The University of New South Wales

Sciences

Board of Studies in Science
and Mathematics

Faculty of Biological Sciences

Faculty of Science

1977
Faculty Handbook

Arms of
**The University of
New South Wales**

Heraldic Description of Arms

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

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

The University of New South Wales

Sciences

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

1977
Faculty Handbook

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

Information in this Handbook has been brought up to date as at 13 September 1976, but may be amended without notice by the University Council

Contents

Sciences

Sciences

Sciences

General Information

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

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

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

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

Some people who can help you

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

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

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

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

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

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

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

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

The Student Health Unit is located in Hut E on College Road. The Director is Dr Max Napthali. For *medical aid* phone 2679 or 3275.

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

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

The Chaplaincy Centre is located in Hut F at the foot of Basser Steps. For spiritual aid consult Rev Phillip Jensen (Anglican)—2684; Rev Father Michael Fallon (Catholic)—2379; Dr Allen Elliott (Church of Christ)—2683; Rev Peter Holden (Methodist)—2683; Mr Glen Weare (Seventh Day Adventist)—2683; Mr Ze'ev Dar (Jewish)—3273; Rev Barry Waters (Baptist)—398 4065.

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

Calendar of Dates

1977

Session 1	7 March to 14 May.
(14 weeks)	*May Recess:* 16 May to 21 May
	23 May to 18 June
	Midyear Recess: 20 June to 23 July
Session 2	25 July to 27 August
(14 weeks)	*August Recess:* 29 August to 3 September
	5 September to 5 November
	Study Recess: 7 November to 12 November
Monday 14 November	Annual examinations begin
Tuesday 6 December	Annual examinations end

January

Monday 3	New Year's Day—Public Holiday
Friday 7	Last day for application for review of results of *annual* examinations
	Last day for application for permission to re-enrol by students who infringed re-enrolment rules at *annual* examinations
Monday 10	Timetables for *deferred* examinations available
Friday 14	Last day for acceptance of applications by Admissions Office for transfer to another course within the University
Monday 24	*Deferred* examinations begin
Monday 31	Australia Day—Public Holiday

February

Saturday 5	*Deferred* examinations end
Monday 14	Enrolment period begins for new students and students repeating first year
Tuesday 15	Last day for appeal against exclusion by students who infringed re-enrolment rules at *annual* examinations
Friday 18	*Deferred* examination results available
Monday 21	Enrolment period begins for second and later year students
Tuesday 22	Last day for application for review of *deferred* examination results

Friday 25	Last day for application for permission to re-enrol by students who infringed re-enrolment rules at *deferred* examinations

March

Monday 7	**Session 1 commences**
Friday 11	Last day for acceptance of enrolments by new students (late fee payable)
Thursday 17	Last day for appeal against exclusion by students who infringed re-enrolment rules at *deferred* examinations

April

Friday 1	Last day for acceptance of enrolments by students re-enrolling in second and later years (late fee payable) Last day for students other than those attending the University for the first time to discontinue without failure subjects which extend over Session 1 only Last day to enrol in additional subjects
Friday 8 to Monday 11	Easter
Monday 25	Anzac Day—Public Holiday
Friday 29	Last day for students attending the University for the first time to discontinue without failure subjects which extend over Session 1 only

May

Tuesday 10	Publication of provisional timetable for June/July examinations
Thursday 12	Last day for acceptance of corrected enrolment details forms Last day for applications from students completing requirements at end of Session 1 for admission to University degrees and diplomas
Monday 16	**May Recess begins**
Friday 20	Last day for students other than those attending the University for the first time to discontinue without failure subjects which extend over the whole academic year
Saturday 21	**May Recess ends**
Monday 23	Last day for students to advise of examination timetable clashes

June

Tuesday 7	Publication of timetable for June/July examinations
Monday 13	Queen's Birthday—Public Holiday
Sunday 19	**Session 1 ends**
Monday 20	**Midyear Recess begins**
Tuesday 21	Midyear examinations begin

July

Tuesday 5	Midyear examinations end
Saturday 23	**Midyear Recess ends**
Monday 25	**Session 2 begins**
Thursday 28	Foundation Day

August

Friday 5	Last day for students attending the University for the first time to discontinue without failure subjects which extend over the whole academic year
Friday 19	Last day for students other than those attending the University for the first time to discontinue without failure subjects which extend over Session 2 only
Monday 29	**August Recess begins**
Wednesday 31	Last day for acceptance of applications for re-admission in 1978 after exclusion under the re-enrolment rules

September

Saturday 3	**August Recess ends**
Monday 12	Last day for applications from students completing requirements at end of Session 2 for admission to University degrees and diplomas
Wednesday 14	Last day for return of corrected enrolment details forms
Friday 16	Last day for students attending the University for the first time to discontinue without failure subjects which extend over Session 2 only
Tuesday 27	Publication of provisional timetable for annual examinations
Friday 30	Last day to apply to MUAC for transfer to another university in Sydney metropolitan area and Wollongong

October

Monday 3	Eight Hour Day—Public Holiday
Friday 7	Last day for students to advise of examination timetable clashes
Tuesday 25	Publication of timetable for annual examinations

November

Saturday 5	**Session 2 ends**
Monday 7	**Study Recess begins**
Monday 14	Annual examinations begin

December

Tuesday 6	Annual examinations end
Sunday 25	Christmas Day
Monday 26	Boxing Day
Tuesday 27	Public Holiday

1978

Session 1	6 March to 14 May
	May Recess: 15 May to 21 May
	22 May to 18 June
	Midyear Recess: 19 June to 23 July
Session 2	24 July to 27 August
	August Recess: 28 August to 3 September
	4 September to 5 November
	Study Recess: 6 November to 12 November
Monday 13 November	Annual examinations begin
Tuesday 7 December	Annual examinations end

January

Monday 2	Public Holiday
Friday 6	Last date for application for review of results of *annual* examinations
Monday 9	Publication of timetable for *deferred* examinations
Friday 13	Last day for acceptance of applications by Admissions Office for transfer to another course within the University
Tuesday 24	*Deferred* examinations begin
Monday 30	Australia Day—Public Holiday

February

Saturday 4	*Deferred* examinations end
Monday 13	Enrolment period begins for new students and students repeating first year
Friday 17	Results of *deferred* examinations available
Monday 20	Enrolment period begins for second and later year students
Tuesday 21	Last day for applications for review of *deferred* examination results

The Academic Year

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

Session 1 commences on the first Monday of March.

Organization of the University

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

In 1976 the University had 18,378 students and 4000 staff who worked in more than eighty buildings. These figures include staff and students at Broken Hill (W. S. and L. B. Robinson University College), Duntroon (the Faculty of Military Studies) and Jervis Bay.

The Council

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

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

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

The Chairman of the Council is the Chancellor, the Hon. Mr. Justice Samuels, and the Deputy Chancellor is Dr F. M. Mathews.

The Professorial Board

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

The Faculties

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

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

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

The Schools

Once courses of study have been approved they come under the control of the individual Schools (eg the School of Chemistry, the School of Mathematics). The professorial 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, Professor Rupert Myers, is charged with managing and supervising the administrative, financial and other activities of the University.

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

General Administration

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

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

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

The Property Division is concerned with the maintenance of buildings and grounds and equipment, and includes the University Architect's office.

Student Representation on Council and Faculties

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

Students proceeding to a degree or a graduate diploma may elect one of their number to a Faculty for each 500 registered students, with a minimum of three students per Faculty. Elections are for a one-year term of office. New provisions for student membership of faculties and boards of studies have been approved by Council, providing for each faculty/board to recommend its own formula for determining the number of students eligible.

Open Faculty Meetings

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

Award of the University Medal

The University may award a bronze medal to the students who have most distinguished themselves in their final year.

Identification of Subjects by Numbers

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

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 G54, Morven Brown Building (663 0351 Extn. 3478).

Sciences

Student Services and Activities

The University Library

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

There are also library services at other centres:

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

The library at the Broken Hill Division in the W. S. and L. B. Robinson University College building. Phone 6022/3/4.

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

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

Staff and students normally use a machine-readable identification card to borrow from the University libraries. For students, a current union card is acceptable. Staff must apply to the library for a library card.

Accommodation

Residential Colleges

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

The Kensington Colleges

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

International House

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

New College

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

Shalom College

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

Warrane College

Warrane College provides accommodation for 200 men and is open to students of all ages, backgrounds and beliefs. A comprehensive tutorial program is offered along with a wide variety of activities and opportunities to meet informally with members of the University staff. Non-resident membership is available to male students who wish to participate in College activities and make use of its facilities. Warrane is directed by the International Catholic lay association Opus Dei. Apply in writing to the Master, Warrane College, PO Box 123, Kensington, NSW 2033. Phone: 663 6199.

Creston Residence

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

Other Accommodation

Off-campus Accommodation

Students requiring other than College accommodation may contact the Housing Officer in the Student Amen-

6

ities and Recreation Unit for assistance in obtaining suitable lodging in the way of full board, room with cooking facilities, flats, houses, share flats, etc. Extensive listings of all varieties of housing are kept up-to-date throughout the year and during vacations.

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

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

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

Student Employment and Scholarships

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

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

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

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

Student Health

A student health clinic and first aid centre is situated within the University. It is staffed by three qualified medical practitioners, assisted by two nursing sisters. The medical service, although therapeutic, is not intended to entirely replace private or community health services. Thus, where chronic or continuing conditions are revealed or suspected, the student may be referred to a private practitioner or to an appropriate hospital for specialist opinion and/or treatment. The health service is not responsible for fees incurred in these instances. The service is confidential and students are encouraged to attend for advice on matters pertaining to health.

The service is available to all enrolled students by appointment, free of charge, between 9 am and 5 pm Mondays to Fridays. For staff members, immunizations

are available, and first aid service in the case of injury or illness on the campus.

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

Appointments may be made by calling at the centre or by telephoning extension 2679 or 3275 during the above hours.

The Family Planning Association of NSW conducts clinics at the Student Health Unit and at the adjacent Prince of Wales Hospital. These clinics are open to staff and students and appointments may be made for the Student Health Unit clinic by telephoning 698 9499, or for The Prince of Wales Hospital clinics by telephoning 399 0111.

Student Counselling and Research

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

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

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

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

Student Amenities and Recreation

In general the Student Amenities and Recreation Unit seeks ways to promote the physical, social and educational development of students through their leisure time activities. The Unit provides, for example, a recreational program for students and staff at the Physical Education and Recreation Centre; negotiates with the Public Transport Commission of NSW on student travel concessions and supplies concession forms for bus, rail, ferries and

planes; assists students with off-campus housing; and, in consultation with the Sports Association, assists various recognized clubs.

The Unit is located in Hut B at the foot of Basser Steps. The various services may be contacted by phone on the following extensions: Recreation Program 3271; Travel 2617; Accommodation 3260; Sports Association 2673.

Physical Education and Recreation Centre

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

The Sports Association

The Sports Association caters for a variety of competitive sports for both men and women. Membership is compulsory at $6 per year for all registered students and is open to all members of staff and graduates of the University.

The Sports Association office is situated in Hut G, near the bottom of Basser Steps, and the control of the Sports Association is vested in the General Committee. The Executive Officer of the Sports Association may be contacted on extension 2673.

The University Union

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

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

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

Full information concerning courses is contained in a booklet obtainable from the Union's Program Department. The University Union should not be confused with the Students' Union or Students' Representative Council as it is known in some other universities. This latter body has a representative function and is the instrument whereby student attitudes and opinions are crystallized and presented to the University and the community.

The Students' Union

The Students' Union is run by students and represents them on and off campus. Presidential elections are by popular vote and all students who have completed two years at the University are eligible for election.

A full-time President, elected each year by popular ballot, directs the entire administration of the Students' Union and its activities, through the permanent Administrative Officer.

Other full-time officers include the **Education Vice-President** who works towards the implementation of Student Union education policy and in assisting students with problems they may encounter in the University; **Director of Overseas Students** who deals with specific problems these students may encounter while in Australia.

Both are elected by students with the latter elected by overseas students.

Membership is compulsory at $10 per annum*.

The activities of the Students' Union include:

1. Infakt: a student-run information referral service. If you want someone to talk to or need help of any kind see the people at Infakt located in the bus at the foot of Basser Steps.

2. A casual employment service.

3. Organization of Orientation Week.

4. Organization of Foundation Day.

5. A nursery/kindergarten, *The House at Pooh Corner*.

6. Publication of the student paper *Tharunka*.

* A rise in Students' Union fees may occur in 1977.

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

8. Students' Union Record Shop which gives an 18% discount.

9. The Nuthouse which deals in bulk and health foods.

10. Secondhand Bookshop for cheap texts.

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

The Students' Union is affiliated with the Australian Union of Students (AUS) which represents students on the national level.

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

Chaplaincy Centre

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

Other Services and Activities

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

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

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

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

Australian Armed Forces Enquiries should be directed to:

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

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

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

Financial Assistance to Students

Tertiary Education Assistance Scheme

Under this scheme, which is financed by the Australian 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.

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

● Undergraduate and graduate degree courses

● Graduate diplomas

● Approved combined Bachelor degree courses

● Master's qualifying courses if the course is the equivalent of an honours year and the student has not attempted an honours year.

Benefits (as at 30 June 1976)
Means-tested Living Allowance The maximum rates of living allowances are $1,000 per annum for students living at home and $1,600 per annum for students living away from home. The maximum rates of living allowance will be paid where the adjusted family income is equal to *or* less than $7,600 per annum. The adjusted family income is assessed by subtracting from the gross income of both parents their business expenses and an amount of $450 for each dependent child other than the student.

When the adjusted family income exceeds $7,600 pa the amount of living allowance will be reduced by $2 for every $10 of income until the family income exceeds $15,200 per annum. After this level, the living allowance will be reduced by $3 for every $10 of income.

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

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

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

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

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

How to Apply 1976 Higher School Certificate candidates and tertiary students receiving an allowance were sent forms last October. Other students may obtain forms from the Admissions Section *or* the Student Employment and Scholarships Unit, *or* from the Regional Director, Department of Education, 323 Castlereagh Street, Sydney, NSW 2000 (Phone 218 8800). The administrative closing date for 1977 applications was 31 October 1976.

Scholarships, Cadetships, Prizes

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

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

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

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

Details of graduate awards are contained in the University Calendar.

Other Financial Assistance

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

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

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

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

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

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

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

Financial Assistance to Aboriginal Students

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

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

Fund for Physically Handicapped and Disabled Students

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

Rules and Procedures

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

Admission

Where can I get information about admission?

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

Applications for special admission, admission with advanced standing and from persons relying for admission on overseas qualifications should be lodged with this office. The Office also receives applications from students who wish to transfer from one course to another, resume their studies after an absence of twelve months or more, or seek any concession in relation to a course in which they are enrolled. It is essential that the closing dates for lodgment of applications are adhered to. For further details see the sections below on Enrolment and Fees.

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

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

Details of the procedure to be followed by students seeking entry to first year courses at the University may be obtained from the Admissions Office or the Metropolitan Universities Admissions Centre.

How do I qualify for admission?

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

Enrolment

How do I enrol?

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

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

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

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

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

New Undergraduate Enrolments

Persons who are applying for entry in 1977 must lodge an application for selection with the Metropolitan Universities Admissions Centre, PO Box 7049, GPO, Sydney 2001, by 1 October 1976.

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

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

First Year Repeat Students

First year students who failed more than half the program at the 1976 Annual Examinations and who were not granted any deferred examinations should NOT follow the above procedure. They are required to *show cause* why they should be allowed to continue in the course, and should await instructions in writing from the Registrar as to the procedure.

Later Year Enrolments

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

New Research Students

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

Re-enrolling Research Students

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

Submission of Graduate Thesis or Project Report at Commencement of Session 1

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

Miscellaneous Subject Enrolments

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

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

Students who have obtained written permission to enrol may attend the Unisearch House enrolment centre on:

Friday 4 March
9.30 am to 12.30 pm

or they may attend the Admissions Office, Chancellery, at the times shown below.

Week Commencing 7 March	Monday to Friday 9.30 am to 1.00 pm 2.00 pm to 4.30 pm 5.30 pm to 7.00 pm
Week Commencing 14 March	Monday to Friday 9.30 am to 1.00 pm 2.00 pm to 4.30 pm Wednesday and Friday 5.30 pm to 7.00 pm

Final Dates for Completion of Enrolments

No enrolments for courses extending over the whole year or for Session 1 only will be accepted from new students after the end of the second week of Session 1 (18 March 1977) except with the express approval of the Deputy Registrar (Student Services) and the Heads of the Schools concerned; no later year enrolments for courses extending over the whole year or for Session 1 only will be accepted after the end of the fourth week of Session 1 (1 April 1977) except with the express approval of the Deputy Registrar (Student Services) and the Heads of Schools concerned. No enrolments for courses in Session 2 only will be accepted after the end of the second week of Session 2 (5 August 1977) except with the express approval of the Deputy Registrar (Student Services) and the Heads of Schools concerned.

How do assisted students (eg scholarship holders) enrol?

Scholarship holders or sponsored students who have an enrolment voucher or letter of authority from their sponsor should present it at the time of enrolment. Such vouchers and authorities are generally issued by the NSW Department of Education and the NSW Public Service. They are not always issued in time and students who expect to receive an enrolment voucher or other appropriate authority but have not done so must pay the fees (and arrange a refund later). Such vouch-

ers and authorities are not the responsibility of the University and their late receipt is not to be assumed as automatically exempting a student from the requirements of enrolling and paying fees.

What special rules apply if I wish to be considered for admission with advanced standing?

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

Can I transfer from one course to another?

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

Can I change my course program?

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

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

Withdrawal from subjects

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

First Year Students

1. one-session subjects: the end of the eighth week of session;

2. double-session subjects: the end of the second week of Session 2.

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

Other Students

1. one-session subjects: the end of the fourth week of session;

2. double-session subjects: the end of the May Recess.

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

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

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

Are there any restrictions upon students re-enrolling?

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

First-year Rule

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

Repeated-failure Rule

2. A student shall be required to show cause why he/she should be allowed to repeat a subject which that student has failed more than once. *Where the subject is prescribed as part of the student's course he/she shall also be required to show cause why he/she should be allowed to continue that course.* Failure in a deferred examination as well as in the initial examination counts for the purposes of this rule as one failure.

*For details of Schedule A see **Restrictions upon Students Re-enrolling** in the University Calendar.

General Rule

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

The Session-unit System

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

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

Exemption from Rules by Faculties

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

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

'Showing Cause'

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

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

Appeal

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

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

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

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

The decision of the Committee shall be final.

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

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

Exclusion

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

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

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

† It is proposed that under this arrangement, the membership of the Appeal Committee will be Pro-Vice-Chancellor J. B. Thornton (Chairman), Professor D. M. McCallum, Chairman of the Professorial Board, and a member of Council in the category of members elected by the graduates of the University, nominated by the Vice-Chancellor.

Re-admission after Exclusion

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

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

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

Restrictions and Definitions

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

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

How do I apply for admission to degree or diploma?

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

Fees*

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

Do I have to pay fees for tuition?

As a result of a decision by the Commonwealth Government, no tuition fees are charged in 1977.

What other fees and charges are payable?

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

How much is my contribution to student activities and services on campus?

All students (with the exceptions noted below) will be required to pay the following fees if enrolling for a program involving two sessions. Those enrolling for only one session will pay one-half of the Student Activities Fees, but the full University Union entrance fee, if applicable.

Student Activities Fees

University Union—$25 entrance fee, payable on first enrolment

University Union—$45 annual subscription

Sports Association—$6 annual subscription

Students' Union:

Students enrolling in full-time courses—$10 annual subscription

Students enrolling in part-time courses—$8 annual subscription

Miscellaneous—$25 annual fee.

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

Are fees charged for examinations?

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

Examinations conducted under special circumstances—for each subject $11

Review of examination result—for each subject $11

What penalties exist for late payment of fees?

The following additional charges will be made in 1977 when fees are paid late:

Failure to lodge enrolment form according to enrolment procedure $20

* Fees quoted are current at the time of publication and may be amended by the Council without notice.

Payment of fees after end of second week of
session $20

Payment of fees after end of fourth week of session $40

Locations and Hours of Cashier

Cashier's Offices are open during the enrolment periods referred to in this booklet. The locations and hours are shown below:

Unisearch House
221 Anzac Parade

Week Commencing 21 February	Week Commencing 28 February
Monday and Thursday	Monday to Thursday
10.00 am to 1.00 pm	9.30 am to 1.00 pm
2.00 pm to 5.00 pm	2.00 pm to 5.00 pm
6.00 pm to 9.00 pm	6.00 pm to 9.00 pm
Wednesday	Friday
10.00 am to 1.00 pm	9.30 am to 5.00 pm
2.00 pm to 5.00 pm	
Friday	
9.30 am to 1.00 pm	

Chancellery

Week Commencing 21 February	Week Commencing 28 February
Monday to Friday	Monday to Friday
9.30 am to 1.00 pm	9.30 am to 1.00 pm
2.00 pm to 4.30 pm	2.00 pm to 4.30 pm
Friday	6.00 pm to 9.00 pm
6.00 pm to 8.30 pm	

First Week of Session 1 Commencing 7 March	Third Week of Session 1 Commencing 21 March
Monday to Friday	Monday to Friday
9.30 am to 1.00 pm	9.30 am to 1.00 pm
2.00 pm to 4.30 pm	2.00 pm to 4.30 pm
5.30 pm to 8.00 pm	

Second Week of Session 1 Commencing 28 March	Fourth Week of Session 1 Commencing 14 March
Monday to Friday	Monday to Friday
9.30 am to 1.00 pm	9.30 am to 1.00 pm
2.00 pm to 4.30 pm	2.00 pm to 4.30 pm
Wednesday and Friday	Friday 26
5.30 pm to 8.00 pm	5.30 pm to 8.00 pm

Who is exempt from payment of fees?

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

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

3. University Union fees and subscriptions may be waived by the Deputy Registrar (Student Services) for students enrolled in graduate courses in which the academic requirements require no attendance on the Kensington campus.

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

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

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

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

8. All Student Activities Fees, for one or more sessions may be waived by the Deputy Registrar (Student Services) for graduate students who are given permission to pursue their studies away from the Kensington campus for one or more sessions.

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

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

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

Yes. The following rules apply:

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

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

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

If you fail to pay prescribed fees or charges or become otherwise indebted to the University and you fail to make a satisfactory settlement of your indebtedness upon receipt of due notice then you cease to be entitled to the use of University facilities. You will not be permitted to register for a further session, to attend classes or examinations, or be granted any official credentials. In the case of a student enrolled for Session 1 only or for Sessions 1 and 2 this disbarment applies if any portion of fees is outstanding after the end of the eighth week of Session 1 (29 April 1977). In the case of a student enrolled for Session 2 only this disbarment applies if any portion of fees is outstanding after the end of the sixth week of Session 2 (2 September 1977).

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

Can I get an extension of time to pay?

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

Examinations

When are examinations held?

Examinations for Session 2 and for Full Year subjects are held in November/December. Examinations for Session 1 subjects are held during the Midyear Recess. Provisional timetables indicating the dates and times of examinations and notices of the location of examinations are posted on the central notice boards in the Biological Sciences Building, the Chancellery, Central Lecture Block, Dalton Building (Chemistry), Main Building (Mining and Physics), and in the Western Grounds Area on 10 May and 27 September. You must advise the Examinations Unit (Chancellery) of a clash in examinations by 23 May and 7 October. Final timetables are displayed and individual copies are available for students on 7 June and 25 October.

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

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

How are examination passes graded?

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

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

When are examination results available?

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

Can examination results be reviewed?

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

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

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

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

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

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

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

Use of electronic calculators

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

How are examinations conducted?

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

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

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

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

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

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

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

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

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

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

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

Under what circumstances are deferred examinations granted?

Deferred examinations may be granted in the following cases:

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

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

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

4. Where a student's progression or graduation is inhibited by his failure in one subject only, a deferred examination may be granted notwithstanding his failure otherwise to qualify for this concession.

In the Faculties of Arts, Commerce and Law special circumstances apply in the granting of deferred examinations. Details in each circumstance are given in the section *Faculty Information* in the respective handbooks for these faculties, or in the Calendar.

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

Can I buy copies of previous examination papers?

Yes—for 5c each from the Union Shop in the University Union.

Essays

Should I list my sources?

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

Student Conduct on Campus

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

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

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

What are the rules related to attendance at classes?

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

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

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

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

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

Why is my University Union card important?

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

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

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

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

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

Why should I inform the University if I change my address?

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

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

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

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

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

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

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

How are student records kept up to date?

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

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

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

Can I get a permit to park on campus?

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

Lost Property?

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

Further Information

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

General

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

Notices

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

Appeals

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

The Calendar

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

Vice-Chancellor's Official Welcome to New Students

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

Full-time Students

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

Monday 28 February 1977
11 am in the Clancy Auditorium

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

Tuesday 1 March 1977
11 am in the Clancy Auditorium

Part-time Students

Tuesday 1 March 1977
6.30 pm in the Clancy Auditorium

Introduction to the Sciences Handbook

This handbook has been designed to assist understanding of the academic activities of three inter-related groups within the university, namely the Board of Studies in Science and Mathematics, the Faculty of Biological Sciences and the Faculty of Science. The Board is responsible for the undergraduate studies of students majoring in disciplines associated with the two faculties and several schools from other faculties. The regulations governing the award of the degree of Bachelor of Science form a substantial part of the handbook.

Several specialist courses of study, also leading to 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, with textbook lists, for units prescribed in the various regulations.

Faculty of Biological Sciences*

Staff

Comprises Schools of Psychology, Biological Technology, Biochemistry, Botany, Microbiology and Zoology.

