N.S.W.*, CChem, FRSC, ARACI
Lyster Waverley Ormsby Martin, BSc *Syd.*, ARACI
Prosper David Lark, BEc *Syd.*, MSc PhD *N.S.W.*, ASTC, CChem, FRSC, FRACI

Honorary Visiting Fellow

Phyllis Lorraine Robertson, MSc *N.Z.*, PhD *Cant.*

Professional Officers

Joseph John Brophy, BSc PhD *N.S.W.*, DipEd *Monash*, ARACI
Leonard Alexander Cherkson, BE PhD *Kiev*, MIEAust
Donald Chadwick Craig, BSc *Syd.*, MSc *N.S.W.*
John Herbert James Dawson, BSc *Sheff.*, PhD *Warw.*
Vladimir Djohadze, BSc *N.S.W.*
Richard James Finlayson, MSc *N.S.W.*, ARACI
Lynette June Fitzpatrick, BSc *Syd.*, MSc *Macq.*
James Malcolm Hook, BSc *N.S.W.*, PhD *A.N.U.*, ARACI
Peter Anthony James, BSc *N.S.W.*, ASTC, AARPC
Naresh Kumap, MSc *Punj.*, PhD *W'gong*
Derek Nelson, BSc DipEd *Belf.*
Huu-Phung Pham, BSc *Saigon*, PhD *N.S.W.*
Helen Shumsky, BSc *Odessa I.T.*
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 Professor

Ian Kelvin Gregor, BSc *N.E.*, MSc PhD *N.S.W.*

Senior Lecturers

Peter William Alexander, MSc PhD *Syd.*, FRACI
Sergio Dilli, BSc PhD *N.S.W.*, ASTC, ARACI
Paul Raymond Haddad, BSc PhD *N.S.W.*, DipMilStud, ARACI
Jaroslav Petr Matousek, IngChem *T.U.Prague*, PhD *N.S.W.*, FRACI

Tutors

Glen William Dillow, BSc *N.S.W.*
Peter Edward Jackson, BSc *N.S.W.*

Department of Inorganic and Nuclear Chemistry

Associate Professors

Douglas John Carswell, MSc PhD DipEd *Syd.*, CChem, FRSC, FRACI
Harold Andrew Goodwin, BSc PhD *Syd.*, FRACI
Mervyn Allan Long, MSc PhD, *Auck.*, MNZIC

Senior Lecturer

David John Phillips, BSc PhD *Lond.*, ARACI

Lecturer

Nicholas Kenneth Roberts, BSc PhD *W. Aust.*, ARACI

Department of Organic Chemistry

Associate Professors

George Crank, MSc *Qu.*, PhD *Monash*, CChem, MRSC
Michael John Gallagher, MSc *Qld.*, PhD *Camb.*, FRACI
Michael Nicholas Paddon-Row, BSc *Lond.*, PhD *A.N.U.*, CChem, FRACI, MRSC
John David Stevens, BSc *Tas.*, PhD *N.E.*, ARACI

Senior Lecturers

George Vernon Baddeley, BSc *Manc.*, DPhil *Oxf.*
Roger Bishop, BSc *St.And.*, PhD *Camb.*, ARACI
Norman William Herbert Cheetham, BSc PhD *Qld.*
Peter Thomas Southwell-Keely, BSc *Syd.*, PhD *N.S.W.*
Robert Francis Toia, BSc PhD *W.Aust.*, ARACI

Lecturers

Satya Narayana Murthy Durvasula, MSc *And.*, PhD *Syd.*, CChem, MRSC
Roger Wayne Read, BSc PhD *Syd.*, DIC *Lond.*
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, MAIP
Alan David Rae, MSc PhD *Auck.*, ANZIC

Senior Lecturers

David Scott Alderdice, MSc *Syd.*, PhD *Lond.*
Martin Peter Bogaard, BSc PhD *Syd.*
Brian Raymond Craven, MSc PhD *N.S.W.*, ASTC
Ruby Foon, MSc PhD *Melb.*
William David Johnson, BSc *Syd.*, MSc *N.E.*, PhD *N.S.W.*

Lecturers

Derek Richard Smith, BSc PhD *Wales*
Gary David Willett, BSc PhD *LaT.*, ARACI

Senior Tutor

Ronald Stanley Haines, BSc PhD *N.S.W.*

First Year Chemistry

Director of First Year Classes in Chemistry

Tristan John Victor Findlay, BSc PhD *St.And.*, CChem, FRSC, FRACI

Lecturers

Peter See Kien Chia, MSc PhD *N.S.W.*
Douglas Neil Duffy, MSc DPhil *Waik.*

Senior Tutors

Jeffrey John Gibson, MSc PhD *Syd.*
Joan Pauline Ross, BSc *Syd.*
Ruth Martha Shaw, BA *Hunter*, PhD *C'nell.*