Dean
Professor B. J. F. Ralph

Chairman
Professor S. H. Lovibond

Administrative Officer
Patrick James MacGinley, BA *N.S.W.*

Professional Officers
Rose Ann Varga, BSc *N.S.W.*
Peter Whaite, BE *N.S.W.*

Senior Tutors
Alan Robert Pierre Journet, BSc *Wales*, PhD *McG.*
Helen Patricia Ramsay, MSc PhD *Syd.*

Tutors
Alison Jean Gilbert, BAppSc *Darling Downs I.A.E.*
Carolyn Jean Jeffery, BSc *Qld.*
William Bernard Kilkeary, BSc *Syd.*
Gillian Sylvia Stephens, BScAgr *Syd.*

Professional Officer
Anthony Ross Smith-White, BSc *Syd.*

Research Assistant
Julia Steinborn, BSc *Syd.*

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

First Year Biology Teaching Unit

Director
Dr A. E. Wood

School of Biochemistry

Professor of Biochemistry and Head of School
Edward Owen Paul Thompson, MSc DipEd *Syd.*,
PhD ScD *Camb.*, ARACI

Professor of Biochemistry
Barry Vaughan Milborrow, BSc PhD DSc *Lond.*, FLS, FIBiol

Professor of Medical Biochemistry
William James O'Sullivan, BSc *W.Aust.*, PhD *A.N.U.*

Associate Professors
John Bruce Adams, MSc *Syd.*, PhD *N.S.W.*, ARACI
Keith Guenther Rienits, MSc *Syd.*, PhD *Birm.*
Philip John Schofield, BSc PhD *N.S.W.*

Senior Lecturers
Kevin David Barrow, MSc PhD *Adel.*
Antony George Mackinlay, MSc PhD *Syd.*

Lecturers
Aldo Sebastion Bagnara, BSc PhD *Melb.*
Michael Richard Edwards, MA PhD *Camb.*
Ian James McFarlane, BSc PhD *Syd.*
Kenneth Edward Moon, BSc PhD *N.S.W.*
Thomas Stanley Stewart, BSc *Syd.*, PhD *N.S.W.*
Roy Tirrell, BSc *Syd.*, PhD *N.S.W.*
George Zalitis, BSc PhD *W.Aust.*

Senior Tutor
Jill Lorraine Gibbons, BSc *Syd.*

Tutors
Pamela Frances Como, BSc *A.N.U.*
Swee Leong Pun, BSc *N.S.W.*
Wayne Keith Willis, BSc *N.S.W.*

Teaching Fellows
David Pavin Chandra, BSc *N.S.W.*
Ming San Foo, BSc *N.S.W.*
Arthur Brian Jenkins, BSc *Qld.*
Peter Henry Leighton, BSc *N.S.W.*
Karen Kwat Har Li, BSc *N.S.W.*

Professional Officers
Antonio Luiz d'Assumpcao, BSc *Syd.*
Walter Samuel Golder, BPharm MSc PhD *Syd.*, ASTC,
DipMedTech, MPS

Wayne George Kelly, MSc *N.S.W.*
Choy Soong Daniel Lee, MSc *N.S.W.*
Andrew George Netting, BSc PhD *N.S.W.*

School of Biological Technology

Professor of Biochemistry and Head of School
Bernhard John Fredrich Ralph, BSc *Tas.*, PhD *Liv.*, FRACI

Associate Professor
Pamela Athelie Deidre Rickard, BSc *Syd.*, MSc *N.S.W.*,
PhD *Lond.*

Senior Lecturer
Peter Lindsay Rogers, BE *Adel.*, DPhil *Oxon.*

Lecturers
Noel William Dunn, MSc *Melb.*, PhD *Monash*
Peter Philip Gray, BSc *Syd.*, PhD *N.S.W.*
David Edward Tribe, BSc *Melb.*

Professional Officers
Thomas Babij, BSc *Syd.*, MSc *N.S.W.*, ARACI
Robert Barrie Doble, BSc *N.S.W.*
Ching Lien Wong, MSc PhD *N.S.W.*

School of Botany

Professor of Botany and Head of School
Derek John Anderson, BSc *Nott.*, PhD *Wales*

Associate Professors
Mary Maclean Hindmarsh, BSc PhD *Syd.*
Haydn John Willetts, MSc *Brist.*, PhD *N.S.W.*

Sciences

Senior Lecturers
Michael John Kempster Macey, BSc *Lond.*, MSc PhD *N.S.W.*
John Henry Palmer, BSc PhD *Sheff.*, FIBiol
Christopher John Quinn, BSc *Tas.*, PhD *Auck.*
Robert Stanley Vickery, BScAgr PhD *Syd.*

Lecturers
Anne Elizabeth Ashford, BA *Camb.*, PhD *Leeds*
Stephen Francis Delaney, BSc *Sheff.*, PhD *Liv.*
Robert John King, BSc DipEd PhD *Melb.*
John Teast Waterhouse, BSc *Syd.*, MSc *N.S.W.*, MSc *R'dg.*, FLS
Alec Edward Wood, BScAgr *Syd.*, PhD *N.S.W.*

Tutor
Jane Tarran, BSc DipEd *N.S.W.*

Professional Officer
Milos Kratochvil, IngAgr *Prague*

Honorary Associates
Lawrence Alexander Sidney Johnson, BSc DSc *Syd.*
Spencer Smith-White, DScAgr *Syd.*, FAA

School of Microbiology

Professor of Medical Microbiology and Head of School
Geoffrey Norton Cooper, MSc PhD *Melb.*

Professor of Microbiology
Kevin Charles Marshall, BScAgr *Syd.*, MS PhD *Corn.*

Associate Professor
Anthony John Wicken, BSc PhD *Cape T.*, MA *Camb.*, FNZIC, ARIC

Lecturers
Yvonne Marie Barnet, BScAgr *Syd.*, PhD *N.S.W.*
Iain Couperwhite, BSc PhD *Strath.*
Brian James Wallace, BSc PhD *Melb.*

Senior Tutor
Basil Patrick McBrien, MSc *N.S.W.*, ASTC

Tutor
Barbara Lillian Blainey, BSc *Melb.*

Professional Officers
Beverley Humphrey, BSc *Syd.*
Mary Essic Johnsen, BSc *Qld.*
Kenneth Gerard Kenrick, FAIMLT
Marshall Henry Maxwell Wilson, BSc *N.S.W.*

Medical Microbiology

Senior Lecturers
Royle Anthony Hawkes, BScAgr *Syd.*, PhD *A.N.U.*
Graham Douglas Fischer Jackson, BSc PhD *Adel.*
Adrian Lee, BSc PhD *Melb.*

Senior Tutor
Elizabeth Hazel Hegarty, MSc *Qld.*

Tutors
Hazel Marjory Young, BSc *Strath.*
Nerissa Glenda Hartwig, BSc *Adel.*

Honorary Associate (School)
Phyllis Margaret Rountree, DSc *Melb.*, DipBact *Lond.*

School of Psychology

Professor of Psychology and Head of School
Laurence Binet Brown, MA DipEd *N.Z.*, PhD *Lond.*

Professor of Psychology
Sydney Harold Lovibond, BA *Melb.*, MA PhD DipSocSc *Adel.*

Professor of Psychology
Vacant

Associate Professor
Donald McNicol, BA *Adel.*, PhD *Camb.*

Administrative Officer
Trevor John Clulow, BA *N.S.W.*

Senior Lecturers
Stephen Bochner, BA *Syd.*, MA *Hawaii*, PhD *N.S.W.*
Alexander Edward Carey, BSc *Lond.*
Evan Edwin Davies, MA *Syd.*, PhD *N.S.W.*
Keith Raymond Llewellyn, BA PhD *Syd.*

Lecturers
Kevin Douglas Bird, BSc PhD *N.S.W.*
James Christopher Clarke, MA *N.Z.*, PhD *N.Y. State
(Stony Brook)*
Patrick John Cleary, BSc *Qld.*, PhD *N.S.W.*
Sydney Engelberg, BA *Rand.*, MS *Hebrew Univ. of Jerusalem*,
MA PhD *N.Y. State*
Austin Sorby Faust-Adams, BA *Adel.*, MA PhD *Mich.*
William Taylor Hardy, BA *Claremont*, MA PhD *Calif.*
William Hopes, BA *Syd.*
Edward James Kehoe, BA *Lawrence*, MA PhD *Iowa*
Charles Porter Kenna, BA BSc *Syd.*
Thomas Angus McKinnon, MA PhD *Syd.*
John Cunningham Murray, BA *Syd.*
George Paxinos, AB *Calif.*, MA PhD *McG.*
John Eaton Taplin, BSc PhD *Adel.*
Reginald Frederick Westbrook, MA *Glas.*, DPhil *Sus.*

Teaching Fellow
Luther Coleman Jones, BS *Texas*

Tutors
William Gordon Adams, BSc *N.S.W.*
Peter James Brandon, BA *N.S.W.*
Elizabeth Anne Kennedy, BA *Syd.*
Carmen Christine Moran, BA *N.S.W.*
Frank Rowland Pace, BA *W.Ont.*, MA *Sask.*
Glenn Peter Richard, BSc *Glas.*
Sherrill Spears, BA *N.S.W.*
Vaegen, BA *Syd.*, MSc *Monash*
Shirley Anne Walls, BA *N.S.W.*
Marie Jeanette Waterhouse, BA *Melb.*

Graduate Assistants
June Rosemary Martin, MSc *N.S.W.*
Noel Margaret Wilton, BSc *N.S.W.*

Professional Officer
Angus John Fowler, BSc *N.S.W.*

School of Zoology

Professor of Zoology and Head of School
Terence John Dawson, BRurSc PhD *N.E.*

Senior Lecturers
Charles Keith Goddard, BSc *Edin.*, PhD *St.And.*
Robert John MacIntyre, MSc *Cant.*, PhD *McG.*
Aola Mary Richards, MSc PhD *N.Z.*
Eleanor Margret Russell, BSc *Qld.*, PhD *Camb.*
Erik Shipp, BSc *Syd.*, PhD *N.S.W.*

Lecturers
Michael Lane Augee, BSc *Willamette*, PhD *Monash*
Francis Norman Carrick, BSc *N.S.W.*
Rossiter Henry Crozier, MSc *Melb.*, PhD *Corn.*
Peter Greenaway, BSc PhD *N'cle. (U.K.)*
Clifford John Francis Harrop, BSc *Adel.*, PhD *Camb.*
Arthur Woods, MA *Oxon.*, FRES, MIBiol

Senior Tutor
Patricia Irene Dixon, BSc PhD *N.S.W.*, DipEd *Syd.*

Tutor
Barbara Millicent Bohdanowicz, BSc DipEd *Syd.*

Teaching Fellows
Duncan Walker McArthur, BSc *Strath.*
Graham Alexander Settle, BSc *Syd.*

Professional Officers
Beverley Anne Ellis, BSc *N.S.W.*
Ladislaus Lehoczky, MD *Szeq*

Honorary Associate
Ronald Strahan, MSc *W.Aust.*, FSIH

Honorary Fellow
Judith Everleigh Marlow, BSc *Lond.*

Faculty of Science*

Staff

Comprises Schools of Chemistry, Mathematics, Optometry and Physics.

Dean
Professor S. J. Angyal

Chairman
Professor R. M. Golding

Director of Studies in Science
Associate Professor L. G. Parry

Graduate Assistant
Emma Shackleton Rossi, BA Syd.

Professor†
George William Kenneth Cavill, MSc Syd., PhD DSc Liv., FAA, FRACI

Professor of Theoretical and Physical Chemistry and Head of Department of Physical Chemistry
Raymund Marshall Golding, MSc Auck., PhD Camb., FNZIC, FInstP, FRACI

Professor** and Head of Department of Inorganic Chemistry
Stanley Edward Livingstone, PhD DSc N.S.W., FSTC, FRACI

Professor of Analytical Chemistry and Head of Department of Analytical Chemistry
Lloyd Earle Smythe, MSc Syd., PhD Tas., FRACI

School of Chemistry

Professor of Chemistry and Head of School
James Stanley Shannon, DIC, PhD Lond., DSc Adel., FRACI

Professor of Organic Chemistry
Stephen John Charles Angyal, PhD Bud., DSc N.S.W., FAA, FRACI

*Board of Studies in Science and Mathematics.

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

**In the field of inorganic chemistry.

†In the field of organic chemistry.

Executive Assistant to Head of School
William John Dunstan, MSc *Syd.*, ARACI

Senior Administrative Officer
Ralph Sutton, MVO, AFAIM, psc

Honorary Associates
Lister George Clark, ASTC, ARACI, FAIFST
John Archer Mills, MSc *Adel.*, PhD *Camb.*, FRACI
Neville Charles Stephenson, MSc *Syd.*, PhD DSc *N.S.W.*, FRACI

Professional Officers
James Bell, BE *N.S.W.*, ASTC
Anthony Yook Ming Chung, BE *Tas.*
Donald Chadwick Craig, BSc *Syd.*, MSc *N.S.W.*
Vladimir Djohadze, BSc *N.S.W.*
Richard James Finlayson, BSc *N.S.W.*, ARACI
Peter Anthony James, BSc *N.S.W.*, ASTC, ARACI
Derek Nelson, BSc DipEd *Belf.*
Victor Arthur James Pickles, MSc *N.S.W.*, ASTC, ARACI
James Francis Rockwell, BSc *N.S.W.*, ASTC
Robert Bruce Rogers, BSc *N.S.W.*, ARMTC
Graeme Thomas See, BSc *N.S.W.*, ASTC
John Sussman, BSc *Syd.*
Oen Bin Tio, BE *N.S.W.*
Michael Keys Withers, MSc *N.S.W.*

Department of Analytical Chemistry

Associate Professor
Douglas Peter Graddon, MSc PhD *Manc.*, FRIC

Senior Lecturers
Peter William Alexander, MSc PhD *Syd.*, ARACI
Ian Kelvin Gregor, BSc *N.E.*, MSc PhD *N.S.W.*
Ewan Cameron Martin, MSc PhD *N.S.W.*, ASTC, FRACI

Lecturers
Sergio Dilli, BSc PhD *N.S.W.*, ASTC, ARACI
Jaroslav Petr Matousek, MSc *T.U.(Prague)*, ARACI

Teaching Fellow
Vyt Peter Garnys, BSc *W.Aust.*, ARACI

Department of Applied Organic Chemistry

Associate Professor and Head of Department
Edward Ritchie Cole, MSc *Syd.*, PhD *N.S.W.*, FAIFST

Senior Lecturer
George Crank, MSc *Qu.*, PhD *Monash*

Lecturers
Norman William Herbert Cheetham, BSc PhD *Qld.*
Peter Thomas Southwell-Keely, BSc *Syd.*, PhD *N.S.W.*

Senior Tutor
Durvasula Satya Narayana Murthy, MSc *And.*, PhD *Syd.*, ARIC

Department of Inorganic Chemistry

Associate Professor
Harold Andrew Goodwin, BSc PhD *Syd.*, ARACI

Senior Lecturers
James Roy Backhouse, MSc *Syd.*, PhD *N.S.W.*
Ian Gordon Dance, MSc *Syd.*, PhD *Manc.*, ARACI
David John Phillips, BSc PhD *Lond.*, ARACI

Lecturer
Benjamin Sidney Morris, MSc *Syd.*, ARACI

Department of Nuclear and Radiation Chemistry

Associate Professor and Head of Department
Douglas John Carswell, MSc PhD DipEd *Syd.*, FRACI

Senior Lecturers
Norman Thomas Barker, MSc PhD *N.S.W.*
Mervyn Allan Long, MSc PhD *Auck.*, ANZIC

Tutor
Anu Mihkelson, MSc *N.S.W.*, PhD *Syd.*

Department of Organic Chemistry

Associate Professor and Head of Department
Ronald Arthur Eade, MSc *Syd.*, PhD *Liv.*, FRACI

Associate Professors
Peter Steele Clezy, BSc PhD *Tas.*, ARACI
Robert Jack Louis Martin, MSc *Melb.*, PhD *Lond.*, ARACI
John Johnson Henry Simes, MSc DipEd *Syd.*, PhD *Liv.*, FRACI

Senior Lecturers
John Lawrence Courtney, BSc PhD *N.S.W.*, ASTC, ARACI
William John Dunstan, MSc *Syd.*, ARACI
Michael John Gallagher, MSc *Qld.*, PhD *Camb.*, ARACI
John David Stevens, BSc *Tas.*, PhD *N.E.*, ARACI

Lecturer
George Vernon Baddeley, BSc *Manc.*, DPhil *Oxon.*

Senior Tutor
Inno Salasoo, BSc PhD *N.S.W.*, ASTC, ARACI

Department of Physical Chemistry

Associate Professor
John Lyndon Garnett, MSc *N.S.W.*, PhD *Chic.*, ASTC, ARACI

Senior Lecturers
Gregory Stewart Buchanan, MSc *Syd.*, ARACI
Brian Raymond Craven, MSc PhD *N.S.W.*, ASTC
Tristan John Victor Findlay, BSc PhD *St. And.*, ARACI
William David Johnson, BSc *Syd.*, MSc *N.E.*, PhD *N.S.W.*
Prosper David Lark, BEc *Syd.*, MSc PhD *N.S.W.*, ASTC, ARACI
Brian John Orr, MSc *Syd.*, PhD *Brist.*, ARACI

Lecturers
David Scott Alderdice, MSc *Syd.*, PhD *Lond.*
Ruby Foon, MSc PhD *Melb.*
Alan David Rae, MSc PhD *Auck.*, ANZIC

Senior Tutor
Martin Peter Bogaard, BSc PhD *Syd.*

Tutor
Remedios Ona Pascual, BSPharm *Philippines*, MA PhD *Col.*

Teaching Fellow
Russell Clive Cowell, BSc *Syd.*

First Year Chemistry

Director of First Year Classes in Chemistry
June Clare Griffith, MSc *N.S.W.*, PhD *Syd.*

Senior Lecturer
Norman Robert Davies, BSc PhD *Lond.*, FRIC

Lecturers
Roger Bishop, BSc *And.*, PhD *Camb.*
Clive Reginald Taylor, BSc *Syd.*

Senior Tutor
Peter See Kien Chia, MSc PhD *N.S.W.*

Tutors
Victor Chen-Teh Bien, MSc *Syd.*
Nguyen Quang Minh, BSc PhD *N.S.W.*

Teaching Fellow
Mohammad Akhtar Malik, MSc *Panj.*

School of Mathematics

Professor of Theoretical and Applied Mechanics and Head of School
Viliam Teodor Buchwald, BSc *Manc.*, MSc PhD *Lond.*, FIMA

Professor of Applied Mathematics
John Markus Blatt, BA *Cinc.*, PhD *Corn.* and *Prin.*, FAA, FAPS

Professor of Pure Mathematics
Gavin Brown, MA *St. And.*, PhD *N'cle.(U.K.)*

Professor of Statistics
Abraham Michael Hasofer, BEE *Faruk*, BEc PhD *Tas.*, MIEAust

Professor of Pure Mathematics
*George Szekeres, DiplChemEng *Bud.*, FAA

Director of First Year Studies
Associate Professor Angus Henry Low, MSc DipEd *Syd.*, PhD *N.S.W.*

Executive Assistant to Head of School
Douglas Edward Mackenzie, BSc *Tas.*

Administrative Assistant
Pamela Jean Monk, BSc *N.E.*

Professional Officer
Loy Tong Yeo, BSc BE *N.S.W.*

Department of Pure Mathematics

Associate Professor
Alfred Jacobus van der Poorten, BA BSc PhD MBA *N.S.W.*

Senior Lecturers
Peter Windeyer Donovan, BA BSc *Syd.*, DPhil *Oxon.*
Jack David Gray, BA *Syd.*, PhD *N.S.W.*
Ezzat Sami Noussair, BA BSc *Cairo*, PhD *Br.Col.*
John Frederick Price, MSc *Melb.*, PhD *A.N.U.*
John St. Alban Sandiford, MSc *Syd.*

Lecturers
Charles Dixon Cox, BSc DipEd *Qld.*
Shaun Anthony Requa Disney, BA *Adel.*, DPhil *Oxon.*
Mary Ruth Freislich, BA *Rand.*, MA *N.S.W.*
Michael Gillingham Greening, MA *Lond.*
David Christopher Hunt, BSc *Syd.*, MSc PhD *Warw.*
Rodney Kelvin James, BSc PhD *Syd.*
John Harold Loxton, MSc *Melb.*, PhD *Camb.*
Ronald William Ramsay, BSc PhD *Monash*
David Graham Tacon, BSc *N'cle.(N.S.W.)*, PhD *A.N.U.*

Senior Tutors
Michael David Hirschhorn, BSc *Syd.*, MSc *Edin.*
Agnes Vilma Nikov, DiplMath DiplEd *Bud.*

Tutors
Gregory Karpilovsky, Dipl *Uzhgorod*, DiplPhD *Kharkov*
Richard Nicholas Reddan, BSc *Qld.*

Honorary Associate
Gregory Maxwell Kelly, BSc *Syd.*, BA PhD *Camb.*, FAA

Department of Applied Mathematics

Associate Professors
Ian Hugh Sloan, BA BSc *Melb.*, MSc *Adel.*, PhD *Lond.*
William Eric Smith, MSc *Syd.*, BSc *Oxon.*, PhD *N.S.W.*, MInstP

Senior Lecturers
Elvin James Moore, MSc *W.Aust.*, PhD *Harv.*
Kazuto Okamoto, BS *Tokyo*, PhD *Louisiana State*

Lecturers
Michael James Barber, BSc *N.S.W.*, PhD *Corn.*
Brian James Burn, MSc *Otago*, PhD *Camb.*
Alexander Hugh Opie, BSc DipEd *Melb.*, PhD *Monash*
Kok-Lay Teo, BSc *Sing.*, MASc PhD *Ott.*, MIEEE, AMIEE

Senior Tutors
Mandel Brender, BSc *McG.*
Felicity Alison Dewar, BSc *Qu.*

Tutors
Cameron Kidd, BSc *Syd.*
Jan Dennis Newmarch, BSc *Brist.*

Department of Statistics

Associate Professor of Mathematical Statistics
James Bartram Douglas, MA BSc DipEd *Melb.*

*Retired from the University 31 December 1976.

Sciences

Associate Professor
Clyde Arnold McGilchrist, BSc BEd *Qld.*, MSc PhD *N.S.W.*

Senior Lecturers
Anthony Gilbert Lewis Elliott, BSc *W.Aust.*
Marek Kanter, BA *Rice*, PhD *Calif.*
Phillip Joseph Staff, BSc DipEd *Syd.*, MSc PhD *N.S.W.*
Manohar Khanderao Vagholkar, DIC. MSc *Bom.*, PhD *Lond.*

Lecturers
Peter John Cooke, MSc *N.E.*, MS PhD *Stan.*
Ronald Bruce Davis, BSc *Syd.*, MSc *N.S.W.*, DipEd *N.E.*
John Anthony Eccleston, BSc *Syd.*, MSc *Man.*, PhD *Corn.*

Tutor
Nelson Shik Yin Tsang, BSc *N.E.*

Professional Officer
Rhonda Gock, BSc *N.S.W.*

Honorary Associate
Alan John Miller, MSc PhD *Manc.*, FSS

Department of Theoretical and Applied Mechanics

Associate Professor
Simon Jacques Prokhovnik, BA MSc *Melb.*

Senior Lecturer
Colin Bruce Kirkpatrick, MSc *Syd.*, AInstP

Lecturers
Noel Geoffrey Barton, BSc PhD *W.Aust.*
Michael Leslie Banner, BE MEngSc *Syd.*, PhD *Johns H.*
John Desmond Fenton, BE MEngSc *Melb.*, PhD *Camb.*
Douglas Edward Mackenzie, BSc *Tas.*
William Dennis McKee, BSc *Adel.*, MSc *Flin.*, PhD *Camb.*
David Allan Mustard, BSc *Syd.*, MSc *N.S.W.*

Senior Tutors
Donald Sidney Craig, BSc *Qld.*
Albert Tator Daoud, BSc *R'dg.*

Tutors
Alan Glenn De'Ath, BSc *N'cle.(U.K.)*
Elizabeth McCarthy, BSc *Teesside Polytech*
Gordon Robert Pennock, BSc *Heriot-Watt*

Honorary Associate
Bruce Valton Hamon, BSc BE *Syd.*, MAIP

School of Optometry*

Professor of Optometry and Head of School
Josef Lederer, BSc *Syd.*, MSc *N.S.W.*, ASTC, FIO

Associate Professor
George Amigo, BSc(OptSc) PhD *N.S.W.*, ASTC, FIO, FAAO

Senior Lecturers
Brien Anthony Holden, BAppSc *Melb.*, PhD *City*, LOSc VCO(Melb), FAAO
Maxwell McNeil Lang, BSc PhD *N.S.W.*, ASTC, FIO, FAAO, MAIP

Lecturers
John Andrew Alexander, MSc *N.S.W.*, ASTC, FIO, FAAO
Stephen John Dain, BSc PhD *City*, FBOA
Graham Leslie Dick, MSc *N.S.W.*, ASTC, FIO

Professional Officer
Angela Kathleen McCarthy, ASTC, FIO

Tutors
David Cecil Pye, BOptom *N.S.W.*
Bernard Peter Tan, BSc(Optom) *Melb.*, LOSc VCO(Melb)

Instructor
Ian William Robinson

*Established from 1 January 1977. Formerly part of School of Applied Physics and Optometry, whose Head of School and Professor of Applied Physics, Christopher John Milner, MA PhD *Camb.*, FInstP, FAIP, retired from the University 31 December 1976.

School of Physics

Professor of Physics and Head of School
Eric Paul George, BSc PhD *Lond.*, DSc *N.S.W.*, FInstP, FAIP

Professor of Experimental Physics and Head of Department of Applied Physics
Hiroshi Julian Goldsmid, BSc PhD DSc *Lond.*, FInstP, FAIP

Professor of Experimental Physics
Kenneth Norman Robert Taylor, BSc PhD *Birm.*, FInstP

Professor of Theoretical Physics and Head of Department of Theoretical Physics
Heinrich Hora, DipPhys *Halle*, DrRerNat *Gena*, FAIP

Professor of Applied Physics
Vacant

Associate Professors
Hans Gerald Leonard Coster, MSc PhD *Syd.*, MInstP, MAIP
Dan Haneman, DSc *Syd.*, PhD *R'dg.*, FAIP
John Charles Kelly, BSc *Syd.*, PhD *R'dg.*, FInstP, MAIP
Jack Foster McConnell, MSc *Syd.*, PhD *N.S.W.*, MInstP, MAIP
Lindsay George Parry, BSc DipEd *Syd.*, MSc PhD *N.S.W.*, MInstP, MAIP

Executive Assistant to Head of School
Kenneth Mann, BSc *Qld.*, MSc *N.S.W.*

Director of First Year Studies
Dr G. J. Russell

Senior Administrative Officer
Cyril Charles Rosario

Senior Lecturers
Graham James Bowden, BSc DipAdvStudSc PhD *Manc.*
John Eric Giutronich, BSc *Syd.*, PhD *N.S.W.*, MAIP
Colin Trevor Grainger, BSc DipEd *Syd.*, MSc *N.E.*, PhD *N.S.W.*, MInstP, MAIP
Norman Reginald Hansen, BSc DipEd *Syd.*, MSc *N.S.W.*, MInstP, MAIP
Eric Harting, BSc PhD *N.S.W.*, ASTC
Graeme John Russell, BSc PhD *N.S.W.*, GradInstP, GradAIP
Raymond Garry Simons, BSc *Syd.*, MSc *Tel Aviv*, PhD *N.S.W.*

Lecturers
Peter Russel Elliston, BSc *Melb.*, PhD *Monash*
Veronica Jean James, BA BSc *Qld.*, PhD *N.S.W.*, MAIP
Kenneth Hulme Marsden, BSc *Lond.*, MSc *N.S.W.*, MInstP, MAIP, ARCS
Peter Mitchell, BSc PhD *Adel.*, MAIP
George Lange Paul, MSc *Syd.*, PhD *Edin.*, MAIP
James Martin Pope, MSc *Brist.*, DPhil *Sus.*, AInstP
Andrew Morven Stewart, DIC, MA *Camb.*, AM *Harv.*, EE *Col.*, PhD *Lond.*, MInstP, MIEEE

Senior Tutors
Ian Richard Dunn, BSc BA *Melb.*, MIEEE
Edward Peter Eyland, BSc MPhysics *N.S.W.*, BD *Lond.*
Martin Desmond Knight, BSc *N.S.W.*

Tutors
Robert Geoffrey Ashcroft, BSc *Syd.*
Kenneth Richard Doolan, BSc *Syd.*
Walter Kalceff, BSc DipEd *Syd.*
Phillip Andrew Miles, BSc *N.S.W.*
Paul Michael O'Halloran, BA *Macq.*, GradAIP
John Dorsett Smith, BSc *Indiana S.U.*
John Robert Smith, BSc *Syd.*

Teaching Fellows
Robert Leendert Calvert, BSc *S'ton*, MSc *Qu.*
Kevin Charles Fitzsimmons, BSc *Syd.*
Prem Darkash Narang, MSc *Delhi*
Ahmed Abdul Rahman, BSc *Qld.*, MSc *N.S.W.*
Janis Lee Van Doorn, BSc *Adel.*

Professional Officers
Peter Robert Barker, BSc *Monash*
Robert Louis Dalgleish, BSc PhD *N.S.W.*
Fredericus Gerardus Majella Steenbeeke, DiplMechEng *Arnhem T.H.*
Peter Claydon Young, BE *N.S.W.I.T.*, GradIEAust

Honorary Associates
John Stuart Dryden, DIC, MSc *Melb.*, PhD *Lond.*, FAIP
Gordon Hay Godfrey MA BSc *Syd.*, FInstP, FAIP, Hon.FIO
John Lloyd Symonds, BSc *Adel.*, PhD *Birm.*, FInstP, FAIP
Guy Kendall White, MSc *Syd.*, DPhil *Oxon.*, FAA, FInstP, FAIP

Honorary Visiting Fellows
Victor Kastalsky, BSc PhD *N.S.W.*, ASTC, MInstP, MAIP

Department of Applied Physics*

Associate Professors
Brian Ronald Lawn, BSc PhD *W.Aust.*, GradInstP
David Henry Morton, MA *Oxon.*, FInstP, FAIP
Howard Frank Pollard, MSc *W.Aust.*, PhD *N.S.W.*, MInstP, MAAS, MASA, MAIP

Senior Lecturers
John Ian Dunlop, BSc PhD *N.S.W.*, MAIP, MAASATI
John Robert Hanscomb, BSc *Qld.*, MSc PhD *N.S.W.*, MAIP, GradInstP
Leslie Bevan Harris, BSc *Lond.*, BA DipEd *Durh.*, PhD *N.S.W.*, AIM, AInstP
Victor Raymond Howes, BSc PhD *Lond.*

Lecturers
Kenneth Mann, BSc *Qld.*, MSc *N.S.W.*

Tutors
Vu Van Hoi, BSc BE *N.S.W.*

Department of Theoretical Physics

Senior Lecturers
Jaan Oitmaa, BSc PhD *N.S.W.*, MAIP

Lecturers
David Neilson Lowy, BSc *Melb.*, MS PhD *N.Y.State*
John Richard Shepanski, MSc *Syd.*, MAIP

Teaching Fellow
Ting Hun Ho, BSc *H.K.*

*Established within the School of Physics from 1 January 1976. Formerly part of School of Applied Physics and Optometry.