Tutors

Alexander Durie, BAAppSc *R.M.I.T.*, MAppSc *Chisholm I.T.*
Jognandan Kumar, BSc *G.N.D. Amritsar*, MSc *Meerut*

School of Mathematics

Professor and Head of School

Ian Hugh Sloan, BA BSc *Melb.*, MSc *Adel.*, PhD *Lond.*

Professor of Applied Mathematics

Viliam Teodor Buchwald, BSc *Manc.*, MSc PhD *Lond.*, FIMA

Professor of Applied Mathematics

Roger Hamilton James Grimshaw, MSc *Auck.*, PhD *Camb.*

Professors of Pure Mathematics

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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.*
Richard Ottmar Jozsa, BSc *Monash*, MSc DPhil *Oxf.*
William Thomas Perrins, MA *Camb.*, DipEd *Mitchell C.A.E.*

Tutors

Ann Margaret Cowling, BSc *Melb.*
Geoffrey John Coombs, MSc *Monash*, PhD *Edin.*
Shahaboddin Ghahreman, MSc *Lond.*
Peter Thomas O'Brien, BSc DipEd *N.S.W.*
Milan Pahor, BSc *W'gong.*
Jennifer Judith Randell, MSc *Witw.*
Derek Noel Ward, BSc DipEd *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

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Senior Lecturers

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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, BEng BSc *Cairo*, PhD *Br.Col.*
Iain Raeburn, BSc *Edin.*, PhD *Utah*
John St Alban Sandiford, MSc *Syd.*
Colin Eric Sutherland, BSc *Cant.*, PhD *Calif.*
David Graham Tacon, BSc *N'cle.(N.S.W.)*, PhD *A.N.U.*
Dennis William Trenerry, BSc PhD *Adel.*

Lecturers

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Shaun Anthony Requa Disney, BA BSc *Adel.*, DPhil *Oxf.*
Anthony Haynes Dooley, BSc PhD *A.N.U.*
Michael David Hirschhorn, BSc *Syd.*, MSc *Edin.*, PhD *N.S.W.*
Rodney Kelvin James, BSc PhD *Syd.*

Senior Tutor

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Emeritus Professor

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Alexander Anthony Kumjian, MA PhD *Calif.*

Honorary Associate

John Harold Loxton, MSc *Melb.*, PhD *Camb.*

Department of Applied Mathematics

Associate Professor

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Senior Lecturers

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Brian James Burn, MSc *Otago*, PhD *Camb.*
William Dennis McKee, BSc *Adel.*, MSc *Flin.*, PhD *Camb.*
Jason Harry Falla Middleton, BSc PhD *Monash*
Elvin James Moore, MSc *W.Aust.*, PhD *Harv.*
Richard Wyndham O'Brien, BE *N.S.W.*, PhD *Camb.*
Alexander Hugh Opie, BSc DipEd *Melb.*, PhD *Monash*, FAIP
Kok-Lay Teo, BSc *Sing.*, MASc PhD *Ott.*, MIEEE, AMIEE

Lecturers

Peter James Blennerhassett, BE *W.Aust.*, PhD *Lond.*
David Charles Guiney, BSc PhD *Adel.*
Stephen Joe, MSc *Massey*, PhD *N.S.W.*
Douglas Edward Mackenzie, BSc *Tas.*, FIMA, MACE
John Michael Murray, MSc *N.S.W.*, PhD *Wash.*
David Allan Mustard, BSc *Syd.*, MSc *N.S.W.*
Robert Spencer Womersley, BSc *Adel.*, MSc PhD *Dundee*

Senior Tutor

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Linda Walsh, BSc PhD *Manc.*

Research Fellow

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Simon Jacques Prokhovnik, BA MSc *Melb.*

Department of Statistics

Associate Professor

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Senior Lecturers

Peter John Cooke, MSc *N.E.*, MS PhD *Stan.*
John Anthony Eccleston, BSc *Syd.*, MSc *Manc.*, PhD *C'nell.*
Manohar Khanderao Vagholkar, MSc *Bom.*, DIC PhD *Lond.*

Lecturers

Ronald Bruce Davis, BSc *Syd.*, *MSc N.S.W.*, DipEd *N.E.*
Marek Musiela, MMath *Wroclaw*, PhD *Polish Acad. Sc.*, DSc *Grenoble*