Staff

Director
Professor J. E. Andersen

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

Director and Head of Department of Science
Professor John Everard Andersen, BE *Melb.*, PhD *N.S.W.*,
FIEAust, MAusIMM, ARACI

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

Administrative Officer
Peter Francis Hern, AASA

Professional Officer
Boyd Parker Watson, BSc(Tech) *N.S.W.*

Department of Mining and Mineral Sciences

Mechanical Engineering

Lecturers
Llewellyn Ramsay Jones, BSc *N.Z.*, DipAm MEng *Sheff.*,
PhD *Wales*, MIEAust, MIMechE

Ian Lachlan Maclaine-cross, BE *Melb.*, MIEAust, MAIRAH,
MSES
Chakravarti Varadachar Madhusudana, BE *Mys.*, ME *B'lore*,
PhD *Monash*, MIEAust

Mining Engineering

Lecturer
Venkata Satyanarayana Vutukuri, BSc(Eng) *Ban.*, MS *Wis.*,
MMGI, AIME, AMAusIMM

Professional Officer
Kenneth James Murray, BSc *Syd.*, MSc *N.S.W.*, AMAusIMM

Mineral Science

Senior Lecturer
Barenya Kumar Banerji, MSc *Patna*, PhD *Leeds*, MAusIMM

Geology

Senior Lecturer
Gerrit Neef, BSc *Lond.*, PhD *Well.*, FGS, AMAusIMM

Lecturers
Ian Rutherford Plimer, BSc *N.S.W.*, PhD *Macq.*, AMAusIMM,
AMIMM
Kevin David Tuckwell, BSc PhD *N.S.W.*, AMAusIMM

Tutor
Alaster Carlile Edwards, BSc *Melb.*, GSA, AMAusIMM

Sciences

Department of Science

Chemistry

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

Lecturer
Derek Richard Smith, BSc PhD *Wales*

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

Mathematics

Lecturers
David Charles Guiney, BSc PhD *Adel.*
Zdenek Kviz, Dip Phys *Brno*, CSc RerNatDr *Charles*, PhD *Prague*
Dennis William Trenerry, BSc PhD *Adel.*

Physics

Lecturers
Robert John Stening, MSc *Syd.*, PhD *Qld.*, MAIP
Kenneth Reid Vost, BSc *Glas.*, MSc *N.S.W.*, AMAusIMM

Fowlers Gap Research Station

Officer-in-Charge
Ian Hugh Auldist, BAgSc *Melb.*, MAIAS

Faculty Information

Faculty of Biological Sciences Enrolment Procedures*

Preliminary Enrolment
BSc Course in Psychology

Each student must obtain his or her personal enrolment form and Personal Program Form P/RE from the School Office, Room 1011, Sciences Building. The forms will be available from 12 October 1976. After notification of the annual examination results the student should indicate the subjects already completed and the proposed program for 1977 on Form P/RE and forward this, together with the enrolment form (completed except for the entry of subjects) to reach the Administrative Officer, School of Psychology, not later than Friday 14 January 1977.

Students who are unable to attend personally should send a representative at the specified time with a letter of authority to collect their form for them.

Enrolment Timetable

School of Psychology

BSc Course in Psychology students must attend for re-enrolment at the *School of Psychology, The Sciences Building,* as follows:

Year 2 and Year 1 repeats	Tuesday 1 March 10.00 am to 12.00 noon
Year 3 and 4	Tuesday 1 March 2.00 pm to 4.00 pm

Geography Subjects

Students enrolling or re-enrolling in Geography subjects are to attend Hut 7 on one of the following dates:

Monday 28 February
10.00 am to 12.00 noon
2.00 pm to 4.00 pm

Wednesday 2 March
10.00 am to 12.00 noon
2.00 pm to 4.00 pm
6.00 pm to 8.00 pm

Friday 4 March
10.00 am to 12.00 noon
2.00 pm to 4.00 pm

Monday 7 March
10.00 am to 12.00 noon
2.00 pm to 4.00 pm

in order to obtain class admission cards and to be allocated places in tutorials and laboratories.

Enrolment Centre

School of Psychology
Room 1021
The Sciences Building

* As a result of a decision by the Commonwealth Government, no tuition fees are charged in 1977.

Faculty of Science Enrolment Procedures*

Preliminary Enrolment

Pure and Applied Chemistry Course

Before the end of Session 2 each student must attend the School Office to complete the necessary preliminary enrolment procedures.

Enrolment forms must be completed as far as possible and left with the School Office.

Enrolment Timetable

Pure and Applied Chemistry Course

Students in the course are required to attend Unisearch House in accordance with the following timetable:

1. Full-time Course

Year 2, & Year 1 repeats	Monday 28 February 2.00 pm to 4.30 pm
Year 3	Wednesday 2 March 9.30 am to 12.30 pm
Year 4	Friday 4 March 9.30 am to 11.00 am

2. Part-time Course

Stage 1 repeats & Stages 2, 3 and 4	Tuesday 1 March 2.00 pm to 4.00 pm 6.00 pm to 8.00 pm
Stages 5, 6 & later	Wednesday 2 March 2.00 pm to 5.00 pm

3. New Students with Advanced Standing

Wednesday 2 March
3.30 pm to 5.00 pm

Optometry Course

Students enrolling in Year 2 of the B Optometry course are requested to bring with them a recent passport size photograph with their name and address printed on the back.

All students are required to attend Unisearch House, 221 Anzac Parade (across from Main Campus) in accordance with the following timetable:

Year 2, & Year 1 repeats	Monday 28 February 2.00 pm to 4.30 pm
Year 3 and Year 4	Tuesday 1 March 2.00 pm to 4.30 pm

Science and Mathematics Course

See Board of Studies in Science and Mathematics

Geography Subjects

As for Faculty of Biological Sciences. See previous page, column 2.

General Studies

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

Enrolment Centre

Pure and Applied Chemistry Optometry	Unisearch House 221 Anzac Parade (across from Main Campus)

Board of Studies in Science and Mathematics Enrolment Procedures*

Preliminary Enrolment

Science and Mathematics Course

Before the end of Session 2, each student must obtain a 1977 Program Form (Form SC77), 1977 timetables and instruction sheets from the Science and Mathematics Course Office.

After notification of the annual examination results, the student should complete Form SC77 and lodge it at the Science and Mathematics Office not later than 14 January 1977. Students whose Program Forms are not received by 14 January 1977 must re-enrol at a late re-enrolment session.

Enrolment Timetable

Science and Mathematics Course

After fulfilling preliminary enrolment requirements, students should complete their re-enrolment at *Unisearch House* in accordance with the following timetable:

* See footnote on previous page.

Full-time Course
Year 2 & Year 1 Repeats

	Wednesday 2 March
Surnames A to G	9.30 am to 12.30 pm
Surnames H to M	2.00 pm to 4.30 pm
	Thursday 3 March
Surnames N to R	9.30 am to 12.30 pm
Surnames S to Z	2.00 pm to 4.30 pm

Year 3

	Monday 28 February
Surnames A to J	2.00 pm to 4.30 pm
	Tuesday 1 March
Surnames K to R	9.30 am to 12.30 pm
Surnames S to Z	2.00 pm to 4.30 pm

Year 4

	Friday 4 March
All students	9.30 am to 12.30 pm
	2.00 pm to 4.30 pm

New Students with   Friday 4 March
Advanced Standing   9.30 am to 12.30 pm

Part-time Course

Stage 2 & Stage 1 Repeats	Tuesday 1 March 6.00 pm to 8.00 pm
Stage 3 & Stage 4 Students	Tuesday 1 March 6.00 pm to 8.00 pm
Stage 5 & Later Stages	Thursday 3 March 6.00 pm to 8.00 pm

New Students with   Thursday 3 March
Advanced Standing   6.00 pm to 8.00 pm

Geography Subjects

As for Faculty of Biological Sciences. See two pages earlier, column 2.

General Studies

As for Faculty of Science. See previous page, column 2.

Enrolment Centre

Science and Mathematics	Unisearch House 221 Anzac Parade (across from Main Campus)

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

There are two late enrolment sessions:

First Late Enrolment Period

Wednesday 9 March

Second Late Enrolment Period

Wednesday 16 March

The times and locations for late enrolment in the Faculties and Board referred to in this handbook are:

Faculty of Biological Sciences	School of Psychology Level 10 The Sciences Building 4.00 pm to 6.00 pm
Faculty of Science Pure and Applied Chemistry Course	The Robert Heffron Building Room 111, First Floor 5.00 pm to 7.00 pm
Optometry Course	The Newton Building 3rd Floor, Room 327 1.00 pm to 2.00 pm
Board of Studies in Science and Mathematics Course	Room 14 (Conference Room) Main Building Wednesday 9 March *only* 5.00 pm to 7.00 pm
Formal Masters Courses and Graduate Diploma Courses	At Office of appropriate School

Sciences Library Facilities

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

The Biomedical Library

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

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

The Physical Sciences Library

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

The Undergraduate Library

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

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

Services of particular interest to undergraduates and academic staff are:

● **The Open Reserve Section**, housing books and other material which are required reading.

● **The Audio-Visual Section**, containing cassette tapes, mainly lectures and other spoken word material. The Audio-Visual Section has wired study carrels and cassette players for student use.

Biomedical Librarian	George Franki
Physical Sciences Librarian	Janine Schmidt
Undergraduate Librarian	Pat Howard

Statistical Society of Australia: New South Wales Branch

The Branch offers student membership to undergraduates who are following a recognised course of study which includes Statistics. The subscription for a student member is $5 per annum.

The regular general meetings of the Branch are held usually on the second Thursday of each month from March to November. 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.

Applications and requests for further information should be sent to the Hon. Secretary, Dr G. H. Cooney, Department of Mathematical Statistics, University of Sydney 2006.

The Psychology Society

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

One of the aims of the Psychology Society is to provide information relevant to these matters. Last year a highly successful careers seminar was held, in which speakers from various areas of psychological practice discussed requirements and opportunities in their respective fields. In a School so large it is difficult to develop a meaningful degree of personal contact between students of different years and students and staff. The Society attempts to provide opportunities for such contact, to foster staff-student relations and to act in the interest of psychology students as a whole. Accordingly, we hope to include such items as staff-student luncheons, informal discussions and theatre parties. On the educational side there are film showings and occasional talks and seminars (eg, on careers, course requirements, etc). An activities fee enables the committee to meet any of the finances needed to support its functions.

Financial Assistance to Students

The scholarships and prizes listed below are available to students whose courses are listed in this handbook.

A similarly oriented list appears in the **Faculty Information** section of each of the faculty handbooks.

The complete list of University scholarships and prizes appears in the **General Information** section of the Calendar.

Scholarships

Undergraduate Scholarships

As well as the assistance mentioned earlier in this handbook (see **General Information: Financial Assistance to Students**), there are a number of scholarships available to students. What follows is an outline only. Full information may be obtained from the Student Employment and Scholarships Unit, located on the Ground Floor of the Chancellery.

Unless otherwise indicated in footnotes, applications for the following scholarships should be made to the Registrar by 14 January each year.

Donor	Value	Year/s of Tenure	Conditions
General			
Bursary Endowment Board*	$300 pa if living at home; $400 pa if living away from home	7 years	Merit in HSC and total family income not exceeding $4000
Sam Cracknell Memorial	$1000 to $1500 pa payable in fort-nightly instalments	1 year	Prior completion of a least 2 years of a degree or diploma course and enrolment in a full-time course during the year of appli-cation; academic merit; participation in sport either directly or administratively; and financial need
Air Force Association Memorial Scholarship	$250 pa	1 year renewable for the duration of the course subject to satisfactory progress	Child of member or former member of Royal Australian Air Force undertaking a full-time degree course
Biological Sciences			
Biological Technology			
Mauri Brothers & Thomson Ltd	$1000 pa	1 year	Eligibility for admission to the honours year of the full-time degree course in Biological Technology
Science			
Mathematics			
Olivetti Australia Pty Ltd	$600 pa	2 years subject to satisfactory progress	Eligibility for admission to third year of the full-time course leading to the degree of Bachelor of Arts or Bachelor of Science majoring in Mathematics or Statistics

*Apply to The Secretary, Bursary Endowment Board. Box 7077, GPO. Sydney 2001 immediately after sitting for HSC.

Undergraduate Scholarships (continued)

Donor	Value	Year/s of Tenure	Conditions
Optometry			
The Australian Optometrical Association	$250 pa for 1st year of the course $500 pa for 2nd and later years of the course	1 year renewable for the duration of the course subject to satisfactory progress	Permanent residence in Australia and eligibility for admission to the full-time degree course in Optometry
The Australian Optometrical Association (NSW Division)	$500 pa		Residents of NSW under the age of 21 who are eligible for admission to the full-time degree course in Optometry
Gibb & Beeman (Spectacle Makers) Pty Ltd	$500 pa		
Optometric Associates Co-operative Limited	$250 pa	1 year	Permanent residents of NSW intending to practice optometry in NSW who are eligible for admission to the fourth year of the full-time degree course in Optometry

Graduate Scholarships

Applications for scholarships should be made in triplicate on the required form, and sent to the Registrar by 31 October. Eligibility depends on such factors as the applicant holding an honours degree or equivalent qualification, or having relevant experience. Students completing the final year of a course may apply. Those under bond should disclose this fact. Awards are tenable for one year, and may be renewed for a maximum of two years for a Masters and 3 to 4 years for a PhD degree. Renewal each year is subject to satisfactory progress. Any exceptions from these requirements are indicated.

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

Where possible, the scholarships are listed in order of schools within the Faculty of Biological Sciences and the Faculty of Science.

Donor	Value	Year/s of Tenure	Conditions
General			
University of New South Wales Research Awards		1-2 years for a Masters and 3-4 years for a PhD degree	Applicants must be honours graduates (or equivalent)
Australian Government (Research Awards)	Living allowance of $4000 pa. Other allowances may also be paid.	As above	Applicants must be honours graduates (or equivalent) who will graduate with honours in current academic year, and who are permanent residents of Australia.
Australian Government (Course Awards)		1-2 years; minimum duration of course	Applicants must be graduates or scholars who will graduate in current academic year and who are permanent residents of Australia, and who have not previously held a Commonwealth Postgraduate Award. Applications to Registrar by 30 September

Graduate Scholarships (continued)

Donor	Value	Year/s of Tenure	Conditions
Australian American Educational Foundation Travel Grant*			Applicants must be graduates, senior scholars or post-doctoral Fellows. Graduate applications close 31 December. Other applications by mid-November.
Australian Federation of University Women	A total of $500/$3200	Up to 1 year	Applicants must be female graduates from any accredited Australian or overseas university.
The British Council Commonwealth University Interchange Scheme	Cost of travel to UK or other Commonwealth country university		Applicants must be: **1.** University staff on study leave. Applications close with Registrar by 30 November. For visits to commence during ensuing financial year 1 April to 31 March. **2.** Graduate research workers holding research grants. Applications close with Registrar by 28 February for visits to commence during ensuing 1 April to 31 March.
Canadian Pacific Airlines Award for Travel to Canada for University Graduates	One free economy class return flight a year to Canada		Graduates of an Australian University who are Australian citizens or permanent residents. Candidates must have been accepted by a Canadian University, be able to support themselves on a full-time basis, and intend to return to Australia. Applications close with Registrar by 31 May.
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	Graduates who are Commonwealth citizens or British Protected Persons, and who are not older than 35 years of age. Applications close with Registrar by 1 October.
General Motors Holden's Research Fellowship	Living allowance and other allowances	Maximum of 3 years	Graduates qualified to undertake research program for Masters or PhD degree
Gowrie Graduate Research Travelling Scholarship	Maximum $2000 pa	2 years	Applicants must be members of the Forces or children of members of the Forces who were on active service during 1939-45 War
Harkness Fellowships of the Commonwealth Fund of New York †	Living and travel allowances, tuition and research expenses, book and equipment and other allowances	Between 12 to 21 months	Candidates must be either: **1.** Members of the Commonwealth or a State Public Service or semi-government Authority. **2.** Staff or graduate students at an Australian university. **3.** Individuals recommended for nomination by the Local Correspondents. The candidate will usually have an honours degree and be between 21-30 years of age. Applications close 23 July.

* Application forms are available from: The Secretary, Department of Education, AAEF Travel Grants, PO Box 826, Woden, ACT 2606.
† Application forms must be obtained from the Australian representative of the Fund, Mr L. T. Hinde, Reserve Bank of Australia, Box 3947, GPO, Sydney, N.S.W. 2001. These must be submitted to the Registrar by 24 July.

Sciences

Graduate Scholarships (continued)

Donor	Value	Year/s of Tenure	Conditions

General (continued)

Donor	Value	Year/s of Tenure	Conditions
IBM Graduate Scholarship Plan	A maximum of $1200 pa	A maximum of 2 years for a degree of Master and 4 years for a PhD	Graduates must already hold a scholarship, such as an Australian Government Postgraduate Research Award and be studying computer science or its applications. Applications close with Registrar by 30 November.
Frank Knox Memorial Fellowships at Harvard University	Stipend of $3400 plus tuition fees pa	2 years	Applicants must be British subjects and Australian citizens, who are graduates or near graduates of an Australian University.
Nuffield Foundation Commonwealth Travelling Fellowships†	Approximately £2240 stg pa for married fellow and wife. Approximately £1760 stg pa in other cases plus travelling costs.	1 year	Australian citizens usually between 25 and 35 who are graduates preferably with higher degrees and who have at least a year's teaching or research experience at a university. Applications close by February.
The Rhodes Scholarship**	£1650 stg pa	2 years, may be extended for a third year	Unmarried male and female British subjects, between the ages of 19 and 25 who have been domiciled in Australia at least 5 years and have completed at least 2 years of an approved university course. Applications close in July each year.
Rothmans Fellowships Award‡	$12,000 pa	Up to 3 years	The field of study is unrestricted. Applications close early September each year.

Biological Sciences

Donor	Value	Year/s of Tenure	Conditions
Queen Elizabeth II Postdoctoral Fellowships in the Physical and Biological Sciences§	Stipend of $13158 pa increased to $14190 pa at age 28 years. $500 pa for dependent wife, $200 pa for each dependent child, plus other allowances.	2 years	Applicants must be Australian citizens or citizens of the UK and colonies ordinarily resident in the UK, who have gained a PhD or equivalent qualification in one of the physical or biological sciences. Usually applicants should be under 30 years of age. Applications close at the end of the first weeks in March and September.

† Applications to the Secretary, The Nuffield Foundation Australian Advisory Committee, Chemistry Laboratory, Barry Building, University of Melbourne, Parkville, Victoria 3052.

** Applications to Mr H. McCredie, Secretary of the NSW Committee, University of Sydney, NSW 2006.

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

* Further details may be obtained from the Commissions in Sydney and Melbourne, or from the School of Health Administration.

§ Applications obtainable from the Secretary, Queen Elizabeth Fellowships Committee, Department of Education, PO Box 826, Canberra, ACT 2600 or the Official Secretary, Australia House, Strand, London, W.C.2.

Graduate Scholarships (continued)

Donor	Value	Year/s of Tenure	Conditions
Science			
International Optical Corporation Contact Lens Research Scholarship	$3000 pa	1 year renewable	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. Applications to Registrar by 30 November.
Contavue Laboratories Contact Lens Graduate Research Scholarship	$1000 pa		
Hydron Laboratories Contact Lens Research Scholarship			
Science Research Scholarship of the Royal Commission for the Exhibition of 1851	£1200 stg pa	2 years. Renewal for further year possible.	To enable graduates under 26 years of age to undertake research in some branch of pure or applied science at an overseas university. Applicants must be British Commonwealth citizens or citizens of the Republic of Ireland or South Africa, who have done at least 3 years of a university Science Course.
The Rutherford Scholarship	Travel, fees, etc. A stipend which, if held in the UK, is worth £1050-1500 stg pa	3 years	To enable graduates under 26 years of age, or if holding a PhD under 28 years, 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.
Shell Scholarship in Science and Engineering	£1750 stg pa plus travelling expenses	2 years	Applicants must be unmarried, male, British subjects, under 25 years of age, with at least 5 years' domicile in Australia and who are graduates with at least 1 year's research experience. The successful candidate will undertake 2 years' graduate research leading to the MSc or PhD degree, at a British university.

Prizes

Undergraduate University Prizes

The following table summarizes the undergraduate prizes awarded by the University. Prizes which are not specific to any School are listed under 'General'. All other prizes are listed under the Faculty or Schools in which they are awarded.

Donor/Name of Prize	Value $	Awarded for
General		
Sydney Technical College Union Award	50.00	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

Undergraduate University Prizes (continued)

Donor/Name of Prize	Value $	Awarded for
School of Botany		
E. O. Tout Memorial	40.00	Best aggregate any five subjects offered by School of Botany
School of Chemistry		
Advanced Analytical Chemistry	100.00	2.013D Advanced Analytical Chemistry
Abbott Laboratories Pty Ltd	50.00	2.003B Organic Chemistry II
Australian Chemical Holdings Ltd	21.00	2.121 Chemistry 1A and 2.131 Chemistry 1B
Australian Consolidated Industries Ltd	30.00	
Borden Chemical Co (Aust) Pty Ltd	50.00	Subject selected by Head of School
Chamber of Manufactures of New South Wales	15.00	
CSR Chemicals Ltd	100.00	Chemistry Honours
Inglis Hudson Bequest	6.00	2.002B Organic Chemistry I
Merck, Sharp & Dohme (Aust) Pty Ltd	52.50	Chemistry — Level 2 subjects in the Science Course
	52.50	Chemistry — Level 3 subjects in the Science Course
The Nestlé Co (Aust) Ltd	50.00	
Parke Pope	20.00	Subject selected by Head of School
Tooth & Co Ltd	20.00	
Unilever Aust Pty Ltd	21.00	2.003A Physical Chemistry II
George Wright	20.00	Subject selected by Head of School
School of Physics		
Head of School's Prize in Physics	20.00	Area selected by Head of School
Physics Staff	60.00	Physics III
Physics Thesis Prize	40.00	Physics IV
School Prize for Physics II	40.00	Physics II

Graduate University Prizes

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

Donor/Name of Prize	Value $	Awarded for
General		
The Thistlethwayte Memorial Prize	100.00	Best essay in the field of water — waste water treatment or water quality management, by MEngSc, MAppSc, ME, MSc student

Board of Studies in
Science and Mathematics

Board of Studies in Science and Mathematics

Introduction

The Science and Mathematics Course (397) 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 Mathematics I, which is offered in three versions each of which counts as two units: Mathematics I, Higher Mathematics I and Mathematics IT. One only is required, but care must be taken in making the choice. In general, Mathematics IT considerably limits the choice of units in following years.

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

Students seeking *general advice* should contact the Board of Studies in Science and Mathematics Office (Room 57, **Main Building, map reference K15**) and for *advice in specific disciplines* should contact the representative of the relevant School as listed below:

	First Year Biology Unit	Dr A. E. Wood
	School of Anatomy	Dr R. Molnar (2nd Year)
		Associate Professor C. R. R. Watson (3rd Year)
		Professor F. W. D. Rost (4th Year)
‡	School of Applied Geology	Dr. G. J. Baldwin
‡	School of Biochemistry	Professor E. O. P Thompson
‡	School of Biological Technology	Associate Professor Pamela A. D. Rickard
‡	School of Botany	Associate Professor M. M. Hindmarsh
	School of Chemistry	Mr W. J. Dunstan
‡	School of Community Medicine	Mr A. E. Stark
‡	School of Electrical Engineering (Computer Science)	Mr K. A. Robinson
‡	School of Geography	Mr N. Lonergan
‡	School of History and Philosophy of Science	Dr J. Saunders

School of Mathematics	Associate Professor W. E. Smith
	Mr J. StA. Sandiford
School of Mechanical and Industrial	
Engineering	Associate Professor R. G. Robertson
‡ School of Microbiology	Dr Y. M. Barnet
School of Philosophy	Professor C. L. Hamblyn
School of Physics	Mr K. Mann
‡ School of Physiology	Dr. P. H. Barry
‡ School of Psychology	Dr P. J. Cleary
	Mr T. J. Clulow
‡ School of Zoology	Mrs Patricia Dixon

Board of Studies in Science and Mathematics

Staff

The Board of Studies in Science and Mathematics includes all members of the Faculty of Biological Sciences* and the Faculty of Science* and some members of a number of specific Schools in other faculties contributing to the Science and Mathematics Course.

The Co-Deans, serving alternately, are Professor S. J. Angyal (Dean of the Faculty of Science) and Professor B. J. F. Ralph† (Dean of the Faculty of Biological Sciences).

The Chairman is Professor R. M. Golding (Chairman of the Faculty of Science).

The Director of Studies in Science is Associate Professor L. G. Parry (School of Physics). The Graduate Assistant is Emma S. Rossi (Faculty of Science).

Saw Kin Loo, Dr M. S. Smith, Dr J. Stone, Dr I. J. Tork; **Lecturers:** Dr Ewa K. Bystrzycka, B. W. Freeman, P. B. Paisley, Dr R. E. Molnar; **Senior Tutors:** Dr Jean J. Carter, Dr P. Gemmell; **Tutors:** Karen A. Ginn, Shirley G. Maclean, D. D. Shimeld, Dr R. T. K.Tan, S. V. Vijayakumar, Catherine Willis; **Teaching Fellow:** G. S. Kesby.

Department of General Studies

Professor and Head of Department of General Studies: Professor R. F. Hall; **Senior Lecturer:** Dr J. R. E. Waddell; **Lecturer:** Helen R. Harding.

School of Geography

Professor of Geography and Head of School: Professor J. A. Mabbutt; **Associate Professor:** E. A. Fitzpatrick; **Senior Lecturer:** Dr F. C. Bell; **Lecturers:** Dr A. D. Abrahams, Dr M. R. Melville, Dr H. J. Schneider; **Tutors:** G. Atkinson, R. K. Murfet.

Associated and Servicing Schools

School of Applied Geology

Professor of Engineering Geology and Head of School: Professor F. C. Beavis; **Senior Lecturers:** Dr A. N. Carter, Dr P. C. Rickwood, Dr B. L. Wood.

School of Anatomy

Professor of Anatomy and Head of School: Professor F. W. D. Rost; **Associate Professors:** Dr B. R. A. O'Brien, Dr C. R. R. Watson; **Senior Lecturers:** Dr. D. A. Fernando, Dr

* See **Staff**, listed earlier in this handbook.
† For 1976-77.

School of Education

Professor of Education and Head of School: Professor L. M. Brown; Professor of Science Education and Director of Science Teachers' Courses: Professor A. A. Hukins.

School of Electrical Engineering

Department of Computer Science

Professor of Computer Science and Head of School: Professor M. W. Allen; Senior Lecturers: Dr A. Dunworth, Dr J. Lions, Dr G. B. McMahon, Dr P. C. Maxwell; Lecturers: Dr P. W. Baker, L. C. Hill, K. A. Robinson.

School of Community Medicine

Professor of Community Medicine and Head of School: Professor I. W. Webster; Senior Lecturer: A. E. Stark.

School of Chemical Technology

Professor of Chemical Technology and Head of School: Professor F. W. Ayscough; Associate Professor: Dr J. K. Haken.

School of Economics

Professor of Economics and Head of the Department of Industrial Relations: Professor J. R. Niland.

School of History and Philosophy of Science

Professor of History and Philosophy of Science and Head of School: Professor J. Ronayne; Senior Lecturer and Acting Head of School: Dr W. H. Leatherdale; Senior Lecturer: Dr R. M. Gascoigne; Lecturers: Dr W. R. Albury, Dr G. A. Freeland, Dr D. R. Oldroyd, Dr J. R. Saunders.

School of Mechanical and Industrial Engineering

Nuffield Professor of Mechanical Engineering, Head of School and of Department of Fluid Mechanics/Thermodynamics: Professor R. A. A. Bryant; Senior Lecturer: R. E. Corbett.

School of Philosophy

Professor of Philosophy and Head of School: Professor C. L. Hamblin; Lecturer: Dr F. Vlach.

School of Physiology and Pharmacology

Professor of Physiology and Head of School: Professor W. E. Glover; Professor of Clinical Pharmacology: Professor D. W. Wade; Senior Lecturer: Dr M. J. Rowe; Lecturer: Dr J. J. Carmody.

School of Surgery

Chairman and Professor of Traumatic and Orthopaedic Surgery and Head of Department: Professor R. L. Huckstep.

School of Sociology

Professor of Sociology and Head of School: Professor S. Encel.

School of Political Science

Professor of Political Science and Head of School: Professor D. M. McCallum.

Board of Studies in Science and Mathematics

397
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 for 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 and knowledge of Science and Mathematics.

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

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

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

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

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

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

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

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

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

Sciences

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 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 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.

- With the approval of the Dean, a student may change from one selected program to another. A written application to make the change, together with details of any optional units selected in the new program, must be lodged at the office of the Board of Studies in Science and Mathematics Room 57 (**Main Building, map reference K15**).

- The programs listed below are made up of a sequence of units. Where a choice of units is indicated within a program care must be taken to satisfy the requirements, such as prerequisites and co-requisites.

- A prerequisite unit is one which must be completed prior to enrolment in the unit for which it is prescribed. A co-requisite unit is one which must either be completed successfully before or be studied concurrently with the unit for which it is prescribed. An excluded unit is one which cannot be counted towards the degree qualification together with the unit which excludes it. In exceptional circumstances, on the recommendation of the head of the appropriate school, the Dean may waive or vary a particular prerequisite or co-requisite.

- A single major is a program specifying only 4 Level III units in a discipline.

- A double major is a program specifying more than 6 Level III units in a discipline.

The three year program

The three year program leading to 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:

A *not less than* eight *nor more than* ten units may be from Level I;

B two of the Level I units must be 10.001 Mathematics I, 10.011 Higher Mathematics I or 10.021 Mathematics IT;

C *not less than* four units from Level III or as specified in individual programs

2. three General Studies electives, usually one in Year 2 and two in Year 3 or as specified in an individual program.

- In order to graduate a student must pass all the units specified in the program of his 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:

A *not less than* eight *nor more than* ten units may be from Level I;

B two of the Level I units must be 10.001 Mathematics I, 10.011 Higher Mathematics I or 10.021 Mathematics IT;

C *not less than* eight units from Level III or as specified in an individual program;

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

or

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

3. four General Studies electives, usually one in Year 2, two in Year 3 and one in Year 4 or as specified in an individual program.

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

Rules governing admission to the Science and Mathematics Course with advanced standing for the purpose of obtaining a double degree

1. Undergraduates* of the University of New South Wales who have satisfied the examiners in at least the first two years of a degree course extending over four or more years and ap-

* In Rule 1, the word 'undergraduates' includes graduands, ie a person may be admitted under these rules if he has met all requirements for a first degree which has not yet been conferred on him, and his admission under these rules shall be no bar to the subsequent award for the first degree.

proved by the Board of Studies in Science and Mathematics for the purpose of double degrees, may be admitted to the Science and Mathematics course (397) with advanced standing. Such undergraduates' performance shall have been of a high standard and their admission shall be subject to the approval of the Dean.

2. Students so admitted who have satisfied the examiners in General Studies subjects and/or Science and Mathematics course units shall be given advanced standing in such General Studies subjects and no more than 14 such Science and Mathematics course units.

3. Students so admitted may be granted exemption from two other Level II Science and Mathematics units on the basis of other subjects completed by them.

4. In order to qualify for the award of the degree of BSc, students so admitted with advanced standing 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 Bachelor's degree under these regulations must include at least four Level III units chosen from related disciplines in accordance with the Science and Mathematics course regulations. One of Mathematics 10.021 or 10.001 or 10.011 must be included in the course (each of these is a double unit).

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

1. Graduates of the University of New South Wales may be admitted to the Science and Mathematics course with exemption in all General Studies subjects completed by them and in no more than twelve Science and Mathematics course units completed by them.

2. Undergraduates of the University of New South Wales who transfer from another course to the Science and Mathematics course (397), may be admitted to the Science and Mathematics course with exemption in all General Studies subjects completed by them and in all Science and Mathematics course units completed by them. Further, where an undergraduate has completed a subject which contains the syllabus material of a Science and Mathematics course unit (or units) the Dean, with the agreement of the Head of School offering the Science and Mathematics course unit (or units) may allow the unit (or units) so covered to be counted to a Bachelor of Science degree.

An undergraduate transferring to the Science and Mathematics course must take Mathematics 10.021 or 10.001 or 10.011 during his first year of enrolment in the course unless one of them has previously been completed.

3. Graduates or undergraduates of other universities or of other approved tertiary institutions may be admitted to the Science and Mathematics course with advanced standing.

4. Students admitted under Rule **3.** who have satisfied the examiners in units of the same title or subject matter as Science and Mathematics course subjects in the University may, subject to the approval of the appropriate Heads of School, be granted exemption in no more than eleven Science and Mathematics course units but not including Level III Science and Mathematics course units.

5. Notwithstanding the provisions of Rules **1.**, **2.**, **3.** and **4.**, the Board of Studies in Science and Mathematics may determine a special program to be completed by a student who wishes to be granted advanced standing for an honours degree of Bachelor of Science in the University.

Programs

Each program has an identifying number. The numbers before the decimal point identify the school according to the following table. The number after the decimal point distinguishes different school programs. Where a double number is given (eg 41/70) two identified schools are equally concerned in the program. Programs indicated as 68 are the direct responsibility of the Board of Studies in Science and Mathematics.

1 Physics	42 Biological Technology
2 Chemistry	43 Botany
6 Computer Science	44 Microbiology
10 Mathematics	45 Zoology
12 Psychology	62 History and Philosophy of Science
25 Geology	68 Board of Studies in Science and Mathematics
27 Geography	70 Anatomy
41 Biochemistry	73 Physiology

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

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

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

Anatomy	*see programs* 70.1, 70.2, 41/70, 45/70, 62/70, 68/70, 70/73
Biochemistry	*see programs* 41.1, 2/41, 41/42, 41/43, 41/44, 41/45, 41/70, 41/73
Biotechnology	*see programs* 42.1, 2/42, 41/42, 42/44
Botany	*see programs* 43.1, 43.2, 43.3, 43.4, 43.5, 43.6, 27/43, 41/43, 43/44 *or* 43/45

Sciences

Chemistry	*see programs* 2.1, 2.2, 2.3, 2/41, 2/42	Microbiology	*see programs* 44.1, 44.2, 44.3, 44.4, 41/44, 42/44, 43/44
Community Medicine	units *available in some programs* (the identifying number is 79)	Occupational Therapy	*see program* 12/68
Computer Science	*see program* 6.1	Philosophy	units *available in some programs* (the identifying number is 52)
Genetics	*	Physics	*see programs* 1.1, 1.2, 1.3, 1.5
Geography	*see programs* 27.1, 27.2, 27.3, 27/25, 27/43	Physiology	*see programs* 73.1, 41/73, 70/73
Geology	*see programs* 25.1, 25.2, 27/25	Physiotherapy	*see program* 68/70
History and Philosophy of Science	*see programs* 62.1, 62/70	Psychology	*see programs* 12.1, 12/68
		Zoology	*see programs* 45.1, 45.2, 45.3, 45.4, 45.5, 45.6, 45.7, 45.8, 45.9, 45.10, 45.11, 45.12, 45.13, 41/45, 43/45, 45/70
Marine Science	*see programs* 68.31, 68.32, 68.33, 68.34		
Mathematics	*see programs* 10.1, 10.1-11, 10.1-12, 10.1-21, 10.1-22, 10.1-31, 10.1-32, 10.1-41, 10.1-42, 10.1-50, 10.2, 10.2-11, 10.2-12, 10.2-21, 10.2-22, 10.2-31, 10.2-32, 10.2-41, 10.2-42, 10.3, 10.4, 10.5, 10.6		

* Under consideration at time of publication.

	Year 1	Year 2	Year 3	Year 4
1.1 **Physics**	1.001 *or* 1.011 10.001 *or* 10.011 Choose 2 of 2.111 2.121 2.131 Choose 2 Level I units from: 5.030 10.041 17.011 17.021 25.011	1.012* 1.022* 1.032 10.111B 10.211A *1 General Studies elective* Choose 3 units from: 6.601A 10.111A 10.411A 10.331	1.013* 1.023* 1.033* 1.043 *2 General Studies electives* Choose at least 3 units from: 1.133 1.143 1.153 1.163 1.173 1.313 1.323 10.212A 10.412D	1.114 1.124 1.134 1.144 1.154 *1 General Studies elective*

* Students seeking passes with distinction may be required to take additional material.

	Year 1	Year 2	Year 3
1.2 **Physics** **Single major†**	1.001 *or* 1.011 10.001 *or* 10.011 Choose 4 Level I units from Table 1	1.012* 1.022* 1.032 10.211A *1 General Studies elective* Choose 4 units from Table 1 *and/or* Table 2 for program 1.2	1.013* 1.023* 1.033* 1.043 *2 General Studies electives* Choose at least 3 units from Table 1 *and/or* Table 2 for program 1.2

* See 1.1 footnote.
† Under exceptional circumstances students taking this program may be eligible for transfer into Year 4 of Program 1.1 or 1.3.

	Year 1	Year 2	Year 3	Year 4
1.3 Applied Physics	1.001 *or* 1.011 10.001 *or* 10.011 Choose 2 of 2.111 2.121 2.131 Choose 2 Level I units from: 5.030 10.041 17.011 17.021 25.011	1.012* 1.022* 1.032 10.111B 10.211A *1 General Studies elective* Choose 3 units from: 6.601A 10.111A 10.331 10.411A	1.013* 1.023* 1.033* 1.043 *2 General Studies electives* Choose at least 3 units from: 1.133 1.313 1.323 1.333	1.314 1.324 1.334 1.344 1.354 *1 General Studies elective*

* See 1.1 footnote.

	Year 1	Year 2	Year 3	Year 4
1.5 Theoretical Physics	1.001 *or* 1.011 10.011 Choose 2 of 2.111 2.121 2.131 Choose 2 Level I units from: 5.030 10.041 17.011 17.021 25.011	1.012* 1.022* 1.032 10.111A 10.111B *or* 10.121B 10.211 A 10.421B *1 General Studies elective* Choose 1 unit from: 6.601A 10.331 10.411A	1.013* *or* 10.222F 1.023* 1.033* 10.412D *2 General Studies electives* Choose at least 3 units from: 1.043 1.513 1.523 10.122B *or* 10.112B 10.212A 10.422A 10.1125 *and* 10.1126	1.114 1.124 1.544 *1 General Studies elective* Choose 2 units from: 1.134 1.144 1.514 1.524 1.534

* See 1.1 footnote.

	Year 1	Year 2	Year 3	Year 4
2.1 Chemistry Single major	1.001 *or* 1.011 2.121 2.131 10.001 *or* 10.011 *or* 10.021 Choose 2 Level I units from Table 1	2.002A 2.002B 2.042C ·2.002D *1 General Studies elective* Choose 3 units from Table 1	*2 General Studies electives* Choose 8 units from Table 1 including 4 Level III Chemistry units	2.004 *1 General Studies elective*

	Year 1	Year 2	Year 3	Year 4
2.2 **Chemistry**	1.001 *or* 1.011 2.121 2.131 10.001 *or* 10.011 *or* 10.021 Choose 2 Level I units from Table 1	2.002A 2.002B *1 General Studies elective* Choose at least 5 units from Table 1 including at least one of: 2.042C *and* 2.002D	*2 General Studies electives* Choose 8 Level III units from Table 1 including only 4 Chemistry units	2.004 *1 General Studies elective*

	Year 1	Year 2	Year 3	Year 4
2.3 **Chemistry** Double major	\[see note below\]			

2.3 Chemistry Double major

Students wishing to take 8 or more Level III Chemistry units are required to transfer to the Pure and Applied Chemistry Course (391) before the commencement of Year 2. If Year 2 studied in the Science and Mathematics course is similar to Year 2 of Course 391, the transfer may still be made before the commencement of Year 3.

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

Year 1	Year 2	Year 3	Year 4
1.001 *or* 1.011 2.121 2.131 10.001 *or* 10.011 *or* 10.021 Choose 2 Level I units from Table 1	2.002A 2.002B 2.042C 2.002D 2.002H *2 General Studies electives* Choose 2 units from Table 1	2.003B 2.003C 2.003D 2.013A *1 General Studies elective* Choose 4 other Chemistry Level III electives from Table 1	2.004 *1 General Studies elective*

	Year 1	Year 2	Year 3	Year 4
2/41 **Chemistry/** **Biochemistry**	1.001 *or* 1.011 2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021	2.002A 2.002B 2.042C 2.002D 41.101 41.111 *1 General Studies elective*	41.102A *2 General Studies electives* Choose *either* 41.102B *or* both 41.102C and 41.102D Choose 4 Chemistry Level III units from Table 1	*1 General Studies elective* 41.103 *or* 2.004

	Year 1	Year 2	Year 3	Year 4
2/42 **Chemistry/** **Biotechnology**	1.001 *or* 1.011 2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021	2.002A 2.002B 41.101 41.111 42.101 44.101 *1 General Studies elective* Choose 1 unit from: 2.042C 2.002D	42.102A 42.102B *2 General Studies electives* Choose 6 Level III units from Table 1 including 4 Chemistry Level III units	*1 General Studies elective* 2.004 *or* 42.103

	Year 1	Year 2	Year 3	Year 4
6.1 Computer Science	10.001 *or* 10.011 Choose 6 Level I units from Table 1	6.601A 6.601B *1 General Studies elective* Choose 6 units from Table 1	6.602A 6.602B 6.602C 6.602D *2 General Studies electives* Choose 4 units from Table 1	6.606 *1 General Studies elective*

	Year 1	Year 2	Year 3
10.1 Mathematics	10.001 *or* 10.011 Choose 6 units from: **1.** Table 1 *&/or* **2.** The BA course*† *&/or* **3.** Table 2† for program 10.1	10.111A *or* 10.121A 10.111B *or* 10.121B 10.211A *or* 10.221A *1 General Studies elective* Choose 5 units from: **1.** Table 1 *&/or* **2.** The BA course*† *&/or* **3.** Table 2† for program 10.1	Choose 4 Level III§ mathematics units from Table 1 (or choose 5 if only 3 Level II mathematics units taken) *2 General Studies electives* Choose 3 (*or* 2) units from: **1.** Table 1 *&/or* **2.** The BA course*† *&/or* **3.** Table 2† for program 10.1

* The program may include up to 8 units from the BA course offered by the following Schools: Drama, Economics, English, French, German, History, Philosophy, Political Science, Russian, Sociology, Spanish and Latin American Studies. Each Upper Level unit so offered by these Schools shall count as 1½-units. Upper Level units from the School of Economics are restricted to all those in Economic History plus 15.062, 15.072, 15.263 and 15.273.

† Not more than 8 units that are not in Table 1 may be taken without the approval of the Head of the School of Mathematics.

§ Not to include more than one Level II/III unit.

	Year 1	Year 2	Year 3
10.1-11 Pure Mathematics	10.001 *or* 10.011 Choose 6 units from: **1.** Table 1 *&/or* **2.** The BA course*† *&/or* **3.** Table 2† for program 10.1	10.111A *or* 10.121A 10.111B *or* 10.121B 10.211A *or* 10.221A *1 General Studies elective* Choose 5 units from: **1.** Table 1 *&/or* **2.** The BA course*† *&/or* **3.** Table 2† for program 10.1	Choose 4 units from: 10.1111 10.1112 10.1121 10.1122 10.1123 10.1124 10.1125 10.1126 10.1127 10.112B 10.112C *2 General Studies electives* If only 3 Level II Mathematics units taken in year 2 choose 1 further Level II or Level III Mathematics unit Choose 3 (*or* 2) units from: **1.** Table 1 *&/or* **2.** The BA course*† *&/or* **3.** Table 2† for program 10.1

*† See 10.1 footnotes.

	Year 1	Year 2	Year 3	Year 4

10.1-12 Pure Mathematics Honours	10.011
	Choose 6 units from:
	  1. Table 1
	&/or 2. The BA course*†
	&/or 3. Table 2† for program 10.1
		10.121A
		10.121B
		10.121C
		10.221A
		1 General Studies elective
		Choose 4 units from:
		  1. Table 1
		&/or 2. The BA course*†
		&/or 3. Table 2† for program 10.1
			10.122A
			10.122B
			10.122C
			10.122E
			2 General Studies electives
			Choose 3 units from:
			  1. Table 1
			&/or 2. The BA course*†
			&/or 3. Table 2† for program 10.1
			at least 2 of which must be Level III units
				10.123
				1 General Studies elective

*† See 10.1 footnotes.

	Year 1	Year 2	Year 3

10.1-21 Applied Mathematics	10.001 *or* 10.011
	Choose 6 units from:
	  1. Table 1
	&/or 2. The BA course*†
	&/or 3. Table 2† for program 10.1
		10.211A *or* 10.221A
		10.111A *or* 10.121A
		10.111B *or* 10.121B
		10.211D *or* 10.221D‡
		1 General Studies elective
		Choose 4 units from:
		  1. Table 1
		&/or 2. The BA course*†
		&/or 3. Table 2† for program 10.1
			10.212A *or* 10.222A
			10.212L *or* 10.222L
			10.212M *or* 10.222M
			One unit from the Theory of Statistics Level III units or from the Theoretical Mechanics Level III units
			2 General Studies electives
			Choose 3 units from:
			  1. Table 1
			&/or 2. The BA course*†
			&/or 3. Table 2† for program 10.1

*† See 10.1 footnotes.
‡ This unit is strongly recommended but not essential. If not taken, one additional Mathematics unit at Level II or Level III must be taken in either Year 2 *or* Year 3.

	Year 1	Year 2	Year 3	Year 4

10.1-22
Applied
Mathematics
Honours
	10.011
	Choose 6 units from:
	    1. Table 1
	&/or 2. The BA
	         course*†
	&/or 3. Table 2† for
	         program 10.1
		10.121A
		10.121B
		10.221A
		10.221D
		1 General Studies
		elective
		Choose 2 additional
		Higher Level
		Mathematics units
		
		Choose 2 units from:
		    1. Table 1
		&/or 2. The BA
		         course*†
		&/or 3. Table 2† for
		         program 10.1
			10.222A
			10.222L
			10.222M
			2 General Studies
			electives
			Choose 2 further
			Level III§ Mathematics
			units one of which
			must not be from
			the Pure Mathematics
			Level III units
			
			Choose 2 units from:
			    1. Table 1
			&/or 2. The BA
			         course*†
			&/or 3. Table 2† for
			         program 10.1
				10.223
				1 General
				Studies
				elective

*†§ See 10.1 footnotes.

	Year 1	Year 2	Year 3

10.1-31
Statistics
	10.001 *or* 10.011
	
	Choose 6 units from:
	    1. Table 1
	&/or 2. The BA
	         course*†
	&/or 3. Table 2† for
	         program 10.1
		10.111A *or* 10.121A
		10.111B *or* 10.121B
		10.211A *or* 10.221A
		10.311A *or* 10.321A
		10.311B *or* 10.321B
		1 General Studies
		elective
		Choose 2 units from:
		    1. Table 1
		&/or 2. The BA
		         course*†
		&/or 3. Table 2† for
		         program 10.1
			Choose 4 units from:
			10.312A *or* 10.322A
			10.312B *or* 10.322B
			10.312C *or* 10.322C
			10.312D *or* 10.322D
			10.312E *or* 10.322E
			2 General Studies
			electives
			Choose 3 Level III
			Mathematics or
			Computer Science units
			from Table 1

*† See 10.1 footnotes.

	Year 1	Year 2	Year 3	Year 4

10.1-32
Statistics
Honours
	10.011
	Choose 6 units from:
	    1. Table 1
	&/or 2. The BA
	         course*†
	&/or 3. Table 2† for
	         program 10.1
		10.121A *or* 10.111A
		10.121B *or* 10.111B
		10.221A *or* 10.211A
		10.321A
		10.321B
		1 General
		Studies
		elective
		Choose 2
		units from:
		    1. Table 1
		&/or 2. The BA
		         course*†
		&/or 3. Table 2† for
		         program 10.1
			Choose 4 units from:
			10.322A
			10.322B
			10.322C
			10.322D
			10.322E
			2 General Studies
			electives
			Choose 3 level
			III Mathematics
			or Computer Science
			units from Table 1
				1 General Studies
				elective
				10.323

*† See 10.1 footnotes.

	Year 1	Year 2	Year 3

10.1-41
Theoretical
Mechanics
	10.001 *or* 10.011
	1.001 *or* 1.011
	Choose 4 units from:
	    1. Table 1
	&/or 2. The BA course*†
	&/or 3. Table 2† for
	      program 10.1
		10.111A *or* 10.121A
		10.111B *or* 10.121B
		10.211A *or* 10.221A
		10.411A *or* 10.421A
		10.411B *or* 10.421B
		1 General Studies
		elective
		Choose 3 units from:
		    1. Table 1
		&/or 2. The BA
		      course*†
		&/or 3. Table 2† for
		      program 10.1
			10.412A *or* 10.422A
			10.412B *or* 10.422B
			10.412D *or* 10.422D
			Choose 1 unit from:
			10.212A *or* 10.222A
			10.212L *or* 10.222L
			10.212M *or* 10.222M
			10.1125 and 10.1126
			or 10.122E
			2 General Studies
			electives
			Choose 3 units from:
			    1. Table 1
			&/or 2. The BA course*†
			&/or 3. Table 2† for
			      program 10.1

*† See 10.1 footnotes.

	Year 1	Year 2	Year 3	Year 4

10.1-42
Theoretical
Mechanics
Honours
	10.011
	1.001 *or* 1.011
	Choose 4 units from:
	    1. Table 1
	&/or 2. The BA
	      course*†
	&/or 3. Table 2† for
	      program 10.1
		10.121A *or* 10.111A
		10.121B
		10.221A
		10.421A
		10.421B
		1 General Studies
		elective
		Choose 3 units from:
		    1. Table 1
		&/or 2. The BA
		      course*†
		&/or 3. Table 2† for
		      program 10.1
			10.422A
			10.422B
			10.422C
			10.422D
			2 General Studies
			electives
			Choose 2 units from:
			10.412A
			10.222A *or* 10.212A
			10.222M *or* 10.212M
			10.221D *or* 10.211D
			10.122B
			10.122E *or* (10.1125
			and 10.1126)
			Choose 1 unit from:
			    1. Table 1
			&/or 2. The BA
			      course*†
			&/or 3. Table 2† for
			      program 10.1
				10.423
				1 General Studies
				elective

*† See 10.1 footnotes.

	Year 1	Year 2	Year 3
10.1-5 **Applied Mathematics and Theoretical Mechanics**	10.001 *or* 10.011 1.001 *or* 1.011 Choose 4 units from: 1. Table 1 *&/or* 2. The BA course*† *&/or* 3. Table 2† for program 10.1	10.111A *or* 10.121A 10.111B *or* 10.121B 10.211A *or* 10.221A 10.411A *or* 10.421A 10.411B *or* 10.421B 10.211D *or* 10.221D *1 General Studies* *elective* Choose 2 units from: 1. Table 1 *&/or* 2. The BA course*† *&/or* 3. Table 2† for program 10.1	10.412A *or* 10.422A 10.412B *or* 10.422B 10.412D *or* 10.422D 10.212A *or* 10.222A 10.212L *or* 10.222L 10.212M *or* 10.222M *2 General Studies* *electives* Choose 1 unit from: 1. Table 1 *&/or* 2. The BA course*† *&/or* 3. Table 2† for program 10.1

*† See 10.1 footnotes.