Professional Officer

Rhonda Gock, BSc MStats *N.S.W.*

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Geoffrey Kennedy Eagleson, BSc PhD *Syd.*

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
David Philip Crewther, MSc *Melb.*, PhD *Cal.Tech.*
Stephen John Dain, BSc PhD *City*, FBCO, MIESAust
Daniel James O'Leary, MSc PhD *Wales*, FBOA, FSMC

Lecturers

Philip James Anderton, BOptom BSc PhD *N.S.W.*, MScOptom *Melb.*
Graham Leslie Dick, MSc *N.S.W.*, ASTC, FIO
Angela Kathleen McCarthy, MSc *N.S.W.*, ASTC, FIO
David Cecil Pye, MOptom *N.S.W.*

Tutors

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Donald Keith Martin, BOptom PhD *N.S.W.*

Senior Research Officer

Sheila Gillard Crewther, MSc DipEd *Melb.*, PhD *Cal.Tech.*

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Instructor

Ian William Robinson

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Janette Mildred Button
Michael Peter Ryan

School of Physics

Associate Professor and Head of School

John Charles Kelly, BSc *Syd.*, PhD *R'dg.*, DSc *N.S.W.*, CPhys, FInstP, FAIP, MAmPS

Professor of Experimental Physics and Head of Department of Applied Physics

Hiroshi Julian Goldsmid, BSc PhD DSc *Lond.*, FAIP

Professor of Experimental Physics

Kenneth Norman Robert Taylor, BSc PhD *Birm.*

Professor of Theoretical Physics and Head of Department of Theoretical Physics

Heinrich Hora, DiplPhys *Halle*, DrRerNat *Jena*, DSc *N.S.W.*, FInstP, FAIP

Professor

Hans Gerard Leonard Coster, MSc PhD *Syd.*, MInstP, MAIP

Professor and Head of Department of Condensed Matter Physics

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Senior Lecturer and Executive Assistant to Head of School

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Director of First Year Studies

Dr G. J. Russell

Principal Tutor
Paul Michael O'Halloran, BA *Macq.*, MEd *N.S.W.*

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Edward Peter Eyland, BSc MPhysics *N.S.W.*, BD *Lond.*
Martin Desmond Knight, BSc *N.S.W.*

Tutors
Jaan Ferdinand Jouke Boersma, MSc *Tas.*
Gail Patricia Box, BSc PhD *N'cle. (N.S.W.)*
Gary James Bryant, BSc *N.S.W.*
Bruce Denby, BSc *N.S.W.*
Michael Philip Goldsworthy, MSc *N.S.W.*
Joseph Khachan, BSc *N.S.W.*
Marlene Noella Read, BSc PhD *N.S.W.*
Sophia Sakellis, DipPhysics *Patras*, MSc *N.S.W.*
Roberta Ann Vaile, BSc *N'cle.(N.S.W.)*
Peter Charles Wall, BSc *N.S.W.*
Perry Robert Wiles, BSc *N.S.W.*

Professional Officers
Peter Robert Barker, BSc PhD *Monash*
Jack William Cochrane, BApplSc *Canberra C.A.E.*, MPhysics *N.S.W.*
Susan Elizabeth Murray-Jones, BSc *N.S.W.*
Barry Perczuk, BSc PhD *Monash*
Jeremy Karl Walter, BSc *Lond.*

Honorary Associates
John Stuart Dryden, MSc *Melb.*, PhD DIC *Lond.*, FAIP
Patrick Kelly, MA PhD ScD *Camb.*, FAIP, MInstP

Honorary Visiting Fellows
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Gerard Raoul Newman, BSc *Melb.*, PhD DIC *Lond.*
Stephen George Szirmai, BSc PhD *N.S.W.*

Department of Applied Physics

Associate Professor
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Erik Harting, BSc PhD *N.S.W.*, ASTC, MAIP
Victor Raymond Howes, BSc PhD *Lond.*
Kenneth Reid Vost, BSc *Glas.*, MSc PhD *N.S.W.*, AMAusIMM

Department of Astrophysics and Optics

Senior Lecturer and Head of Department of Astrophysics and Optics
John William Vanstan Storey, BSc *LaT.*, PhD *Monash*

Senior Lecturers
Zdenek Kviz, DipPhys *Brno*, CScRerNatDr *Charles*, PhD *Prague*
Peter Mitchell, BSc PhD *Adel.*, MAIP
George Lange Paul, MSc *Syd.*, PhD *Edin.*
Betty Louise Turtle, BSc *Adel.*, PhD *A.N.U.*