	Year 1	Year 2	Year 3
10.2 **Mathematics and Liberal Studies**	10.001 *or* 10.011 Choose 6 units* from: 1. Table 1† *&/or* 2. The BA course§ *&/or* 3. Table 2 for program 10.2	10.111A *or* 10.121A 10.111B *or* 10.121B 10.211A *or* 10.221A Choose 5 units from: 1. Table 1† *&/or* 2. The BA course§ *&/or* 3. Table 2 for program 10.2	Choose 4 Level III‡ Mathematics units from Table 1 (or Choose 5 if only 3 Level II Mathematics units taken) Choose 5 (or 4) units from: 1. Table 1† *&/or* 2. The BA course§ *&/or* 3. Table 2 for program 10.2

Note: The program shall consist of at least 25 units; there is no General Studies requirement.

* Except for mathematics units, not more than 2 Level I units may be taken in one subject.

† Units in Geography, History and Philosophy of Science, and Philosophy shall be those from the BA course.

§ The program shall include at least 6 units from the BA course 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. Each Upper Level unit so offered by these schools shall count as 1½ units. Upper Level units from the School of Economics are restricted to all those in Economic History plus 15.062. 15.072. 15.263 and 15.273.

‡ Not to include more than one Level II/III unit.

	Year 1	Year 2	Year 3
10.2-11 Pure Mathematics and Liberal Studies	10.001 *or* 10.011 Choose 6 units* from: 1. Table 1† *&/or* 2. The BA course§ *&/or* 3. Table 2 for program 10.2	10.111A *or* 10.121A 10.111B *or* 10.121B 10.211A *or* 10.221A Choose 5 units from: 1. Table 1† *&/or* 2. The BA course§ *&/or* 3. Table 2 for program 10.2	Choose 4 units from: 10.1111, 10.1112, 10.1121, 10.1122, 10.1123, 10.1124, 10.1125, 10.1126, 10.1127 10.112B 10.112C If only 3 Level II Mathematics units were taken choose 1 further Level II or Level III Mathematics unit Choose 5 (or 4) units from: 1. Table 1† *&/or* 2. The BA course§ *&/or* 3. Table 2 for program 10.2

Note: The program shall consist of at least 25 units; there is no General Studies requirement.

*†§ See 10.2 footnotes.

	Year 1	Year 2	Year 3	Year 4
10.2-12 Pure Mathematics Honours and Liberal Studies	10.011 Choose 6 units* from: 1. Table 1† *&/or* 2. The BA course§ *&/or* 3. Table 2 for program 10.2	10.121A 10.121B 10.221A 10.121C Choose 4 units from: 1. Table 1† *&/or* 2. The BA course§ *&/or* 3. Table 2 for program 10.2	10.122A 10.122B 10.122C 10.122E Choose 5 units from: 1. Table 1† *&/or* 2. The BA course§ *&/or* 3. Table 2 for program 10.2	10.123

Note: The first three years of the program shall consist of at least 25 units; there is no General Studies requirement.

*†§ See 10.2 footnotes.

	Year 1	Year 2	Year 3

10.2-21
Applied
Mathematics and
Liberal Studies
	10.001 *or* 10.011
	Choose 6 units* from:
	    1. Table 1†
	&/or **2.** The BA course§
	&/or **3.** Table 2 for
	        program 10.2
		10.111A *or* 10.121A
		10.111B *or* 10.121B
		10.211A *or* 10.221A
		10.211D *or* 10.221D‡
		Choose 4 units from:
		    1. Table 1†
		&/or **2.** The BA course§
		&/or **3.** Table 2 for
		        program 10.2
			10.212A *or* 10.222A
			10.212L *or* 10.222L
			10.212M *or* 10.222M
			Choose 1 unit from:
			the Theory of Statistics Level III
			units or from the Theoretical
			Mechanics Level III units
			Choose 5 units from:
			    1. Table 1†
			&/or **2.** The BA course§
			&/or **3.** Table 2 for
			        program 10.2

Note: The program shall consist of at least 25 units; there is no General Studies requirement.

*†§ See 10.2 footnotes.

‡ This unit is strongly recommended but not essential. If not taken one additional Mathematics unit at Level II or Level III must be taken in either year 2 or year 3.

	Year 1	Year 2	Year 3	Year 4

10.2-22
Applied
Mathematics
Honours and
Liberal Studies
	10.011
	Choose 6 units* from:
	    1. Table 1†
	&/or **2.** The BA
	        course§
	&/or **3.** Table 2 for
	        program 10.2
		10.121A
		10.121B
		10.221A
		10.221D
		Choose 2 additional
		Higher Level
		Mathematics units
		Choose 2 units from:
		    1. Table 1†
		&/or **2.** The BA
		        course§
		&/or **3.** Table 2 for
		        program 10.2
			10.222A
			10.222L
			10.222M
			Choose 2 additional
			Level III‡ Mathematics
			units one of which
			must not be from
			the Pure Mathematics
			Level III units
			Choose 4 units from:
			    1. Table 1†
			&/or **2.** The BA
			        course§
			&/or **3.** Table 2 for
			        program 10.2
				10.223

Note: The first three years of the program shall consist of at least 25 units; there is no General Studies requirement.

*†§‡ See 10.2 footnotes.

	Year 1	Year 2	Year 3

10.2-31
Statistics and
Liberal Studies
	10.001 or 10.011
	Choose 6 units* from:
	    1. Table 1†
	&/or 2. The BA course§
	&/or 3. Table 2 for
	       program 10.2
		10.111A or 10.121A
		10.111B or 10.121B
		10.211A or 10.221A
		10.311A or 10.321A
		10.311B or 10.321B
		Choose 2 units from:
		    1. Table 1†
		&/or 2. The BA course§
		&/or 3. Table 2 for
		       program 10.2
			Choose 4 units from:
			10.312A or 10.322A
			10.312B or 10.322B
			10.312C or 10.322C
			10.312D or 10.322D
			10.312E or 10.322E
			Choose 3 Level III
			Mathematics or Computer
			Science units from Table 1
			Choose 2 units from:
			    1. Table 1†
			&/or 2. The BA course§
			&/or 3. Table 2 for
			       program 10.2

Note: The program shall consist of at least 25 units; there is no General Studies requirement.

*†§ See 10.2 footnotes.

	Year 1	Year 2	Year 3	Year 4

10.2-32
Statistics
Honours and
Liberal Studies
	10.011
	Choose 6 units* from:
	    1. Table 1†
	&/or 2. The BA
	      course§
	&/or 3. Table 2 for
	      program 10.2
		10.111A or 10.121A
		10.111B or 10.121B
		10.211A or 10.221A
		10.321A
		10.321B
		Choose 2 units from:
		    1. Table 1†
		&/or 2. The BA
		      course§
		&/or 3. Table 2 for
		      program 10.2
			Choose 4 units from
			10.322A
			10.322B
			10.322C
			10.322D
			10.322E
			Choose 3 Level III
			Mathematics or
			Computer Science
			units from Table 1
			Choose 2 units from:
			    1. Table 1†
			&/or 2. The BA
			      course§
			&/or 3. Table 2 for
			      program 10.2
				10.323

Note: The first three years of the program shall consist of at least 25 units; there is no General Studies requirement.

*†§ See 10.2 footnotes.

	Year 1	Year 2	Year 3

10.2-41
Theoretical
Mechanics and
Liberal Studies
	10.001 or 10.011
	1.001 or 1.011
	Choose 4 units* from:
	  1. Table 1†
	&/or 2. The BA course§
	&/or 3. Table 2 for
	    program 10.2
		10.111A or 10.121A
		10.111B or 10.121B
		10.211A or 10.221A
		10.411A or 10.421A
		10.411B or 10.421B
		Choose 3 units from:
		  1. Table 1†
		&/or 2. The BA course§
		&/or 3. Table 2 for
		    program 10.2
			10.412A or 10.422A
			10.412B or 10.422B
			10.412D or 10.422D
			Choose 1 unit from:
			10.212A or 10.222A
			10.212L or 10.222L
			10.212M or 10.222M
			(10.1125 and 10.1126)
			or 10.122E
			Choose 5 units from:
			  1. Table 1†
			&/or 2. The BA course§
			&/or 3. Table 2 for
			    program 10.2

Note: The three year program shall consist of at least 25 units; there is no General Studies requirement.
*†§ See 10.2 footnotes.

	Year 1	Year 2	Year 3	Year 4

10.2-42
Theoretical
Mechanics
Honours and
Liberal Studies
	10.011
	1.001 or 1.011
	Choose 4 units* from:
	  1. Table 1†
	&/or 2. The BA
	    course§
	&/or 3. Table 2 for
	    program 10.2
		10.121A or 10.111A
		10.121B
		10.221A
		10.421A
		10.421B
		Choose 3 units from:
		  1. Table 1†
		&/or 2. The BA
		    course§
		&/or 3. Table 2 for
		    program 10.2
			10.422A
			10.422B
			10.222C
			10.422D
			Choose 2 units from:
			10.412A
			10.212A or 10.222A
			10.222M or 10.212M
			10.221D or 10.211D
			10.122B
			10.122E or (10.1125 and
			10.1126)
			Choose 3 units from:
			  1. Table 1†
			&/or 2. The BA
			    course§
			&/or 3. Table 2 for
			    program 10.2
				10.423

Note: The first three years of the program shall consist of at least 25 units; there is no General Studies requirement.
*†§ See 10.2 footnotes.

	Year 1	Year 2	Year 3

10.3 Applied Mathematics (Economic Optimization)	10.001 *or* 10.011
	15.001
	15.011
	Choose 4 units from:
	    1. Table 1
	&/or **2.** The BA course
	&/or **3.** Table 2 for
	        program 10.3
		10.111A *or* 10.121A
		10.111B *or* 10.121B
		10.211A *or* 10.221A
		10.211D *or* 10.221D
		15.002
		15.042
		1 General Studies
		elective
		Choose *either* 10.331 *and* 1 unit from:
		    1. Table 1
		&/or **2.** The BA course
		&/or **3.** Table 2 for
		        program 10.3
		or
		Choose both:
		10.311A
		10.311B
		or
		Choose both:
		10.321A
		10.321B
			10.212L *or* 10.222L
			10.212M *or* 10.222M
			15.003
			15.413
			15.423
			1 General Studies
			elective
			Choose 2 Level III* Mathematics units from Table 1 *if* 10.331 was chosen and *otherwise* choose 1 Level III* Mathematics unit from Table 1 excluding 10.312C *and* 10.322C

Note: Only 2 General Studies electives are required in this program. Each of 14.601, 15.601 and 15.611 (Table 2) may be substituted for a General Studies elective but may not then count as a qualifying unit.

  * The two half units 10.1125 and 10.1126 are recommended.

	Year 1	Year 2	Year 3	Year 4

10.4 Applied Mathematics Honours (Economic Optimization)	10.011
	15.001
	15.011
	Choose 4 units from:
	    1. Table 1
	&/or **2.** The BA
	        course
	&/or **3.** Table 2 for
	        program 10.4
		10.121A *or* 10.111A
		10.121B
		10.221A
		10.221D
		10.331
		or
		both
		10.311A
		and
		10.311B
		or
		both
		10.321A *and*
		10.321B
		15.012
		15.052
		1 General Studies
		elective
			10.222A
			10.222L
			10.222M
			10.122B
			15.013
			15.033
			15.413
			15.423
			1 General Studies
			elective
				10.233
				15.024
				15.034

Notes: **1.** Only 2 General Studies electives are required in this program. Each of 14.601, 15.601 and 15.611 (Table 2) may be substituted for a General Studies elective but may not then count as a qualifying unit.

2. Where higher units are specified in years 1 and 2, exceptional grades in suitable ordinary units may, at the discretion of the Head of School of Mathematics, be accepted as equivalent in the case of students seeking transfer into the program.

	Year 1	Year 2	Year 3

10.5 Mathematics of Management	10.001 *or* 10.011
	14.501
	14.511
	15.001
	15.011
	Choose 2 units from:
	    1. Table 1
	&/or **2.** Table 2 for
	        program 10.5
		10.111A *or* 10.121A
		10.111B *or* 10.121B
		10.211A *or* 10.221A
		10.211D *or* 10.221D
		10.311A *or* 10.321A
		14.522
		14.602
		1 General Studies elective
		Choose at least one of:
		14.542
		14.603
		14.613
		15.042
			1 General Studies elective
			14.583
			Choose at least 4 Level III mathematics units from Table 1, of which at least 2 shall be selected from:
			10.212A *or* 10.222A
			10.412D *or* 10.422D
			10.212L *or* 10.222L
			10.212M *or* 10.222M
			10.311B *or* 10.321B
			10.312A *or* 10.322A
			Choose at least one unit from:
			14.604
			14.608
			14.614
			14.615
			Choose any remaining units from:
			    1. Table 1
			&/or **2.** Table 2 for
			        program 10.5

Note: Only 2 General Studies electives are required in this program. Each of 14.601, 15.601 and 15.611 (Table 2) may be substituted for a General Studies elective but may not then count as a qualifying unit.

	Year 1	Year 2	Year 3	Year 4

10.6 Mathematics of Management Honours Program	10.011
	14:501
	14.511
	15.001
	15.011
	Choose 2 units from:
	    1. Table 1
	&/or **2.** Table 2 for
	        program 10.6
		10.121A *or* 10.111A
		10.121B
		10.221A
		10.221D
		10.331*
		14.532
		14.552
		1 General Studies elective
		Choose *either*
		15.062 *and* 15.072
		or
		15.042 *and* 15.002
			10.222A
			10.222L
			10.222M
			10.122B
			14.573
			14.593
			1 General Studies elective
			Choose 1 Level III unit from:
			    1. Table 1
			&/or **2.** Table 2 for
			        program 10.6
				10.233
				14.852
				14.851 *or* one Accountancy Honours Option

Notes: **1.** Only 2 General Studies electives are required in this program. Each of 14.601, 15.601 and 15.611 (Table 2) may be substituted for a General Studies elective but may not then count as a qualifying unit.

2. Where higher units are specified in Years 1 and 2, exceptional grades in suitable ordinary units may, at the discretion of the Head of the School of Mathematics, be accepted as equivalent in the case of students seeking transfer into the program.

    * May be taken in third year.

	Year 1	Year 2	Year 3	Year 4
12.1 **Psychology**	10.001 *or* 10,011 *or* 10.021 12.001 Choose 4 Level I units from Table 1	12.052 12.062 12.152 *1 General Studies* *elective* Choose 5 units from Table 1	*2 General Studies* *electives* Choose at least 7 units from Table 1 including at least 4 Level III Psychology units	*1 General Studies* *elective* 12.014 *or* 12.044

	Year 1	Year 2	Year 3	Year 4
12/68 **Psychology/** **Occupational** **Therapy** **Graduate** **Diploma**	2.121 2.131 10.001 *or* 10.011 *or* 10.021 12.001 17.011 17.021	12.052 12.062 12.152 70.011A 70.011C 73.011A *1 General Studies* *elective* Choose 1 unit from Table 1	12.603 12.653 12.663 70.012A 70.012C 70.303 *2 General Studies* *electives* Choose 1 unit from: 12.253 12.453 12.713 Choose 1 unit from Table 1	*1 General Studies* *elective* *and* 12.014 *or* 12.044 in Year 4 *and* Graduate Diploma at Cumberland College of Health Sciences in Year 5 *or* Graduate Diploma at Cumberland College of Health Sciences in Year 4

	Year 1	Year 2	Year 3	Year 4
25.1 **Geology** Double major	1.001 *or* 1.011 2.121 2.131 10.001 *or* 10.011 *or* 10.021 25.011	25.012 25.022 *1 General Studies* *elective* Choose 5 units from Table 1	25.013 25.023 25.033 *2 General Studies* *electives*	25.404 *1 General Studies* *elective*

	Year 1	Year 2	Year 3	Year 4
25.2 **Geology** Single major	1.001 *or* 1.011 2.121 2.131 10.001 *or* 10.011 *or* 10.021 25.011	25.012 25.022 *1 General Studies* *elective* Choose 5 units from Table 1	25.013 25.023 *2 General Studies* *electives* Choose 4 units from Table 1	25.404 *1 General Studies* *elective*

25/27
Science Geography/Geology

	Year 1	Year 2	Year 3	Year 4
27.1 **Science** **Geography**	10.001 *or* 10.011 *or* 10.021 27.801 27.802 Choose 4 Level I units from Table 1	27.811 27.812 27.813 *1 General Studies* *elective* Choose 4 units from Table 1 including not more than 2 Level I units.	*2 General Studies* *electives* Choose 8 units including at least 4 Level III units from Table 1 including at least 3 units from: 27.103 27.203 27.413 27.423 *or* 27.863 27.872	27.604 *1 General Studies* *elective*

	Year 1	Year 2	Year 3	Year 4
27.2 **Science** **Geography** **with Botany**	10.001 *or* 10.011 *or* 10.021 17.011 17.021 27.801 27.802 Choose 2 units from: 2.111 2.121 2.131	1.001 27.811 27.812 27.813 43.101 43.111 *1 General Studies* *elective* Choose 1 Level II unit from Table 1	27.103 27.203 43.142 *2 General Studies* *electives* Choose 4 units from: 27.023 27.413 27.423 27.840 27.862 43.112 43.162	27.604 *1 General Studies* *elective*

	Year 1	Year 2	Year 3	Year 4
27.3 **Science** **Geography** **with Geology**	2.121 2.131 10.001 *or* 10.011 *or* 10.021 25.011 27.801 27.802	1.001 25.012 25.022 27.811 27.812 27.813 *1 General Studies* *elective*	25.013 27.413 27.423 *2 General Studies* *electives* Choose 3 units from: 25.1333 27.023 27.103 27.203 27.840 27.862	27.604 *1 General Studies* *elective*

	Year 1	Year 2	Year 3	Year 4
27/25 Science Geography/ Geology	2.121 2.131 10.001 *or* 10.011 *or* 10.021 25.011 27.801 27.802	1.001 25.012 25.022 27.811 27.812 27.813 *1 General Studies elective*	25.013 25.023 27.413 27.423 *2 General Studies electives* Choose 1 unit from: 27.023 27.103 27.203 27.840 27.862	*1 General Studies elective* 25.404 *or* 27.604

	Year 1	Year 2	Year 3	Year 4
27/43 Science Geography/ Botany	10.001 *or* 10.011 *or* 10.021 17.011 17.021 27.801 27.802 Choose 2 units from: 2.111 2.121 2.131	1.001 27.811 27.812 27.813 43.101 43:111 *1 General Studies elective* Choose 1 Level II unit from Table 1	27.103 27.203 43.112 *or* 43.162 43.142 *2 General Studies electives* Choose 3 units from: 27.413 27.423 27.812 27.840 27.841 43.102 43.152	*1 General Studies elective* 27.604 *or* 43.103

	Year 1	Year 2	Year 3	Year 4
41.1 Biochemistry	1.001 *or* 1.011 2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021	2.002B 41.101 41.111 *1 General Studies elective* Choose at least 3 units from Table 1	41.102A Choose *either* 41.102B *&/or* both 41.102C and 41.102D *2 General Studies electives* Choose 2 or 3 other units from Table 1	41.103 *1 General Studies elective*

41/2
Biochemistry/Chemistry

See 2/41

	Year 1	Year 2	Year 3	Year 4
41/42 **Biochemistry/** **Biotechnology**	1.001 *or* 1.011 2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021	2.002A 2.002B 41.101 41.111 42.101 44.101 *1 General Studies* *elective* Choose 1 unit from: 10.031 17.012	42.102A 42.102B *2 General Studies* *electives* Choose 6 Level III units from Table 1 including 4 units from: 41.102A 41.102B *or* 41.102C and 41.102D	*1 General Studies* *elective* 41.103 *or* 42.103

	Year 1	Year 2	Year 3	Year 4
41/43 **Biochemistry/** **Botany**	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 Level I units from Table 1	2.002B 41.101 41.111 43.121 *1 General Studies* *elective* Choose 2 units from: 43.101 43.111 43.131	41.102A 41.102C 41.102D 43.122 43.182 *2 General Studies* *electives* Choose 2 units from: 43.102 43.112 43.132 43.142 43.172	*1 General Studies* *elective* 41.103 *or* 43.103

	Year 1	Year 2	Year 3	Year 4
41/44 **Biochemistry** **Microbiology**	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 level I units from Table 1	2.002B 17.012 41.101 41.111 44.101 *1 General Studies* *elective* Choose at least 1 unit from Table 1	41.102A 44.102 44.112 *2 General Studies* *electives* Choose *either* 41.102B *or* both 41.102C and 41.102D	*1 General Studies* *elective* 41.103 *or* Choose 10 units including *either:* 44.563 *or* 44.573 *or* 44.583 and from: 44.513 44.523 44.533 44.543 44.553

Sciences

	Year 1	Year 2	Year 3	Year 4

41/45 Biochemistry/ Zoology	1.001 *or* 1.011
	2.121
	2.131
	10.001 *or*
	10.011 *or*
	10.021
	17.011
	17.021
		2.002B
		41.101
		41.111
		45.101
		45.201
		45.301
		1 General Studies elective
		Choose one unit from:
		  2.002A
		  2.002D
		  2.042C
		  17.012
		  43.101
			41.102A
			41.102B
			2 General Studies electives
			Choose 4 Level III Zoology units from Table 1
				1 General Studies elective
				41.103 *or* 45.103

	Year 1	Year 2	Year 3	Year 4

41/70 Biochemistry/ Anatomy	2.121
	2.131
	10.001 *or*
	10.011 *or*
	10.021
	17.011
	17.021
	Choose 2 units from Table 1
		2.002B
		41.101
		41.111
		70.011A
		70.011C
		1 General Studies elective
		Choose 1 unit from:
		  2.002A
		  2.002D
		  2.042C
		  70.011B
			41.102A
			41.102B
			70.012A
			70.304
			2 General Studies electives
			Choose 2 units from:
			70.011B
			70.012B
			70.012C
			70.303
				1 General Studies elective
				41.103 *or* 70.013

	Year 1	Year 2	Year 3	Year 4

41/73 Biochemistry/ Physiology	2.121
	2.131
	10.001 *or*
	10.011 *or*
	10.021
	17.011
	17.021
	Choose 2 Level I units from Table 1
		2.002B
		41.101
		41.111
		73.011A
		1 General Studies elective
		Choose 1 unit from:
		  2.002A
		  2.002D
		  2.042C
		Choose 1 unit from Table 1
			41.102A
			41.102B
			73.012
			2 General Studies electives
				1 General Studies elective
				41.103 *or* 73.103

	Year 1	Year 2	Year 3	Year 4
42.1 Biotechnology (General)	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 Level I units from Table 1	2.002A 2.002B 41.101 41.111 42.101 44.101 *1 General Studies elective* Choose 1 Level II unit from Table 1	42.102A 42.102B *2 General Studies electives* Choose 6 Level III units from Table 1	42.103 *1 General Studies elective*

42/2 Biotechnology/ Chemistry

See 2/42

42/41 Biotechnology/ Biochemistry

See 41/42

	Year 1	Year 2	Year 3	Year 4
42/44 Biotechnology/ Microbiology	1.001 *or* 1.011 2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021	2.002A 2.002B 17.012 41.101 41.111 42.101 44.101 *1 General Studies elective*	42.102A 42.102B 44.102 44.112 *2 General Studies electives* Choose 2 Level III units from Table 1	*1 General Studies elective* 42.103 *or* Choose 10 units including *either:* 44.563 *or* 44.573 *or* 44.583 *and* from: 44.513 44.523 44.533 44.543 44.553

	Year 1	Year 2	Year 3	Year 4
43.1 Systematic Botany	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 Level I units from Table 1	43.101 43.111 *1 General Studies elective* Choose 2 Level II units of Biochemistry or Chemistry or Physics Choose 4 units from: 17.012 25.002 43.112 43.121 43.131 43.152 43.162 44.101 *or* other units from Table 1	*2 General Studies electives* Choose at least 4 or 6 Level III Botany units from Table 1, including either or both of 43.112 or 43.162 Choose either 4 or 2 Level III units from Table 1	43.103 *1 General Studies elective*

	Year 1	Year 2	Year 3	Year 4
43.2 Mycology — Plant Pathology	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 units of 1.001 or other Level I units in Table 1	41.101 43.101 43.111 43.121 43.131 44.101 45.201 *1 General Studies elective*	43.132 *2 General Studies electives* Choose 7 units of Botany from Table 1	43.103 *1 General Studies elective*

	Year 1	Year 2.	Year 3	Year 4
43.3 Botany — Cellular Plant Physiology	1.001 *or* 1.011 2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021	1.012 2.002A 2.002B 41.101 43.111 43.121 *1 General Studies elective*	1.143 1.153 41.102A 43.101 43.122 43.182 *2 General Studies electives* Choose *either:* 41.102B *or* 41.102C and 41.102D	43.103 *1 General Studies elective*

	Year 1	Year 2	Year 3	Year 4
43.4 **Botany — Whole** **Plant and** **Crop Physiology**	2.121 2.131 10.001 *or* 10.011 17.011 17.021 Choose 2 units of 1.001 or other Level I units from Table 1	6.601A 10.031 27.801 27.802 41.101 43.111 43.121 *1 General Studies* *elective*	10.032 17.012 27.103 27.203 43.101 43.122 43.142 43.182 *2 General Studies* *electives*	43.103 *1 General Studies* *elective*

	Year 1	Year 2	Year 3	Year 4
43.5 **Botany —** **Applied Plant** **Physiology**	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 units of 1.001 or other Level I units from Table 1	41.101 43.101 43.111 43.121 44.101 45.101 45.201 *1 General Studies* *elective*	43.131 43.102 43.132 43.142 43.182 45.402 45.412 45.422 *2 General Studies* *electives*	43.103 *1 General Studies* *elective*

	Year 1	Year 2	Year 3	Year 4
43.6 **Botany** **with Zoology**	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 Level I units from Table 1	41.101 43.101 43.111 43.121 45.201 45.301 *1 General Studies* *elective* Choose 1 unit from: 17.012 43.131 45.401	*2 General Studies* *electives* Choose at least 7 units from Table 1 including at least 4 Level III Botany units	43.103 *1 General Studies* *elective*

43/27
Science Geography/Botany

See 27/43

43/41
Botany/Biochemistry

See 41/43

	Year 1	Year 2	Year 3	Year 4
43/44 **Botany/** **Microbiology**	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 units of 1.001 or other Level I units in Table 1	41.101 43.101 43.111 43.121 43.131 44.101 *1 General Studies* *elective* Choose either 45.201 *or* 17.012	43.132 43.142 43.172 44.102 *2 General Studies* *electives* Choose 1 unit from: 42.102 43.182 Choose 2 units from: 44.112 44.122 44.132	*1 General Studies* *elective* 43.103 or Choose 10 units including *either:* 44.563 *or* 44.573 *or* 44.583 *and* from: 44.513 44.523 44.533 44.543 44.553

	Year 1	Year 2	Year 3	Year 4
43/45 **Plant** **Pathology/** **Entomology**	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 units of 1.001 or other Level I units in Table 1	41.101 43.131 44.101 45.101 45.201 *1 General Studies* *elective* Choose 2 other Botany Level II units from Table 1	43.132 45.202 45.402 45.412 45.422 *2 General Studies* *electives* Choose 3 Botany Level III units	*1 General Studies* *elective* 43.103 *or* 45.103

	Year 1	Year 2	Year 3	Year 4
44.1 **Microbiology**	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 Level I units from Table 1	2.002B 17.012 41.101 44.101 *1 General Studies* *elective* Choose 2 units from Table 1	41.102A 44.102 44.112 44.132 *2 General Studies* *electives* Choose 1 unit from: 42.102 44.122	*1 General Studies* *elective* Choose 10 units including *either:* 44.563 *or* 44.573 *or* 44.583 *and* from: 44.513 44.523 44.533 44.543 44.553

	Year 1	Year 2	Year 3	Year 4
44.2 **Microbiology** **(Immunology)**	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 Level I units from Table 1	2.002B 41.101 44.101 70.011A *1 General Studies* *elective* Choose 2 units from Table 1	41.102A 44.102 44.112 44.122 70.304 *2 General Studies* *electives*	*1 General Studies* *elective* Choose 10 units including *either:* 44.563 *or* 44.573 *or* 44.583 *and* from: 44.513 44.523 44.533 44.543 44.553

	Year 1	Year 2	Year 3	Year 4
44.3 **Microbiology** **(Ecology)**	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 Level I units from Table 1	17.012 41.101 43.111 43.131 44.101 45.201 *1 General Studies* *elective*	43.132 43.142 43.172 44.102 44.112 45.112 *2 General Studies* *electives*	*1 General Studies* *elective* Choose 10 units including *either:* 44.563 *or* 44.573 *or* 44.583 *and* from: 44.513 44.523 44.533 44.543 44.553

	Year 1	Year 2	Year 3	Year 4
44.4 Microbiology (General)	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 Level I units from Table 1	41.101 44.101 *1 General Studies elective* Choose 4 units from Table 1	44.102 44.112 *2 General Studies electives* Choose 4 units from Table 1	*1 General Studies elective* Choose 10 units including either: 44.563 *or* 44.573 *or* 44.583 *and* from: 44.513 44.523 44.533 44.543 44.553

**44/41
Microbiology/Biochemistry**

See 41/44

**44/42
Microbiology/Biotechnology**

See 42/44

**44/43
Microbiology/Botany**

See 43/44

	Year 1	Year 2	Year 3	Year 4
45.1 **Zoology** **(General)**	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 Level I units from Table 1	45.101 45.201 45.301 *1 General Studies* *elective* Choose 5 units from Table 1 including at least 2 Level II units of Biochemistry, Chemistry, Geography, Geology or Mathematics	*2 General Studies* *electives* Choose 8 units from Table 1 including at least 4 units from: 45.112 45.121 45.122 45.132 45.142 45.202 45.302	45.103 *1 General Studies* *elective*

	Year 1	Year 2	Year 3	Year 4
45.2 **Entomology**	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 Level I units from Table 1	41.101 45.101 45.402 *1 General Studies* *elective* Choose 4 Level II units from: Zoology, Botany, Microbiology or Mathematics	45.412 45.422 45.432 *2 General Studies* *electives* Choose 5 Level III units from: Zoology, Botany, Microbiology, Mathematics or 79.201	45.103 *1 General Studies* *elective*

	Year 1	Year 2	Year 3	Year 4
45.3 **Zoology** **with Botany**	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 Level I units from Table 1	41.101 43.111 43.121 45.101 45.201 45.301 *1 General Studies* *elective* Choose 1 unit from: 17.012 43.131 43.101 45.402	*2 General Studies* *electives* Choose at least 7 units from Table 1 including at least 4 Level III Zoology units	45.103 *1 General Studies* *elective*

	Year 1	Year 2	Year 3	Year 4
45.4 **Zoology** (Functional)	1.001 *or* 1.011 2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021	41.101 41.111 45.301 73.011A *1 General Studies* *elective* Choose *either* 45.201 *or* 45.402	45.132 45.142 *2 General Studies* *electives* Choose *either* 45.202 *or* 45.412 Choose 5 units from Table 1	45.103 *1 General Studies* *elective*

	Year 1	Year 2	Year 3	Year 4
45.5 **Zoology** (Environmental)	1.001 *or* 1.011 2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021	17.012 41.101 43.111 45.101 45.201 45.301 *1 General Studies* *elective* Choose 1 Level II unit from Table 1	43.142 43.152 43.172 45.112 45.132 45.302 *2 General Studies* *electives* Choose at least 1 unit from: 45.122 45.202	45.103 *1 General Studies* *elective*

	Year 1	Year 2	Year 3	Year 4
45.6 **Zoology** (Zoogeography and Ecology)	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 25.011	17.012 25.022 43.101 43.111 45.101 45.201 45.301 *1 General Studies* *elective* Choose 1 Level II unit from Table 1	43.152 45.112 45.121 45.122 45.302 *2 General Studies* *electives* Choose at least 2 units from Table 1	45.103 *1 General Studies* *elective*

	Year 1	Year 2	Year 3	Year 4
45.7 Zoology (Ecology)	2.121 2.131 10.001 *or* 10.011 17.011 17.021 Choose 2 other Level I units	10.031 10.331 17.012 41.101 43.111 45.201 45.301 *1 General Studies elective*	10.032 43.152 45.112 45.121 45.122 45.132 45.302 *2 General Studies electives* Choose at least 1 unit from Table 1	45.103 *1 General Studies elective*

	Year 1	Year 2	Year 3	Year 4

45.8 Zoology (Population Biology)	2.121
	2.131
	10.001 *or*
	10.011
	17.011
	17.021
	Choose 2 units
	from Table 1
		17.012
		43.101
		45.301
		1 General Studies elective
		Choose either
		45.101 *or* 10.331
		Choose either
		45.201 *or* 45.402
		Choose 3 units from:
		  1.922
		  1.932
		  6.601A
		  10.031
		  43.111
		  44.101
			45.121
			45.122
			45.302
			79.201
			2 General Studies electives
			Choose 3 units from:
			  6.602C
			  6.602D
			  10.032
			  43.102
			  43.172
			  45.112
			  45.202
			  45.402
			  79.302
				45.103
				1 General Studies elective

	Year 1	Year 2	Year 3	Year 4
45.9 Zoology with Mathematics	2.121 2.131 10.001 *or* 10.011 17.011 17.021 Choose 2 Level I units from Table 1	10.111A 10.111B 10.211A 45.201 45.301 *1 General Studies elective* Choose 3 units from Table 1 including at least 1 Level II Statistics unit	*2 General Studies electives* Choose 4 Level III Zoology units Choose 4 Level III Mathematics units	45.103 *1 General Studies elective*

	Year 1	Year 2	Year 3	Year 4
45.10 Entomology and Plant Physiology	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 Level I units from Table 1	41.101 43.111 43.121 45.101 *1 General Studies elective* Choose 3 units from Botany, Zoology or Biochemistry	43.122 43.182 45.402 45.412 45.422 45.432 *2 General Studies electives* Choose *either:* 43.112 *or* 43.162 Choose 1 unit from Botany or Zoology	45.103 *1 General Studies elective*

	Year 1	Year 2	Year 3	Year 4
45.11 Entomology and Genetics	1.001 *or* 1.011 2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021	41.101 43.101 45.101 45.402 *1 General Studies elective* Choose 3 units from Botany, Zoology or Biochemistry	43.102 45.121 45.412 45.422 45.432 79.201 79.302 *2 General Studies electives* Choose 1 unit from Botany or Zoology	45.103 *1 General Studies elective*

	Year 1	Year 2	Year 3	Year 4
45.12 Entomology and Ecology	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 Level I units from Table 1	43.101 45.101 45.201 45.402 *1 General Studies elective* Choose 3 Level II Units from Table 1	17.012 43.111 45.142 45.412 45.422 45.432 *2 General Studies electives* Choose 2 units from: 43.102 43.112 43.162	45.103 *1 General Studies elective*

	Year 1	Year 2	Year 3	Year 4
45.13 Entomology and Plant Pathology	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 Level I units from Table 1	41.101 43.101 43.131 43.132 44.101 45.402 *1 General Studies elective* Choose 2 units from: 45.201 45.301	45.101 45.412 45.422 45.432 *2 General Studies electives* Choose 4 Level III Zoology or Botany units	45.103 *1 General Studies elective*

**45/41
Zoology/Biochemistry**

See 41/45

**45/43
Plant Pathology — Entomology**

See 43/45

	Year 1	Year 2	Year 3	Year 4
45/70 Zoology/ Anatomy	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 Level I units from Table 1	45.101 45.301 70.011A 70.011C *1 General Studies elective* Choose 3 units from Table 1 including 2 units from Biochemistry, Chemistry, Geology, Mathematics or Physics	70.012A *2 General Studies electives* Choose 3 units from: 70.011B 70.012B 70.012C 70.303 70.304 Choose 4 Level III Zoology units from Table 1	*1 General Studies elective* 45.103 *or* 70.013

	Year 1	Year 2	Year 3	Year 4
62.1 **History and** **Philosophy** **of Science**	10.001 *or* 10.011 *or* 10.021 Choose at least 6 Level I units from Table 1	62.012 62.022 62.032 *1 General Studies elective* Choose at least 4 units from Table 1	*2 General Studies electives* Choose 8 units from Table 1 including 4 units from: 62.013 62.023 62.033 62.043 62.053 62.063 62.073 62.083 62.093	62.014 *1 General Studies elective*

	Year 1	Year 2	Year 3	Year 4
62/70 **History and** **Philosophy of** **Science/** **Anatomy**	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 Level I units from Table 1	62.012 62.022 62.032 70.011A 70.011B 70.011C *1 General Studies elective* Choose 1 unit from Table 1	70.012A *1 General Studies elective* Choose 4 units from: 62.013 62.023 62.033 62.043 62.053 62.063 62.073 62.083 62.093 Choose 3 units from: 70.012B 70.012C 70.303 70.304	*1 General Studies elective* 62.014 *or* 70.013

	Year 1	Year 2	Year 3
68.31 **Marine Science** (Physical Oceanography)	1.001 *or* 1.011 10.001 *or* 10.011 Choose 4 units from two of the groups 1., 2. and 3. 1. 17.011 17.021 2. 25.011 27.801 27.802 3. 2.121 2.131	68.302 1.012 *or* 10.411A *1 General Studies elective* Choose at least 5 units from Table 1 including the units required from 2 of the groups 1., 2. and 3. chosen in Year 1: 1. At least 1 unit from 17.012 43.111 45.201 2. 25.633A and 27.413A 3. 2.002A 2.002D	1.913 10.411A 10.412A *2 General Studies electives* Choose 5 units from Table 1 which *may* include units from 2 of the groups 1., 2. and 3. chosen in Year 1: 1. 43.172 45.112 2. none 3. 2.043A

	Year 1	Year 2	Year 3	Year 4

68.32
Marine Science
(Biological
Oceanography)
	10.001 *or*
	10.011
	17.011
	17.021
	Choose 4 units
	from 2 of the
	groups **1.**, **2.** and **3.**
	1. 1.001 *or*
	        1.011
	2. 25.011 *or*
	        27.801 and
	        27.802
	3. 2.121
	        2.131
		68.302
		43.111
		44.101
		45.201
		1 General Studies
		elective
		Choose at least
		1 unit from:
		10.331
		17.012
		41.101
		including the units
		required from 2 of
		the groups **1.**, **2.** and **3.**
		chosen in Year 1:
		1. 10.031
		2. 25.633A *and*
		        27.413A
		3. 2.002A
		        2.002D
			43.172
			45.112
			2 General Studies
			electives
			Choose at least
			6 units from
			Table 1 which *may*
			include units
			from 2 of the
			groups **1.**, **2.**
			and **3.** chosen in
			Year 1:
			1. 10.032
			        10.412A
			2. none
			3. 2.043A
				68.004
				1 General Studies
				elective

	Year 1	Year 2	Year 3	Year 4

68.33
Marine Science
(Earth Science
Oceanography)
	10.001 *or*
	10.011
	25.011
	Choose 4 units
	from 2 of the
	groups **1.**, **2.**
	and **3.**:
	1. 1.001 *or*
	        1.011
	2. 17.011
	        17.021
	3. 2.121
	        2.131
		68.302
		25.022
		27.801
		27.802
		1 General Studies
		elective
		Choose at least
		3 units from Table 1
		including the units
		required from 2 of
		the groups **1.**, **2.** and **3.**
		chosen in Year 1:
		1. 10.031
		2. at least 1 unit
		from:
		17.012
		43.111
		45.201
		3. 2.002A
		        2.002D
			25.613
			25.623
			25.633A *and*
			27.413A
			25.643
			2 General Studies
			electives
			Choose 4 units
			from Table 1
			which *may*
			include units
			from 2 of the
			groups **1.**, **2.** and **3.**
			chosen in Year 1.
			1. 10.032
			        10.412A
			2. 43.172
			        45.112
			3. 2.043A
				68.004
				1 General Studies
				elective

Sciences

	Year 1	Year 2	Year 3	Year 4
68.34 **Marine Science** (Environmental Chemistry)	2.121 2.131 10.001or 10.011 Choose 4 Units from 2 of the groups **1.**, **2.** and **3.** 1. 1.001 or 1.011 2. 17.011 17.021 3. 25.011 27.801 27.802	68.302 2.002A 2.002D *1 General Studies elective* Choose at least 4 units from Table 1 including the units required from 2 of the groups **1.**, **2.** and **3.** chosen in Year 1: 1. 10.031 2. At least 1 unit from: 17.012 43.111 45.201 3. 25.633A *and* 27.413A	2.043A 2.003D *2 General Studies electives* Choose 6 units from Table 1 including the units required from 2 of the groups **1.**, **2.** and **3.** chosen in Year 1: 1. 10.032 10.412A 2. 43.172 45.112 3. none	68.004 *1 General Studies elective*

68/12 Occupational Therapy Graduate Diploma/Psychology

See 12/68

	Year 1	Year 2	Year 3	Year 4
68/70 **Physiotherapy** **Graduate** **Diploma/** **Anatomy**	1.001 2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021	12.001 70.011A 70.011B 70.011C 73.011A *1 General Studies elective* Choose 1 unit from Table 1	70.012A *2 General Studies electives* Choose 7 units from Table 1 including at least 3 units from: 70.012B 70.012C 70.303 70.304	*1 General Studies elective* *and* 70.013 in Year 4 and Graduate Diploma at Cumberland College of Health Sciences in Year 5. *or* Graduate Diploma at Cumberland College of Health Sciences in Year 4.

	Year 1	Year 2	Year 3	Year 4
70.1 **Anatomy**	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 Level I units from Table 1	70.011A 70.011B 70.011C *1 General Studies elective* Choose at least 4 units from Table 1	70.012A 70.012B 70.012C 70.303 70.304 *2 General Studies electives* Choose at least 3 units from Table 1	70.013 *1 General Studies elective*

	Year 1	Year 2	Year 3	Year 4
70.2 **Anatomy —** Single Major	10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 4 Level I units from Table 1	70.011A 70.011C *1 General Studies* *elective* Choose at least 5 units from Table 1	70.012A *2 General Studies* *electives* Choose 7 units from Table 1 including at least 3 units from: 70.011B 70.012B 70.012C 70.303 70.304	70.013 *1 General Studies* *elective*

70/41 Anatomy/Biochemistry

See 41/70

70/45 Anatomy/Zoology

See 45/70

70/62 Anatomy/History and Philosophy of Science

See 62/70

70/68 Anatomy/Physiotherapy Graduate Diploma

See 68/70

Sciences

	Year 1	Year 2	Year 3	Year 4
70/73 Anatomy/ Physiology	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 Level I units from Table 1	41.101 41.111 70.011A 70.011C 73.011A *1 General Studies elective* Choose 1 unit from Table 1	70.012A 73.012 *2 General Studies electives* Choose 3 units from: 70.011B 70.012B 70.012C 70.303 70.304	*1 General Studies elective* 70.013 *or* 73.013

	Year 1	Year 2	Year 3	Year 4
73.1 Physiology — Single Major	2.121 2.131 10.001 *or* 10.011 *or* 10.021 17.011 17.021 Choose 2 Level I units from Table 1	41.101 41.111 73.011A *1 General Studies elective* Choose 3 units from Table 1	73.012 *2 General Studies electives* Choose 4 units from Table 1	73.013 *1 General Studies elective*

73/41 Physiology/Biochemistry

See 41/73

73/70 Physiology/Anatomy

See 70/73

Units offered by the
Board of Studies in Science and Mathematics

Table 1

Tabular 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).

School of Physics

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites.	Co-requisites.	Excluded
1.001	Physics I	I	2	F	6	2 unit Mathematics (at HSC Exam Grade 1 *or* 2) *or*		
1.011	Higher Physics I	IH	2	F	6	3 unit Mathematics (at HSC Exam Grade 1, 2 *or* 3) *or* 4 unit Mathematics (at HSC Exam Grade 1, 2, 3, 4 *or* 5 (Grade 5 at a standard acceptable to the Professorial Board)) *and* 2 unit Science (incl. Physics *and/or* Chem.) (at HSC Exam Grade 1, 2 *or* 3) 4 unit Science (incl. Physics *and/or* Chem.) (at HSC Exam Grade 1, 2 *or* 3)		

Physics Level II

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites.	Co-requisites.	Excluded
1.012	Mechanics and Thermal Physics	II	1	S1	5	1.001 *or* 1.011 10.001	10.211A	1.112C, 1.122C

For footnotes, see overleaf

School of Physics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
1.022	Electromagnetism and Modern Physics	II	1	S2	5	1.001 or 1.011 10.001	10.211A	1.112A, 1.122A, 1.112B, 1.122B, 1.932, 1.212C
1.032	Laboratory	II	1	F	3	1.001 or 1.011 10.001		1.112A, 1.122A, 1.112B, 1.122B, 1.212B, 1.922
1.912	Geometric Optics	II	½	S1	3	1.001 or 1.011 10.001 or 10.011 or 10.021		1.212A, 31.212, 31.182
1.922	Electronics	II	½	S1	3	1.001 or 1.011		1.212B, 1.032
1.932	Introduction to Solids	II	½	S2	3	1.001 or 1.011 10.001 or 10.011 or 10.021		1.022, 1.212C
1.112A	Electromagnetism*	II	1	S2	6	1.001, 10.001	10.211A	1.122A, 1.022
1.112B	Modern Physics*	II	1	S1	6	1.001, 10.001	10.211A	1.122B, 1.022, 1.932

Physics Level III

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
1.013	Quantum Mechanics and Nuclear Physics	III	1	F	2	1.012, 1.022, 10.211A		1.113A, 1.123A, 1.123D, 2.023A, 10.222F
1.023	Statistical Mechanics and Solid State Physics	III	1	S1	4	1.012, 1.022, 10.211A	1.013	1.113C, 1.123B, 1.123C
1.033	Electromagnetism and Optical Physics	III	1	S2	4	1.012, 1.022, 10.211A		1.113B, 1.123B, 10.222C
1.043	Experimental Physics	III	1	F	6	1.012, 1.022, 1.032		1.113A, 1.113B, 1.113C, 1.113D, 1.123A, 1.123B, 1.123C, 1.123D
1.133	Electronics	III	1	S1	6	1.032 or 1.922		1.143B
1.143	Biophysics	III	½	S1	3	1.012, 1.022		1.143A
1.153	Biophysical Techniques	III	½	S2	3	1.012, 1.022, 1.032		1.143A
1.163	Astrophysics	III	½	S1	2	1.022		1.113D
1.173	Conceptual Framework of Physics	III	½	S2	3	1.012, 1.022	1.013, 1.023	1.143D
1.313	Physics of Materials	III	1	S2 or F	6 3		1.023	31.113A
1.323	Physics of Measurement	III	1	S1	6	1.032		31.113B

School of Physics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
1.333	Applications of Radiation	III	1	S2	6	1.033		31.113C
1.513	Plasma and Laser Physics	III	1	S2	4	1.012, 1.022		
1.523	Relativity and Electromagnetism	III	1	S1	4	1.012, 1.022, 10.211A, 10.111A, 10.111B		
1.113A	Wave Mechanics*	III	1	S1	6	1.112B, 1.112C, 10.211A		1.123A, 1.123D, 1.013, 2.023A 10.222F
1.113D	Astrophysics and Nuclear Physics*	III	1	S2	6	1.112B	1.113A or 10.222F	1.123C, 1.013, 1.163

Higher Physics Level III

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
1.123A	Quantum Mechanics*	IIIH	1	S1	6	1.122B, 1.122C, 1.122A, 10.211A, 10.111A, 10.111B		1.113A, 1.013, 10.222F
1.123B	Electromagnetic Theory and Statistical Mechanics*	IIIH	1	S1	6	1.122C, 1.122A, 10.211A		1.113C, 1.033, 1.023, 10.222C
1.123C	Solid State and Nuclear Physics*	IIIH	1	S2	6	1.122B, 10.211A	1.113A or 1.123A or 10.222F	1.113C, 1.113D, 1.013, 1.023
1.123D	Atomic Physics and Spectroscopy*	IIIH	1	S2	6	1.122B, 1.122A, 10.211A	1.123A or 10.222F	1.113A, 1.013

Physics Level III Supplementary Units

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
1.913	Marine Acoustics and Seismic Methods (Oceanography Unit)		1	F	3			

* The School of Physics has introduced new and revised Level II and Level III units. The School realises that some students presently enrolled will not have completed either all of the old Level II units, or all of the old Level III units. Some of the new units are sufficiently compatible, to permit substitution of a new unit in a program requiring an old unit. Where this is not possible the old unit, indicated by an asterisk in the table above, will be provided for those students wishing to complete a set of Level II or Level III units.

School of Chemistry

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
2.111	Introductory Chemistry‡	I	1	S1	6	None		
2.121	Chemistry IA	I	1	S1 or S2	6	2.111 or 4 unit Science or 2 unit Science (Chemistry) or 2 unit Science (Physics) or 2 unit Science (Biology) or 2 unit Science (Geology) (at HSC Exam Grade 1, 2, or 3)		

For footnotes, see overleaf

School of Chemistry (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
2.131	Chemistry IB	I	1	S1 or S2	6	2.111 or 2.121		
2.002A	Physical Chemistry	II	1	*	6	2.121, 10.001 or 10.011 or 10.021		
2.002B	Organic Chemistry	II	1	*	6	2.131		
2.002D	Analytical Chemistry	II	1	*	6	2.121, 2,131, 10.001 or 10.011 or 10.021		
2.042C	Inorganic Chemistry	II	1	*	6	2.121, 2.131		
2.003E	Nuclear and Radiation Chemistry	II/III	1	*	6	2.121, 2.131, 10.001 or 10.011 or 10.021		
2.003H	Molecular Spectroscopy and Structure	II/III	1	S2	6	2.121, 2.131		
2.003J	Fundamentals of Biological Chemistry	II/III	1	*	6	2.121, 2.131		41.101
2.003K	Solid State Chemistry	II/III	1	*	6	2.121, 2.131 and 10.001 or 10.011		
2.013A	Introductory Quantum Chemistry	II/III	1	*	6	1.001 or 1.011, 2.121, 2.131, 10.001 or 10.011 or 10.021		
2.003A	Physical Chemistry	III	1	*	6	2.002A		
2.003B	Organic Chemistry	III	1	*	6	2.002B		
2.003C	Inorganic Chemistry	III	1	*	6	2.042C		
2.003D	Instrumental Analysis	III	1	*	6	2.002D, 2.002A		
2.003L	Applied Organic Chemistry	III	1	*	6	2.002B		2.033L
2.003M	Organometallic Chemistry	III	1	*	6	2.002B		
2.013B	Synthetic Organic Chemistry	III	1	*	6	2.003B		
2.013C	Advanced Inorganic Chemistry	III	1	*	6	2.042C	2.003C	
2.013D	Advanced Analytical Chemistry	III	1	*	6	2.002D	2.003D	
2.013L	Chemistry and Enzymology of Foods	III	1	*	6	2.002B		2.023L, 2.043L, 2.053L
2.013M	Thermochemistry	III	1	*	6	2.002A		
2.023A	Chemical Physics	III	1	*	6	2.002A, 10.211A		
2.023B	Natural Product Chemistry	III	1	*	6	2.003B		
2.023L	Biological and Agri-cultural Chemistry	III	1	*	6	2.002B		2.013L, 2.043L, 2.053L
2.033A	Physical Chemistry of Macromolecules	III	1	*	6	2.003J or 2.002B, 1.012 or 2.002A		
2.033L	Applied Organic Chemistry†	III	2	F	6	2.002B		2.003L
2.043A	Environmental Chemistry	III	1	*	6	2.002A, 2.002D		
2.043L	Chemistry and Enzymology of Foods†	III	2	F	6	2.002B		2.013L, 2.023L, 2.053L
2.053A	Chemical Kinetics and Reaction Mechanisms	III	1	*	6	2.002A		

School of Chemistry (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
2.053L	Biological and Agri-cultural Chemistry†	III	2	F	6	2.002B		2.013L 2.023L, 2.043L
2.063A	Advanced Molecular Spectroscopy	III	1	*	6	2.013A		

* These courses may be offered either Full year, one session, or both.

† Only one of these double units may be chosen.

‡ A student who has passed 2.121 may not subsequently enrol in 2.111.

School of Mechanical and Industrial Engineering

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
5.010	Engineering A	I	1	S1 or 2	6	*Either* 2 unit Science (incl. Physics) (at HSC Exam Grade 1, 2 or 3) *or* 4 unit Science (incl. Physics) (at HSC Exam Grade 1, 2, 3 or 4) *or* 2 unit Industrial Arts (at HSC Exam Grade 1, 2 or 3) *or* 3 unit Industrial Arts (at HSC Exam Grade 1, 2, 3 or 4)	5.010	
5.020	Engineering B	I	1	S1 or 2	6			
5.030	Engineering C	I	1	S1 or 2	6			

Students who wish to enrol in this subject can make up for the lack of the prerequisite by work taken in Physics in the first half of first year.

School of Electrical Engineering

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
6.601A	Introduction to Computer Science	II	1	S1	5	10.001		
6.601A*	Introduction to Computer Science	II	1	F	2½	10.001		
6.601B	Assembler Programming II and Non-numeric Computing		1	S2	5	10.001	6.601A	
6.601B*	Assembler Programming II and Non-numeric Computing		1	F	2½	10.001	6.601A	

For footnotes, see overleaf

School of Electrical Engineering (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
6.602A	Computer Systems I	III	1	S1	5	6.601B		
6.602B	Computer Systems II	III	1	S2	5	6.601B		
6.602C	Computer Applications	III	1	S1	5	6.601A		
6.602D	Programming Languages and Compiling Techniques	III	1	S2	5	6.601A		

* Offered only in the evening.