Department of Biophysics

Senior Lecturer and Head of Department of Biophysics
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Senior Lecturers
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Raymond Gary Simons, BSc *Syd.*, MSc *Tel Aviv*, PhD *N.S.W.*
Joseph Albert Wolfe, BSc *Qld.*, PhD *A.N.U.*

Lecturer
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Department of Condensed Matter Physics

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Senior Lecturers
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Colin Trevor Grainger, BSc DipEd *Syd.*, MSc *N.E.*, PhD *N.S.W.*, MInstP, MAIP
Leslie Beven Harris, BSc *Lond.*, BA DipEd *Durh.*, PhD *N.S.W.*, CEng, FIM, FInstP
David John Miller, BSc PhD *N.S.W.*, DipEd *Syd.*, MAIP, MAmPS, MAAPT
Graeme John Russell, BSc PhD *N.S.W.*, MInstP, GradAIP

Lecturer
Michael Gal, MSc PhD *E.L.Bud.*

Department of Theoretical Physics

Associate Professors
David Neilson, BSc *Melb.*, MS PhD *N.Y. State*
Jaan Oitmaa, BSc PhD *N.S.W.*, FAIP, MAmPS

Senior Lecturer
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, MAmPS

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 1987

Theatres

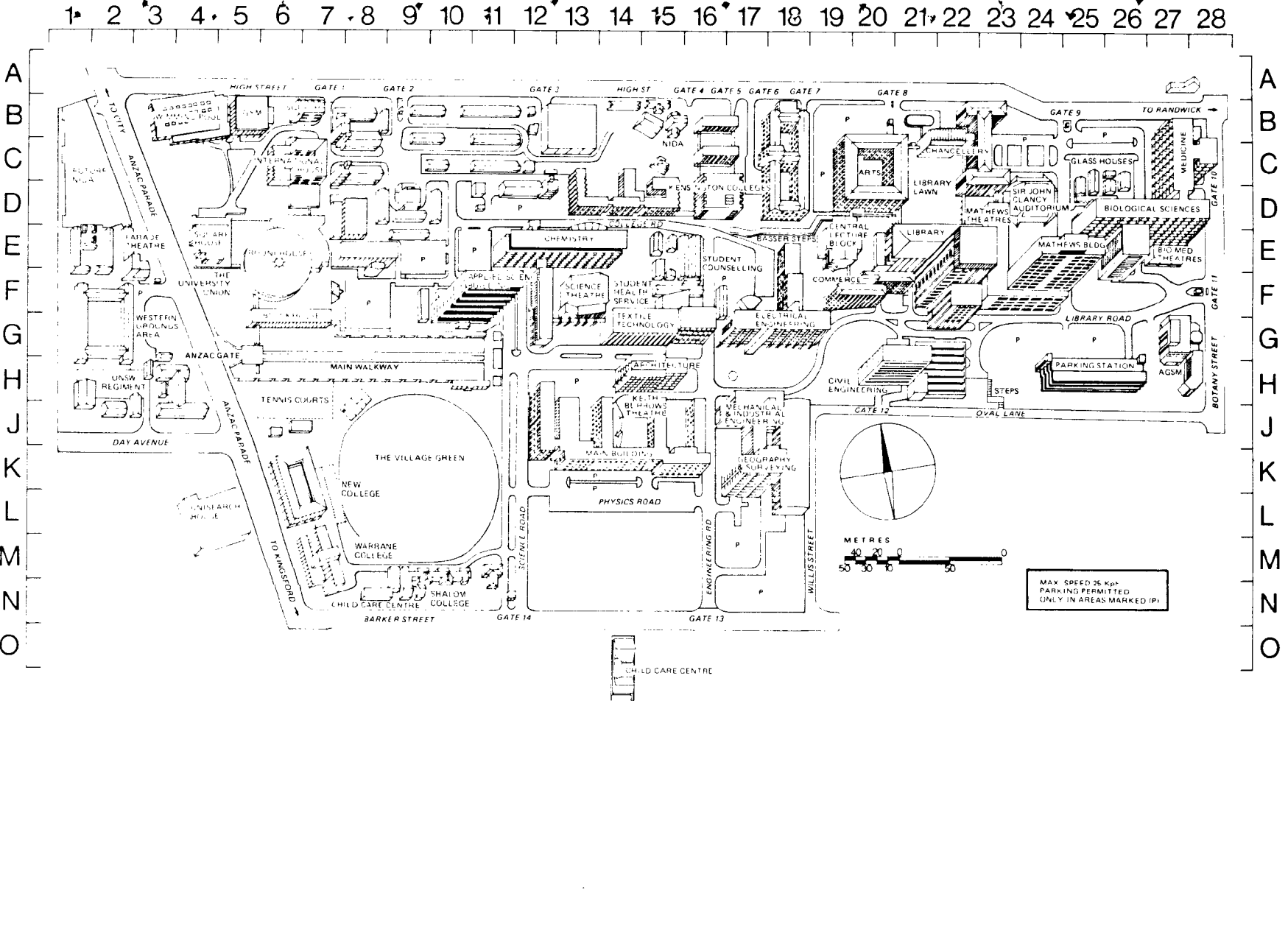
Biomedical Theatres **E27**
Central Lecture Block **E19**
Classroom Block (Western Grounds) **H3**
Rex Vowels Theatre **F17**
Keith Burrows Theatre **J14**
Main Building Theatrette **K14**
Mathews Theatres **D23**
Parade Theatre **E3**
Science Theatre **F13**
Sir John Clancy Auditorium **C24**