School of Mathematics

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites††	Co-requisites††	Excluded*
Mathematics								
10.001	Mathematics I	I	2	F	6	2 unit Mathematics (at HSC Exam Grade 1 or 2) or 3 unit Mathematics (at HSC Exam Grade 1, 2 or 3) or 4 unit Mathematics (at HSC Exam Grade 1, 2, 3, 4 or 5 (Grade 5 at a standard acceptable to the Professorial Board))		
10.011	Higher Mathematics I	I	2	F	6	4 unit Mathematics (at HSC Exam Grade 1, 2, 3, 4 or 5 (Grade 5 at a standard acceptable to the Professorial Board))		
10.021	Mathematics IT	IT	2	F	6	3 unit Mathematics (at HSC Exam Grade 1 or 2) or 4 unit Mathematics (at HSC Exam Grade 1, 2, 3, 4 or 5 (Grade 5 at a standard acceptable to the Professorial Board))		
10.041†‡	Introduction to Applied Mathematics	I	1	S2	6		10.001	
10.031‡	Mathematics	II	1	F	2	10.001 or 10.021 Cr		‡
10.032§	Mathematics	III	1	F	2	10.031		§
Pure Mathematics								
Pure Mathematics Level II								
10.111A	Linear Algebra	II	1	F	2	10.001		10.121A
10.111B	Analysis	II	1	F	2	10.001		10.121B
10.1111	Group Theory	II/III	½	S1	2	10.001	10.111A, 10.111B, 10.211A	10.121A
10.1112	Geometry	II/III	½	S2	2	10.001	10.111A, 10.111B, 10.1111, 10.211A	10.121C
Higher Pure Mathematics Level II†								
10.121A	Algebra	II	1	F	2½	10.011		10.111A, 10.1111
10.121B	Real and Complex Analysis	II	1	F	2½	10.011		10.111B
10.121C	Number Theory and Geometry	II/III	1	F	2½	10.011	10.121A, 10.121B, 10.221A or 10.211A	10.1112, 10.1121

School of Mathematics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites ††	Co-requisites ††	Excluded †
Pure Mathematics Level III*								
10.112B	Real Analysis	III	1	F	2	10.111A, 10.111B	10.211A	10.122B
10.112C	Differential Geometry	III	1	F	2	10.111A, 10.111B	10.211A	10.122C
10.1121	Number Theory	III	½	S1	2	***	10.111A, 10.111B, 10.211A	10.121C
10.1122	Algebra	III	½	S2	2	10.111A	10.111B, 10.1111, 10.211A	10.122A
10.1123	Set Theory	III	½	S1	2	***	10.111A, 10.111B, 10.211A	
10.1124	Combinatorial Topology	III	½	S2	2	10.111B	10.111A, 10.211A	
10.1125	Ordinary Differential Equations	III	½	S1	2	***		10.122E.
10.1126	Partial Differential Equations	III	½	S2	2	***	10.1125	
10.1127	History of Mathematics	III	½	S2	2	10.111A, 10.111B, 10.211A		
Higher Pure Mathematics Level III**								
10.122A	Algebra	III	1	F	2½	10.121A		10.1122
10.122B	Integration and Functional Analysis	III	1	F	2½	10.121B		10.112B
10.122C	Topology and Differential Geometry	III	1	F	2½	10.121A, 10.121B		10.1124, 10.112C
10.122E	Complex Analysis and Differential Equations	III	1	F	2½	10.121B		10.1125

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

* If a unit in this column is counted the corresponding unit in the first column may not be counted.

†1. Admission to Higher Pure Mathematics II normally requires completion of 10.011 Higher Mathematics I; students who gain a superior pass in 10.001 Mathematics I may, subject to the approval of the Head of the School of Mathematics, be permitted to proceed to Higher Pure Mathematics II units.

2. Students majoring in Physics who wish to take Higher Pure Mathematics II should attempt 10.121A, 10.121B and either 10.221A or 10.211A.

3. Students aiming at Honours in Pure Mathematics must take 10.121A, B and C and either 10.221A or 10.211A.

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

§ Mathematics 10.032 is included for students desiring to attempt only one Level III Mathematics unit. If other Level III units in Pure Mathematics, Applied Mathematics or Theoretical Mechanics are taken, 10.032 Mathematics will not be counted.

** Students wishing to attempt Higher Level III units should consult with the School of Mathematics prior to enrolment. Pre- and co-requisites may be varied in special circumstances with the permission of the Head of the School.

*** Students will not normally be permitted to attempt a Level III Pure Mathematics unit unless they have completed at least one Level II unit from 10.111A, 10.111B and 10.211A and are concurrently attempting the remaining units of these three units.

‡‡ May not be offered in 1977.

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites††	Co-requisites††	Excluded**
Applied Mathematics								
Applied Mathematics Level II								
10.211A	Mathematical Methods	II	1	F	2	10.001		10.221A
10.211D	Introduction to Optimization Theory and its Applications	II	1	F	2	10.001		10.221D
Higher Applied Mathematics Level II								
10.221A	Mathematical Methods	II	1	F	2½	10.011 *or* 10.001 Dist.*		10.211A
10.221D	Introduction to Optimization Theory and its Applications	II	1	F	2	10.011 *or* 10.001 Dist.*		10.211D

For footnotes, see overleaf

School of Mathematics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites††	Co-requisites ††	Excluded**
Applied Mathematics Level III								
10.212A	Numerical Analysis	III	1	F	2	10.211A, 10.111A		10.222A
10.212L	Optimization Methods	III	1	F	2	10.211A, 10.111A, 10.111B	10.211D‡	10.222L
10.212M	Optimal Control Theory	III	1	F	2	10.211A, 10.111A, 10.111B		10.222M
Higher Applied Mathematics Level III								
10.222A	Numerical Analysis	III	1	F	2	10.221A or 10.211A Dist.*, 10.121A or 10.111A Dist.*		10.212A
10.222C	Maxwell's Equations and Special Relativity	III	1	F	2	10.221A or 10.211A Dist.*, 10.121B or 10.111B Dist.*, 1.001		1.033
10.222F	Quantum Mechanics	III	1	F	2	10.221A or 10.211A Dist.*, 10.121A or 10.111A Dist.*, 10.121B or 10.111B Dist.*		1.013
10.222L	Optimization Methods	III	1	F	2	10.221A or 10.211A Dist.*, 10.121A or 10.111A Dist.*, 10.121B or 10.111B Dist.*	10.221D or 10.211D‡	10.212L
10.222M	Optimal Control Theory	III	1	F	2	10.221A or 10.211A Dist.*, 10.121A or 10.111A Dist.*, 10.121B or 10.111B Dist.*		10.212M

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

** If a unit in this column is counted the corresponding unit in the first column may not be counted.

* With the permission of the Head of the Department a sufficiently good grading may be substituted.

‡ Effective from 1978 only. Students enrolling in 10.212L (10.222L) in 1977 should not enrol in 10.211D (10.221D)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites††	Co-requisites††	Excluded*
Statistics								
Theory of Statistics Level II								
10.311A	Probability and Random Variables	II	1½	S1	7	10.001 or 10.021 Cr		10.321A, 10.331, 45.101
10.311B	Basic Inference	II/III	1½	S2	7	10.311A		10.321B, 10.331, 45.101
10.331	Statistics SS	II	1	F	2	10.001 or 10.021 Cr		10.311A, 10.311B, 10.321A, 10.321B, 45.101
Higher Theory of Statistics Level II								
10.321A	Probability and Random Variables	II	1½	S1	8	10.001		10.311A, 10.331, 45.101
10.321B	Basic Inference	II/III	1½	S2	8	10.321A		10.311B, 10.331, 45.101

School of Mathematics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites††	Co-requisites††	Excluded*
Theory of Statistics Level III**								
10.312A	Probability and Stochastic Processes	III	1	S1	4	10.311A, 10.111A, 10.111B, 10.211A		10.322A
10.312B	Experimental Design (Applications) and Sampling	III	1	S2	4	10.311B or 10.331 (Nor. Cr)	10.211A	10.322B
10.312C	Experimental Design (Theory)	III	1	S1	4	10.311B, 10.111A, 10.111B, 10.211A	10.312B†	10.322C
10.312D	Probability Theory	III	1	S2	4	10.311A, 10.111A, 10.111B, 10.211A		10.322D
10.312E	Statistical Inference	III	1	S2	4	10.311B, 10.111A, 10.111B, 10.211A	†	10.322E
Higher Theory of Statistics Level III**								
10.322A	Probability and Stochastic Processes	III	1	S1	4½	10.321A, 10.111A, 10.111B, 10.211A		10.312A
10.322B	Experimental Design (Applications) and Sampling	III	1	S2	4½	10.321B, 10.111A, 10.111B, 10.211A		10.312B
10.322C	Experimental Design (Theory)	III	1	S1	4½	10.321B, 10.111A, 10.111B, 10.211A	10.322B†	10.312C
10.322D	Probability Theory	III	1	S2	4½	10.321A, 10.111A, 10.111B, 10.211A		10.312D
10.322E	Statistical Inference	III	1	S2	4½	10.321B, 10.111A, 10.111B, 10.211A	†	10.312E

* If a unit in this column is counted, the corresponding unit in the first column may not be counted.

† Plus any two Level III Pure Mathematics, *or* Applied Mathematics *or* Theoretical Mechanics units. It is sufficient to take 10.312B (10.322B) in the same year.

** For a student taking four of the units 10.312A, 10.312B, 10.312C, 10.312D, 10.312E (or the corresponding Higher units) a project is required as part of either 10.312C (10.322C) *or* 10.312E (10.322E).

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

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites††	Co-requisites††	Excluded**
Theoretical and Applied Mechanics								
Theoretical Mechanics Level II								
10.411A	Hydrodynamics	II/III	1	S2	4	10.001	10.411B	10.421A
10.411B	Principles of Theoretical Mechanics	II	1	S1†	4	10.001, 1.001 or 10.041 or 5.010	10.211A, 10.111B	10.421B
Higher Theoretical Mechanics Level II								
10.421A	Hydrodynamics	II/III	1	S2	4	10.011 or 10.001 Dist.*	10.421B	10.411A
10.421B	Principles of Theoretical Mechanics	II	1	S1	4	10.011 or 10.001 Dist.*, 1.001 or 10.041 or 5.010	10.221A, 10.111B	10.411B
Theoretical Mechanics Level III								
10.412A	Dynamical and Physical Oceanography	III	1	F	2	1.001, 10.211A or 10.031	‡	
10.412B	Continuum Mechanics	III	1	F	2	10.211A, 10.111A, 10.111B	10.411A or 1.012 or 1.913	10.422B
10.412D	Mathematical Methods	III	1	F	2	10.211A, 10.111A, 10.111B		10.422D

For footnotes, see overleaf

School of Mathematics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
Higher Theoretical Mechanics Level III								
10.422A	Fluid Dynamics	III	1	S2	4	10.421A or 10.411A Dist.* 10.422B		
10.422B	Mechanics of Solids	III	1	S1	4	10.211A, 10.111A, 10.111B, 10.421B or 10.411B Dist.* or 1.012		10.412B
10.422D	Mathematical Methods	III	1	F	2	10.221A or 10.211A Dist.*, 10.121A or 10.111A Dist.*, 10.121B or 10.111B Dist.*		10.412D

†† For any listed unit an appropriate higher unit may be substituted.
** If a unit in this column is counted the corresponding unit in the first column may not be counted.
† The evening course for 10.411B runs at 2 hours per week throughout the year.
* With the permission of the Head of the Department a sufficiently good grading may be substituted.
‡ It is recommended that one of the following be taken concurrently: 10.411A or 1.012 or 1.913.

School of Psychology

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
12.001	Psychology I	I	2	F	5			
12.052	Basic Psychological Processes II	II	1	S1	4	12.001		
12.062	Complex Psychological Processes II	II	1	S2	4	12.001		
12.152	Research Methods II	II	1	F	3	12.001		
12.153	Research Methods IIIA	III	1	S1	4		+ 12.153	
12.163	Research Methods IIIB	III	1	S2	4		+ 12.163	
12.173	Psychological Issues III	III	1	Not offered 1977	4			
12.253	Learning IIIA	III	1	S1	4			
12.263	Learning IIIB	III	1	S2	4		+ 12.253	
12.303	Personality IIIA	III	1	S1	4			
12.313	Personality IIIB	III	1	Not offered 1977	4			12.623
12.323	Motivation IIIA	III	1	Not offered 1977	4			
12.373	Psychological Assessment IIIA (Testing)	III	1	S1	4			
12.383	Psychological Assessment IIIB (Psychometric Theory)	III	1	Not offered 1977	4			
12.413	Physiological Psychology IIIA	III	1	S1	4			12.402 (Psych BSc)

(Co-requisites column note: 12.052, 12.062 and 12.152 are prerequisites for any Level III unit)

School of Psychology (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
12.423	Physiological Psychology IIIB	III	1	S2	4	+ 12.413		12.402 (Psych BSc)
12.453	Human Information Processing IIIA	III	1	S1	4			
12.463	Human Information Processing IIIB	III	1	Not offered 1977	4	+ 12.453		
12.473	Perception IIIA	III	1	S1	4			
12.483	Perception IIIB	III	1	S2	4			
12.503	Social Psychology IIIA	III	1	S1	4			
12.513	Social Psychology IIIB	III	1	S2	4	+ 12.503		
12.553	Developmental Psychology IIIA	III	1	S1	4			
12.563	Developmental Psychology IIIB	III	1	S2	4			
12.603	Abnormal Psychology IIIA	III	1	S1	4			
12.613	Abnormal Psychology IIIB	III	1	Not offered 1977	4	+ 12.603		
12.623	Guidance and Counselling III	III	1	S2	4			12.313
12.653	Industrial Psychology III	III	1	S1	4			
12.663	Ergonomics III*	III	1	S2	4			
12.703	Psychological Techniques III*	III	1	S2	4	+ 12.373		
12.713	Behaviour Control and Modification III	III	1	S2	4			12.042 (Psych BSc)
12.733	Laboratory Instrumentation III*	III	1	S2	4			

(Prerequisites column, spanning rows: 12.052, 12.062, 12.152 and are prerequisites' for any Level III unit.)

* Reserved for approved potential Psychology IV candidates. Applicants must have completed 12.001, 12.052, 12.062 and 12.152 at an average level of Credit or better.

Notes:

1. A major in Psychology in the science and mathematics course is minimally satisfied by the completion of 9 units value of Psychology units which have included 12.001, 12.052, 12.062, 12.152 and four Level III units.

2. A double major in Psychology in the science and mathematics course adds an additional four Level III units to the four required for single major. The double major is available to students in the three year program and the four year program.

3. Not all Level III units will necessarily be offered in each year.

General Biology

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
17.011	Biology of Mankind	I	1	S1	6	Science 2 or 4 units (at HSC Exam Grade 1, 2 or 3)		
17.021	Comparative Functional Biology	I	1	S2	6	17.011†		
17.012	General Ecology	II	1	S1	6	17.011 and 17.021		

† Terminating pass acceptable.

School of Applied Geology

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
25.011*	Geology I	I	2	F	6 ⎫	2 unit Science (any strands) (at HSC Exam Grade 1, 2 or 3) or		25.151
					⎬	4 unit Science (any strands) (at HSC		
25.151*	Geoscience IA	I	2	F	6 ⎭	Exam Grade 1, 2 or 3)		25.011
25.012**	Geology IIA	II	2	F	6	25.011, 2.121, 2.131		
25.022**	Geology IIB	II	1	F	3	25.011, 2.121, 2.131		
25.013	Geology IIIA	III	2	F	6	25.012 and 25.022		
25.023***	Geology IIIB	III	2	F	6	25.012 and 25.022		
25.033****	Geology IIIC	III	4	F	12	25.012 and 25.022	25.013 and 25.023	
25.613†	Geological Oceanography	III	1	S1	6	25.011 and 25.022		

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

** Field work of up to six days in each case is a compulsory part of this course.

*** A geological survey camp of 10 days' duration is a compulsory part of this course.

**** Field tutorials constitute an essential part of this course.

† Compulsory field work to be arranged.

School of Geography

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
27.801	Introduction to Physical Geography	I	1	S1	4½			
27.802	Introduction to Human Geography	I	1	S2	4½			
27.811	Physical Geography	II	1	S2	4½ ⎫ 27.801, 27.802,			
27.812	Human Geography	II	1	S2	4½ ⎭ 27.813			
27.813	Geographic Methods	II	1	S1	4	27.801, 27.802		
27.103	Climatology	II/III	1	S2	5	1.001, 27.801 and 27.813 or 25.011		
27.203	Biogeography	II/III	1	S1	5	27.801 and 27.813, or 17.011 and 17.021		
27.413	Geomorphology	II/III	1	S1	5	27.813 and 25.011, or 27.801 and 27.802		
27.423	Pedology	II/III	1	S2	5	Any Two (2) of: 2.111, 2.121, 2.131 and 27.813, and either 27.811 or 27.801 and 25.012 or 25.022		27.863
27.823	Urban Geography	II/III	1	S1	5	27.812, 27.813		
27.840	Agricultural Geography	II/III	1	S2	5	27.812 and 27.813, or 15.603 or 53.204 or 51.542		
27.841	Population Geography	II/III	1	S1	5	27.812, 27.813, or 53.204		
27.860	Landform Studies	II/III	1	S1	5	27.811, 27.813		

School of Geography (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
27.862	Australian Environment and Land Resources	II/III	1	S2	5	27.811 *and* 27.813 *or* 25.011		
27.863	Soil, the Ecosystem and Man	II/III	1	S1	5	27.811, 27.813		27.423
27.833	Urban Geography (Advanced)	III	1	S2	6	} 27.812 (Cr), 27.813 (Cr)		
27.850	Agricultural Geography (Advanced)	III	1	S2	6			
27.851	Population Geography (Advanced)	III	1	S1	6			
27.870	Landform Studies (Advanced)	III	1	S1	6	27.811 (Cr), 27.813 (Cr)		
27.872	Australian Environment and Land Resources (Advanced)	III	1	S2	6	27.811 (Cr), 27.813 (Cr)		
27.880	Advanced Geographic Methods	III	1	S1	6	27.813 (Cr) *and* 27.811 (Cr) *or* 27.812 (Cr)		

School of Biochemistry‡

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites*	Co-requisites	Excluded
41.101	Introductory Biochemistry	II	2	S1	12	For any Level II unit: 17.021†, 2.121†, 2.131†		2.003J
41.111	Biochemical Control	II	1	S2	6	41.101		
41.102A	Biochemistry of Macromolecules	III	2	S1	12	41.101 2.002B		
41.102B	Physiological Biochemistry	III	2	S2	12	41.101 *and* 2.002B		
41.102C	Plant Biochemistry	III	1	S2	6	41.101 *and* 2.002B		
41.102D	Biosynthesis of Plant Metabolites	III	1	S2	6	41.101 *and* 2.002B	41.102C	

‡   Level III Units available only during the daytime.

*   In exceptional circumstances a student may apply to the Head of School for variation of the prerequisite.

†   Terminating pass not acceptable.

School of Biological Technology

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, 17.021, 10.001 *or* 10.011 *or* 10.021		
42.102A	Biotechnology A	III	1	S1	6	41.101 *and* 42.101 *or* 44.101		
42.102B	Biotechnology B	III	1	S2	6	42.101		

*   . In exceptional circumstances a student may apply to the Head of School for variation of the prerequisite.

School of Botany†

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
17.012	General Ecology					See under **General Biology**		
43.101	Genetics	II	1	S2	6	17.001 *or* 17.011 *and* 17.021		
43.111	Flowering Plants	II	1	S1	6	17.001 *or* 17.011 *and* 17.021		
43.121	Plant Physiology	II	1	S2	6	17.001 *or* 17.011 *and* 17.021, 2.001 *or* any 2 units of: 2.111, 2.121, 2.131***		
43.131	Fungi and Man	II	1	S1	6	17.001 *or* 17.011 *and* 17.021		
43.102	Advanced Genetics	III	1	S2	6	43.101		
43.112	Plant Taxonomy	III	1	S2§	6	43.111	43.101	
43.122	Advanced Plant Physiology	III	1	S1	6	41.101 *or* 41.101A *and* 41.101B, 43.121		
43.132	Mycology-Plant Pathology	III	1	S2	6	43.131***		
43.142	Environmental Botany	III	1	S1	6	17.001 *or* 17.011 *and* 17.021, 1.001***		
43.152	Palaeoecology	III	1	S2	6	43.111		
43.162	The Plant Kingdom	III	1	S2§	6	43.111		
43.172	Phycology and Marine Botany	III	1	S1	6	43.111		
43.182	Cellular and Developmental Physiology	III	1	S2	6	43.121**		

Note: A student shall not be admitted to Level III Botany units, without special permission of the Head of School, unless Chemistry 2.001 or 2.121 and 2.131 has been completed. Students taking four or more units in the School of Botany must take at least two Level II units in Biochemistry, or Chemistry, or Physics, or Mathematics.

† Level III courses conducted by the School of Botany are available only during the daytime to part-time students enrolling for the first time in 1973 or later.

** This unit may be taken as a co-requisite in some circumstances.

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

§ These units will alternate each year. 43.162 The Plant Kingdom is offered in 1977. If both units 43.112 and 43.162 are to be included in a three-year pass degree program, one should be completed in Year 2.

School of Microbiology†

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites*	Co-requisites	Excluded
44.101	Introductory Microbiology	II	1	S2	6	17.011 *and* 17.021		
44.111	Microbiology**	II	1	F	3			
44.102	General Microbiology	III	2	S1	12	44.101, 41.101 *or* 41.101A *and* 41.101B		
44.112	Applied Microbiology	III	2	S2	12	44.102		
44.122	Immunology	III	1	S2	6	17.011 *and* 17.021; 41.101 *or* 41.101A *and* 41.101B		
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.

** For students not intending to major in Microbiology and not taking Level II Biochemistry. This unit is not acceptable as a prerequisite for Level III Microbiology, except on the recommendation of the Head of School.

School of Zoology†

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
45.101	Biometry	II	1	S1	6	17.011, 17.021		10.311A, 10.321A, 10.331
45.201	Invertebrate Zoology	II	1	S2	6	17.011, 17.021		
45.301	Vertebrate Zoology	II	1	S2	6	17.011, 17.021		
45.112	Marine Ecology*	III	1	S1	6	17.011, 17.021, 45.201 or 25.022 or 2.002D		
45.121	Evolutionary Theory	III	1	S1	6	17.011, 17.021		
45.122	Animal Behaviour	III	1	S1	6	45.101, 45.201, 45.301		
45.132	Comparative and Environmental Physiology	III	1	S2	6	41.101, 45.201, 45.301		
45.142	Developmental and Reproductive Biology	III	1	S2	6	45.201, 45.301		
45.202	Advanced Invertebrate Zoology	III	1	S1	6	45.201		
45.302	Vertebrate Zoogeography	III	1	S2	6	45.301	45.122 or 45.132 or 45.142	
45.402	Insect Structure and Classification	II/III	1	S1	6	17.011, 17.021		
45.412	Insect Physiology	III	1	S1	6	45.101‡	45.402	
45.422	Applied Entomology	III	1	S2	6	45.412		
45.432	Project	III	1	S2	6	45.412		

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 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 of Biochemistry, or Chemistry, or Physics, or Mathematics, or Geology.

† Level III courses conducted by the School of Zoology are available only during the daytime to part-time students enrolling for the first time in 1973 or later.

* Students intending to enroll in this unit should register with the School of Zoology for the February field trip by 7 January.

‡ One of: 10.311A; 10.321A; 10.331 may be substituted for 45.101 with special permission of the Head of School.

School of Philosophy

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
52.151	Plato	I	½	S1	2	Nil		
52.161	Informal Logic	I	½	S1	2	Nil		
52.171	Philosophy of Religion	I	½	S2	2	Nil		
52.152	Hume	I	½	S2	2	Nil		
52.162	Formal Logic	I	½	S2	2	Nil		
52.182	Introduction to Political Philosophy	I	½	S2	2	Nil		
52.153	Predicate Logic	II	½	S1	2	52.162		
52.163	Descartes	II	½	S1	2	Level II status in Philosophy**		
52.173	British Empiricism	II	½	S1	2	Level II status in Philosophy**		
52.183	Greek Philosophy: Thales to Plato	II	½	S1	2	Level II status in Philosophy**		
52.193	Scientific Method	II	½	S1	2	Level II status in Philosophy**		
52.213	Sartre	II	½	S1	2	52.493		

For footnotes, see overleaf.

School of Philosophy (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
52.223	Foundations of Mathematics	II	½	S2	2	52.153		
52.233	Argument	II	½	S2	2	Level II status in Philosophy**		
52.243	Logical Atomism	II	½	S2	2	Level II status in Philosophy**		
52.253	Philosophy of Biology	II	½	S2	2	Level II status in Philosophy**		
52.263	Philosophy of Psychology	II	½	S2	2	52.193		
52.273	Aesthetics	II	½	S2	2	Level II status in Philosophy**		
52.283	Philosophical Study of Woman	II	½	S2	2	52.182 or 52.203 or 52.493		
52.293	Plato's Later Dialogues	II	½	S2	2	52.483*		
52.303	Spinoza and Leibniz	II	½	S2	2	52.163		
52.323	Set Theory	II	½	S1	2	52.153 or 26.812 or 10.001 or 10.011 or 10.021		
52.343	Privacy and Other Minds	II	½	S1	2	52.163, 52.173 or 52.243		
52.353	History of Modern Logic	II	½	S1	2	52.153		
52.363	Wittgenstein	II	½	S1	2	52.243		
52.373	Philosophical Foundations of Marx's Thought	II	½	S2	2	52.182 or 52.203*		
52.383	Twentieth Century Marxist Philosophy	II	½	S2	2	52.182 or 52.203*		
52.393	History of Traditional Logic	II	½	S2	2	52.153		
52.403	Model Theory	II	½	S2	2	52.323 or 10.1123		
52.413	Reading Option	II	½	S1 or 2		Satisfactory performance in Level II units		
52.463	Introduction to Transformational Grammar	II	½	S1	2	Any Level I unit		
52.473	Semantics of Natural Language	II	½	S2	2	52.463 or 52.153		
52.483	Plato's Theory of Forms	II	½	S1	2	Level II status in Philosophy**		
52.493	Existentialism	II	½	S1	2	Level II status in Philosophy**		
52.503	Utopias	II	½	S1	1½	Level II status in Philosophy** and 52.182 or 52.203		
52.513	Social and Political Philosophy	II	½	S1	2	Level II status in Philosophy** and 52.182		
52.523	Classical Ethical Theories	II	½	S1	2	Level II status in Philosophy**		
52.533	Contemporary Ethics	II	½	S2	2	52.523*		
52.543	The Philosophy of Love	II	½	S1	2	52.163 or 52.173 or 52.263		
52.423	Seminar A	II	½	S2	2	Level II units (Cr)		
52.433	Seminar B	II	½	S1	2	Level II units (Cr)		

N.B. 52.162, 52.172 and 52.182 will be timetabled at the same time.

* 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 two Level I Philosophy half-units *in the same session*. This prerequisite may be waived in certain cases by the School.