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 (Office)**
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**
NIDA **D2**
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 **F15**
Alumni and Ceremonials **C22**
Anatomy **C27**
Applied Geology **F10**
Applied Science (Faculty Office) **F10**
Architecture
(including Faculty Office) **H14**
Arts (Faculty Office) **C20**
Audio Visual Unit **F20**
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 **F15**
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**
Commerce (Faculty Office) **F20**
Committee in Postgraduate Medical
Education **B27**
Community Medicine **D26**
Computing Services Unit **F21**
Continuing Education Support Unit **F23**
Economics **F20**
Education **G2**
Education Testing Centre **E15d**
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 Science and 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 **H14**
Industrial Engineering **J17**
Institute of Rural Technology **B8b**
Japanese Economic Management
Studies Centre **G14**
Kanga's House **O14**
Kindergarten (House at Pooh Corner) **N8**
Landscape Architecture **K15**
Law (Faculty Office) **F21**
Law Library **F21**
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 **D2**
Nuclear Engineering **J17**
Off-campus Housing **C22**
Optometry **J12**
Organizational Behaviour **F20**
Pathology **C27**
Patrol and Cleaning Services **F20**
Philosophy **C20**
Physics **K15**
Physical Education and
Recreation Centre (PERC) **B5**
Physiology and Pharmacology **C27**
Political Science **C20**
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 **C20**
Sport and Recreation **E4**
Student Counselling and Research **F15**
Student Health **F15**
Student Records **C22**
Students' Union **E4 and C21**
Surveying **K17**
Tertiary Education Research Centre **E15d**
Textile Technology **G14**
Theatre Studies **B10**
Town Planning **K15**
University Archives **C22**
University Press **A28**
University Union (Blockhouse) **G6**
Wool and Pastoral Sciences **B8a**
Zoology **D26**


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
NIDA
KENSINGTON COLLEGES
CHANCELLERY
ARTS
LIBRARY LAWN
GLASS HOUSES
MEDICINE
SIR JOHN CLANCY AUDITORIUM
MATHEWS THEATRES
BIOLOGICAL SCIENCES
MATHEWS BLDG
BIO MED THEATRES
GATE 10
GATE 11
BASSER STEPS
CENTRAL LECTURE BLOCK
LIBRARY
COMMERCE
LIBRARY ROAD
PARKING STATION
AGSM
BOTANY STREET
CIVIL ENGINEERING
STEPS
GATE 12
OVAL LANE
CHEMISTRY
APPLE ICE SCENE
SCIENCE THEATRE
STUDENT HEALTH SERVICE
STUDENT COUNSELLING
TEXTILE TECHNOLOGY
ELECTRICAL ENGINEERING
ARCHITECTURE
KEITH BURROWS THEATRE
MECHANICAL & INDUSTRIAL ENGINEERING
MAIN BUILDING
GEOGRAPHY & SURVEYING
PHYSICS ROAD
ENGINEERING RD
WILLIS STREET
SCIENCE ROAD
GATE 13
GATE 14
BARKER STREET
CHILD CARE CENTRE
SHALOM COLLEGE
THE VILLAGE GREEN
NEW COLLEGE
WARRANE COLLEGE
UNISEARCH HOUSE
TO KINGSFORD
TENNIS COURTS
MAIN WALKWAY
ANZAC GATE
DAY AVENUE
WESTERN GROUNDS AREA
UNSW REGIMENT
THE UNIVERSITY UNION
GARAGE THEATRE
SQUARE HOUSE
ROUNDHOUSE
METRES
40 20 0 0
50 30 10 50
MAX SPEED 25 Kph
PARKING PERMITTED
ONLY IN AREAS MARKED (P)
CHILD CARE CENTRE

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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.

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The Calendar costs $6.00 (plus postage $1.40, interstate $1.80).

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