School of History and Philosophy of Science

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
62.012	The Origins of Modern Science	II	1	S1	6	A pass in *two* of: 1.001, 17.011 *and* 17.021,		
62.022	The Social History of Science — From the French Revolution to the Second World War	II	1	S2		2.001, 10.001, 25.011 *or* 25.151, 1.011, 10.011, 10.021, 27.801 *and* 27.802, 12.001		
62.032	The Scientific Theory	II	1	S2				
62.013	History of the Philosophy of Science	III	1	F	3	62.012 *or* 62.022 *or* 62.032		
62.023	The Rise of Environmentalism	III	1	S1	6	62.012 *or* 62.022 *or* 62.032		
62.033	The Development of Theories of Matter	III	1	S1	6	62.012 *or* 62.022 *or* 62.032		
62.043	The Historical Foundations of Experimental Biology	III	1	S1	6	62.012 *or* 62.022 *or* 62.032		
62.053	The History of Theories of Generation and Heredity	III	1	S2	6	62.012 *or* 62.022 *or* 62.032		
62.063	History and Philosophy of Cosmology	III	1	S2	6	62.012 *or* 62.022 *or* 62.032		
62.073	Predicate Logic and the Foundations of Mathematics	III	1	F	3	52.162 or prescribed reading during preceding long vacation		
62.083	Marxism and Science	III	1	F	3	62.032		
62.093	Science and the Strategy of War and Peace	III	1	F	3	62.012 *or* 62.022 *or* 62.032		

School of Anatomy

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
70.011A	Histology I	II	1	S1	6	17.011 *and* 17.021		
70.011B	Mammalian Embryology	II/III	1	S2	6	17.011 *and* 17.021		
70.011C	Introductory Anatomy	II	1	S1	6	17.011 *and* 17.021		
70.012A	Musculoskeletal Anatomy	III	1	S1	6	70.011A, 70.011C		
70.012B	Visceral Anatomy	III	1	S2	6	70.011A, 70.011C		
70.012C	Neuroanatomy	III	1	S1	6	70.011A, 70.011C		
70.303	Kinesiology	III/IV	1	S2	6	70.012A, 70.012C		
70.304	Histology II	III	1	S2	6	70.011A		

School of Physiology and Pharmacology

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
73.011A	Principles of Physiology	II	2	F	6	2.121, 2.131, 10.001 *or* 10.011 *or* 10.021, 17.011, 17.021		
73.012	Physiology II	III	4	F	12	73.011A; 41.101, 41.111		

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.

School of Community Medicine

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
79.201	Population Genetics Theory	III	1	S1	5	45.101 *or* 10.311A *and* 10.311B *or* 10.321A *and* 10.321B *or* 10.331		
79.202	Quantitative Methods in Human Genetics	III	1	S2	5	9.801 *or* 43.101; 9.811 *or* 10.311A *and* 10.311B *or* 10.321A *and* 10.321B *or* 10.331 *or* 12.152 *or* 45.101	.	
79.302	Biochemical Genetics of Man	III	1	S2	6	43.101, 41.101		

Course 397
Units available in specific programs

Table 2

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Specific Programs
2.021	Chemistry IE	I	1	S1·	6		10.041	Any with 10.041
3.111	Chemical Engineering Principles 1 ·	II	1	F	2S1 3S2			10.1
3.121	Chemical Engineering Principles 2	III	2	F	11S1 3S2	3.111		10.1
6.010	Electrical Engineering I	I	1	S2	6			10.1, 1.2
6.021A	Basic Circuit Theory	II	½	S1	4	6.010		1.2
6.021C	Electronics	II	½	S1	4	6.021A		1.2
14.501	Accounting and Financial Management IA	I	1	S1	4			10.1, 10.3, 10.4, 10.5, 10.6
14.511	Accounting and Financial Management IB	I	1	S2	4	14.501		10.1, 10.3, 10.4, 10.5, 10.6
14.522	Accounting and Financial Management IIA	II	1	S1	4	14.511		10.1, 10.5
14.532	Accounting and Financial Management IIA (Honours)	II	1	S1				10.6
14.542	Accounting and Financial Management IIB	II	1	S2	4	14.511		10.1, 10.5
14.552	Accounting and Financial Management IIB (Honours)	II	1	S2				10.6
14.563	Accounting and Financial Management IIIA	III	1	S1	4	14.542		10.5
14.573	Accounting and Financial Management IIIA (Honours)	III	1	S1				10.6
14.583	Accounting and Financial Management IIIB	III	1	S2	4	14.522		10.5
14.593	Accounting and Financial Management IIIB (Honours)	III	1.	S2				10.6
14.601	Law and Society I	I	1	S2	3			10.3, 10.4, 10.5, 10.6

Sciences

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Specific Programs
14.602	Information Systems IIA	II	1	S1	3			10.1, 10.3, 10.4, 10.5, 10.6
14.603	Information Systems IIB	II	1	S2	3	14.602		10.1, 10.3, 10.4, 10.5, 10.6
14.604	Information Systems IIIA	III	1	S1	3	14.603		10.5, 10.6
14.608	Advanced File Design and Commercial Programming	III	1	S2	3	14.603		10.5, 10.6
14.613	Business Finance II	II	1	S2	3			10.1, 10.5, 10.6
14.614	Business Finance IIIA	III	1	S1	3	14.613		10.5, 10.6
14.615	Business Finance IIIB	III	1	S2	3	14.614		10.5, 10.6
14.851	Current Developments in Accounting Thought — Financial	IV	1	S1	3			10.6
14.852	Current Developments in Accounting Thought — Managerial	IV	1	S1	3			10.6
15.001	Economics IA	I	1	S1	4			10.3, 10.4, 10.5, 10.6
15.002	Economics IIA	II	1	S1	4	15.011		10.1, 10.3, 10.6
15.003	Economics IIIA	III	1	S1	3	15.042		10.3
15.011	Economics IB	I	1	S2	4	15.001		10.3, 10.4, 10.5, 10.6
15.012	Economics IIA (Honours)	II	1	S1	4			10.4
15.013	Economics IIIA (Honours)	III	1	S1	4			10.4
15.022	Economics IIB	II	1	S2	4	15.002		10.1, 10.3
15.023	Economics IIIB	III	1	S2	4	15.022		10.3
15.024	Economics IVC	IV	1	S1	2½			10.4
15.032	Economics IIB (Honours)	II	1	S2	4			10.4
15.033	Economics IIIB (Honours)	III	1	S2	4			10.4
15.034	Economics IVD	IV	1	S2	2½			10.4
15.042	Economics IIC	II	1	S2	4	15.011		10.1, 10.3, 10.5, 10.6
15.052	Economics IIC (Honours)	II	1	S2	4			10.4
15.062	Economics IID	II	1	S1	4	15.011		10.6
15.063	Monetary Theory and Policy	III	1	S2	4	15.002		10.3, 10.4
15.072	Economics IIE	II	1	S2	4	15.011		10.6
15.073	Natural Resources Economics	III	1	S1	4	15.022		10.3, 10.4
15.183	Economic Planning III	III	1	S2	4	15.022 or 15.042		10.3, 10.4
15.413	Econometrics A	III	1	S1	4	15.462 or 10.331 or (10.311A and 10.311B)		10.3, 10.4
15.423	Econometrics B	III	1	S2	4	15.413 or 10.312C		10.3, 10.4
15.433	Decision Theory	III	1	S2	3	15.462 or 10.331 or (10.311A and 10.311B)		10.3, 10.4
15.434	Mathematical Economics A	III	1	S1	3	15.442		10.3, 10.4
15.444	Mathematical Economics B	III	1	S2	3	15.434		10.3, 10.4
15.453	Time Series Analysis	III	1	S2	3	15.462 or 10.331 or (10.311A and 10.311B)		10.3, 10.4
15.601	Economic History IA	I	1	S1	3			10.3, 10.4, 10.5, 10.6
15.611	Economic History IB	I	1	S2	3	15.601		10.3, 10.4,

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Specific Programs
25.1333	Geology for Geographers†	III	2	F	6	25.012, 25.022	25.013, 27.413, 27.423	10.5, 10.6
25.623	Estuarine Geology*	III	1	S2	6	25.011, 25.022		68.33
25.633A	Hydrological Surveying*	III	½	S2	3		27.413A	68.31, 68.32, 68.33, 68.34
25.643	Marine Geology*‡	III	1	S2	6	25.011, 25.022	25.613	68.33
68.302	Introductory Marine Science	I	1	S1	4			68.31, 68.32, 68.33, 68.34

† Compulsory field work to be arranged.

* Field tutorials are an essential part of this unit.

‡ Unit 1.913 may not be counted as a qualifying unit with 25.643

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	Prerequisite§ Years 1, 2 and 3 in	Number of Level III Units Required
1.114	Quantum Mechanics	IV	1	S1	Program 1.5 or 1.1 and 10.412D	7
1.124	Statistical Mechanics	IV	1	F	Program 1.5 or 1.1 and 10.412D	7
1.134	Solid State	IV	1	F	Program 1.5 or 1.1 and 10.412D	7
1.144	Atomic and Nuclear Physics	IV	1	S2	Program 1.5 or 1.1 and 10.412D	7
1.154	Projects	IV		F	Program 1.1	7
1.314	Advanced Physics of Materials	IV	1	S1	Program 1.3 or 1.1 and 1.313	7
1.324	Advanced Physical Instruments	IV	1	S1	Program 1.3 or 1.1	7
1.334	Science in Industry	IV	1	F	Program 1.3 or 1.1	7
1.344	Special Studies	IV			Program 1.3	7
1.354	Projects	IV		F	Program 1.3	7
1.514	Plasma Theory	IV	1	S1	1.513	
1.524	Waves in Continuous Media	IV	1	S2	Program 1.5	7
1.534	Quantum Theory of Solids	IV	1	S2	1.134	
1.544	Projects	IV	1	F	Program 1.5	7
2.004	Chemistry IV	IV	10	F	Program 2.1, 2.2, 2.3 or 2/41	8
6.606	Computer Science IV	IV	10	F	Program 6.1	8
10.123	Pure Mathematics Honours	IV		F	* Program 10.1-12 or 10.2-12	
10.223	Applied Mathematics Honours	IV		F	* Program 10.1-22 or 10.2-12	7*
10.233	Applied Mathematics Honours (Short Course)	IV	6	F	* Program 10.4 or 10.6	
10.323	Theory of Statistics Honours	IV		F	* Program 10.1-32 or 10.2-32	
10.423	Theoretical Mechanics Honours	IV		F	* Program 10.1-42 or 10.2-42	
12.014	Psychology IV (Research)	IV	10	F	Program 12.1, including 12.153 or 12/68 including 12.153	8
12.044	Psychology IV (Course Work)	IV	10	F	Program 12.1, including 12.153 and seven other Psychology Level III units or 12/68, including 12.153 and seven other Psychology Level III units	8
14.851		IV	2	F	See program 10.6	
14.852		IV	2	F	See program 10.6	

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

No.	Name	Level	Unit Value	When offered	Prerequisites§ Years 1, 2 and 3 in	Number of Level III Units Required
15.024		IV	2	F	See program 10.4	
15.034		IV	2	F	See program 10.4	
25.004	Geology IV	IV	10	F	Program 25.1, 25.2 or 27/25	8
27.604	Geography IV	IV	10	F	Program 27.1, 27.2, 27.3, 27/25 or 27/43	8
41.103	Biochemistry IV	IV	* 10	F	Program 41.1, 41.2, 2/41, 41/42, 41/44, 41/45, 41/70 or 41/73	8
42.103	Biotechnology IV	IV	10	F	Program 42.1, 42.2, 2/41, 41/42 or 42/44	7
43.103	Botany	IV	10	F		
43.113	Botany project A	IV	8	F		
43.123	Botany project B	IV	6	F	Program 43.1, 43.2, 43.3, 43.4, 43.5, 43.6, 27/43, 41/43, 43/44 or 43/45	8
43.133	Botany project C	IV	4	F		
43.143	Botany project D	IV	2	F		
44.513	General Microbiology	IV	2	S1		
44.523	Applied Microbiology	IV	2	S1		
44.533	Immunology	IV	2	S1		
44.543	Virology	IV	2	S1	Program 44.1, 44.2, 44.3, 44.4, 41/44, 42/44 or 43/44	8
44.553	Electron Microscopy	IV	2	F		
44.563	Microbiology Project I	IV	2	F		
44.573	Microbiology Project II	IV	4	F		
44.583	Microbiology Project III	IV	6	F		
45.103	Zoology IV	IV	10	F	Program 45.1, 45.2, 45.3, 45.4, 45.5, 45.6, 45.7, 45.8, 45.9, 45.10, 45.11, 45.12, 45.13, 41/45	8
62.014	History and Philosophy of Science	IV	10	F	Program 62.1, 62/70	8
68.004	Marine Science IV	IV	10	F	Program 68.32, 68.33 or 68.34	
70.013	Anatomy IV	IV	10	F	Program 70/68, 70.1, 70.2, 41/70, 45/70, 62/70 or 70/73	
73.013	Physiology IV	IV	10	F	Program 73.1, 41/73 or 70/73	8

* Higher level units of Mathematics must be included in Year 1, 2 and 3 in order to comply with the prerequisites for admission to Level IV Mathematics. Since entry to fourth year is only with approval of the Head of School, students should discuss their third year program with a Professor of the Department concerned. In special circumstances additional prerequisites may be required, or some of those listed may be waived.

§ Students are required to complete the prerequisite program with better than passing grades in the relevant studied subjects. In all cases a student considering proceeding to Level IV studies should seek the guidance of the Head of the appropriate School at an early stage of study to ensure that the program being followed is best suited to lead into the Level IV units and that special prerequisites are complied with.

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 (397) and the Faculty supervises the undergraduate course in Psychology (343). The Schools of the Faculty also offer facilities for students to proceed to the award of masters degrees and the degree of Doctor of Philosophy.

Students requiring advice about the undergraduate course should contact
School of Psychology   ..   ..   Dr P. J. Cleary
                                                                      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.

Sciences

Faculty of Biological Sciences

Course Outline 343

343
Psychology Degree Course
Full-time course
Bachelor of Science
BSc

The four year course in Psychology, which leads to the award of the degree of Bachelor of Science, is designed to meet the requirements of students who intend to become professional psychologists, as either practitioners or research workers. It provides extensive study of psychological theory and practice, supported by an appropriate selection of other subjects.

The course is available on a full-time basis only.* Entry into the course is subject to a quota which is determined from time to time.

In the fourth year, students undertake a program of study which includes courses selected from the School's advanced electives. Electives are offered in the major areas of general psychology and in a number of applied fields, eg clinical, social, industrial and human factors. In addition, each student must complete a research thesis or project.

Details of the qualifications required for admission to the Psychology Course leading to the award of BSc, the course requirements for Pass and Honours at graduation and rules governing admission with advanced standing are given below. Hours of attendance for the main subjects available in the course are shown in the Schedule of Course Subjects, together with some recommended course patterns.

Rules governing the Psychology Course

1. Applicants for admission to the Course must be matriculated to this University; and also have either satisfied the entrance requirements for 10.001 Mathematics I *or* 10.021 Mathematics IT *or* 17.011 Biology of Mankind and 17.021 Comparative Functional Biology.

2. A. In order to qualify for admission to the award of degree of BSc in Psychology under these regulations a candidate must attend classes and satisfy the examiners in the following subjects:

1. *Each of:*
12.001   Psychology I
12.042   Psychology IIA
12.052   Basic Psychological Processes II
12.062   Complex Psychological Processes II
12.152   Research Methods II
12.153   Research Methods IIIA
12.163   Research Methods IIIB
and
A total value of 6 Level III units of Psychology
(In special cases, the Head of the School of Psychology or his representative may approve of the substitution of any other appropriate course or equivalent units),
and
12.004   Psychology IV.

* Any student who enrolled in the former BSc in Applied Psychology Course prior to 1973 on a part-time basis may continue enrolling on that basis, provided that the course of study is completed within the minimum time plus two years.

112

2. *Five other subjects* (or their equivalent in units) selected to meet the following requirements:

A that they shall include *at least* one of:

(a) 10.011   Higher Mathematics I, *or*
     10.001   Mathematics I *or*
     10.021   Mathematics IT
or
(b) 17.011   Biology of Mankind *and*
     17.021   Comparative Functional Biology.
[They may include both (a) and (b).]

B that they shall include *at least* one of:

53.103   Introduction to Contemporary Industrial Society *and*
53.104   Introduction to Social Theory *or*
15.001   Economics IA and 15.011 Economics IB *or*
54.901   Australian Politics A or Australian Politics B, and either 54.902 Comparative Politics or 54.903 Some Major Political Theories *or*
Four of 52.151 Plato, 52.161 Informal Logic, 52.171 Philosophy of Religion, 52.152 Hume, 52.162 Formal Logic and 52.182 Political Philosophy.

or with the approval of the Head of the School of Psychology, one other Arts I subject or two General Studies electives.

C that they shall include at least one subject which together with the subject meeting the requirements of A or B immediately above constitutes a recognized sequence of two courses.

Recognized sequences are:
(a) 10.001 Mathematics I, followed by three Mathematics Level II units (10.111A, 10.111B, 10.211A) or by both of 10.311A Probability and Random Variables and 10.311B Statistical Inference;

(b) 17.011 Biology of Mankind and 17.021 Comparative Functional Biology followed by 12.402 Physiological Psychology, or by the equivalent of one subject (three Level II units are equivalent to one Level II subject) chosen from the following units according to the regulations of the Board of Studies in Science and Mathematics:

41.101   Principles of Biochemistry (equivalent to 2 units)
41.111   Biochemical Control
43.101   Genetics
45.101   Biometry
45.301   Vertebrate Zoology
73.011A Principles of Physiology (equivalent to 2 units)

(c) Sociology followed by two units value of Sociology Upper Level units
Economics IA and Economics IB followed by two units value of Economics Upper Level units
Two of Political Science Level I followed by two units value of Political Science Upper Level units
Four of Philosophy Level I followed by two units value of Philosophy Upper Level units.

B 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 will fit in with the timetable.

C 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 or to the Calendar for a statement of subject prerequisites and/or co-requisites.

4. The award of the degree of BSc in Psychology at graduation shall be at either Pass level or with Honours after a minimum of four years of full-time study.

Rules governing admission to the Psychology Course with advanced standing

1. Graduates of the University of New South Wales may be admitted to the Psychology Course leading to the award of the degree of BSc with exemptions from no more than five subjects or their unit equivalents completed by them. No more than two Psychology subjects may be included in the subjects exempted.

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. Some supporting studies in mathematics and/or biology, of which a minimum of one course is compulsory;

Sciences

3. Some supporting studies in the social sciences, of which a minimum of one course is compulsory; and

4. The special needs, interests and academic or vocational background of individual students when the balance of the five supporting subjects (or their equivalents in units) is selected, in consultation with the Head of School or his representative.

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 patterns of supporting subjects in consultation with the Head of the School or his representative before completing enrolment. For such students, some examples of patterns, based on supporting subject variants, are suggested below:

		Year 1	Year 2	Year 3	Year 4
Compulsory Psychology Subjects for all Courses		12.001	12.052, 12.062, 12.152 *and* 12.042	12.153, 12.163, and 6 other Psychology Level III units	12.004
Main Supporting Subject:					
Pure Mathematics	2 Yrs	10.001	10.111A, 10.111B *and* 10.211A		
		Social Science Subject I*		An approved Level I or II Subject*	
		Any approved Level I Subject*			
	3 Yrs	10.001	10.111A unit 10.111B unit 10.211A unit	4 Pure Mathematics Level III unit value	
		A Social Science Subject I* Any approved Level I Subject*			
Statistics	2 Yrs	10.001 A Social Science Subject I* Any approved Level I Subject*	10.311A 10.311B	An approved Level I or II Subject*	
Biochemistry		17.011 *and* 17.021 2.121 *and* 2.131 10.001 *or* 10.021	41.101 41.111	A Social Science Subject I*	
Zoology	2 Yrs	17.011 *and* 17.021 Choose 2 of 2.171, 2.121 *and* 2.131 10.001 *or* 10.021	45.301 43.101 *or* 45.101 A Social Science Subject I*		
Physiology	2 Yrs	17.011 *and* 17.021 A Social Science Subject I* Any approved Level I Subject*	73.011A Any approved Level I or II Subject*		
	2 Yrs	17.011 *and* 17.021 2.121 *and* 2.131 10.001 *or* 10.011 *or* 10.021	73.011A 10.331 *or* A Pure Maths II unit	A Social Science Subject I*	

		Year 1	Year 2	Year 3	Year 4
Social Science Subject	2 Yrs	A Social Science Subject (A) I* 10.011 or 10.001 of 10.021 or 17.011 and 17.021 Any approved Level I Subject*	Social Science Subject (A) II* An approved Level I or II Subject*		
	3 Yrs	A Social Science Subject (A) I* 10.011 or 10.001 or 10.021 or 17.011 and 17.021 Any approved Level I Subject*	Social Science Subject (A) II*	Social Science Subject (A) III*	
General		Social Science Subject (A) I* 17.011 and 17.021 10.001 or 10.021	12.402	Social Science Subject (A) II* or Social Science Subject (B) 1* or Any approved Level I or II Subject*	

* Or equivalent units.

Schedule: Main Psychology Course Subjects

Key: S1 (Session 1); S2 (Session 2); F (Full year); U (Upper)

	No.	Subject or Unit	Level	Hpw	When Offered	Prerequisites	Co-requisites
Psychology	12.001	Psychology I	I	5	F		
	12.042	Psychology IIA	II	4	F	12.001	12.052, 12.062 and 12.152
	12.052	Basic Psychological Processes II	II	4	S1	12.001	12.152
	12.062	Complex Psychological Processes II	II	4	S2	12.001	12.152
	12.152	Research Methods II	II	3	F	12.001	12.052 and 12.062
	12.153	Research Methods IIIA	III	4	S1	12.052, 12.062 and 12.152	
	12.163	Research Methods IIIB	III	4	S2	12.153	
		6 Psychology units	III	12	F	12.052, 12.062 and 12.152	
	12.004	Psychology IV	IV	15	F	All other Course requirements	
	12.402	Physiological Psychology	II	4	F	12.001, 17.011 and 17.021	

Continued overleaf

115

Schedule: Main Psychology Course Subjects (continued)

	No.	Subject or Unit	Level	Hpw	When Offered	Prerequisites	Co-requisites
Mathematics§	10.001	Mathematics I	I	6	F		
	10.011	Higher Mathematics I	I	6	F		
	10.021	Mathematics IT	I	6	F		
	10.111A 10.111B	Pure Mathematics II	II	6	F	10.001 or 10.011	
	10.211A	Applied Mathematics II					
	10.311A 10.311B	Theory of Statistics II	II	7	F	10.001 or 10.011 or 10.021 Cr.	
	10.321A 10.321B	Higher Theory of Statistics II	II	8	F	10.001 or 10.011	
Human Biology	17.011	Biology of Mankind	I	6	S1		
	17.021	Comparative Functional Biology	I	6	S2		
Biochemistry Units§	41.101	Principles of Biochemistry	II	12	S1	17.011 and 17.021 10.001 or 10.011 or 10.021	
	41.111	Biochemical Control	II	6	S2	41.101	
Zoology Units§	43.101	Genetics	II	6	S2	17.011 and 17.012 Choose 2 of 2.111, 2.121 or 2.131 10.001 or 10.011 or 10.021	
	45.101	Biometry	II	6	S1		
	45.301	Vertebrate Zoology	II	6	S2		
Physiology Units§	73.011A	Principles of Physiology (Equiv. Unit Value = 2)	II	6	F	17.011 and 17.021 2.121 and 2.131 10.001 or 10.011 or 10.021	
Economics†	2 units	Economics	I				
	2 units	Economics	U				
Philosophy†	2 units	Philosophy	I				
	2 units	Philosophy	U				
Sociology†	2 units	Sociology	I				
	2 units	Sociology	U				
Political Science†	2 units	Political Science	I				
	2 units	Political Science	U				

§ For details of Level II and Level III Science and Mathematics units, including pre- and co-requisites, refer to Science and Mathematics Course details. If units are taken, three Level II units are equivalent to one Level II subject; four Level III units are equivalent to one Level III subject.

† For details of Arts units, refer to the Faculty of Arts Handbook.

Faculty of Science

Faculty of Science

Introduction

The Schools of the Faculty of Science contribute programs to the Science and Mathematics Course (397) and the Faculty supervises undergraduate courses in Pure and Applied Chemistry (391) and Optometry (395) and the Graduate Diploma courses Food and Drug Analysis (551) and Current Science (552). The Schools of the Faculty also offer facilities for students to proceed to Masters Degrees in Chemistry (877), Mathematics (874), Optometry (876), Physics (873) and Statistics (875), 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 courses should contact the representative of the appropriate School:
School of Chemistry .. .. Mr W. J. Dunstan
School of Optometry .. .. Professor J. Lederer

Students requiring information about the postgraduate studies which are available should seek advice from:
Graduate Diploma in Current Science .. .. Associate Professor D. H. Morton
Graduate Diploma in Food and Drug Analysis .. .. .. Associate Professor E. R. Cole
or
in the case of Masters and Doctors degrees from:
School of Chemistry .. .. Professor G. W. K. Cavill
School of Mathematics .. .. Associate Professor I. H. Sloan
School of Physics.. .. .. Professor H. J. Goldsmid

Faculty of Science

Course Outlines

391
Pure and Applied Chemistry Course

Specialization in Chemistry

While some students will wish to include a small number of chemistry units in courses leading to major studies in other disciplines, there will be others who wish to specialize in chemistry to varying degrees.

1. *Major in Chemistry in the Science and Mathematics Course.* For purposes of graduation Science course regulations require students to study a minimum of four Level III units in related disciplines, such a combination being regarded as major study in that discipline or group of disciplines.

When studies in chemistry are required to be regarded as being major studies at least seven units of chemistry *must* be included after completing Chemistry I and these *must* include at least three of the four Level II units.

Students wishing to take 8 or more Level III Chemistry units are required to transfer to the Pure and Applied Chemistry Course (391) before the commencement of Year 2. If Year 2 studied in the Science and Mathematics course is similar to Year 2 of Course 391, the transfer may still be made before the commencement of Year 3.

2. *Pure and Applied Chemistry Course.* This course which allows intensive specialization in chemistry according to a prescribed pattern, leads to the award of the Bachelor of Science degree, and is administered by the Faculty of Science. It may be taken at pass or honours standard. The pass course requires full-time attendance at the University for three years. An additional year is required for the honours degree. The program may also be taken on a part-time basis over six years for the pass degree.

A total of 23 units is required for graduation at the pass level. First year is similar to the Science and Mathematics Course and covers 8 units. Of the remaining 15 units *at least 12* must be chemistry units and must include the following:

2.002A, 2.002B, 2.002D, 2.003B, 2.003C, 2.003D, 2.003H, 2.013A, 2.042C

The remaining 3 units may be chosen from any of the Science and Mathematics course topics, but no more than 2 may be at Level I.

In all cases prerequisites, co-requisites and exclusions are similar to those prescribed for the units in the Science and Mathematics course.

Electives offered by the School of Chemistry

Level	No.	Title	Prerequisites	Co-requisites	Excluded
II/III	2.003E	Nuclear and Radiation Chemistry	2.121 *and* 2.131 10.001 or 10.011 or 10.021		

Level	No.	Title	Prerequi-sites	Co-requi-sites	Excluded
II/III	2.003H	Molecular Spectroscopy and Structure	2.121 *and* 2.131		
II/III	2.003J	Fundamentals of Biological Chemistry	2.121 *and* 2.131		41.101A
II/III	2.003K	Solid State Chemistry	2.121 *and* 2.131 *and* 10.001 or 10.011		
II/III	2.013A	Introductory Quantum Chemistry	1.001 or 1.011 *and* 2.121 *and* 2.131 *and* 10.001 or 10.011 or 10.021		
III	2.003A	Physical Chemistry	2.002A		
III	2.003B	Organic Chemistry	2.002B		
III	2.003C	Inorganic Chemistry	2.042C		
III	2.003D	Instrumental Analysis	2.002D *and* 2.002A		
III	2.003L	Applied Organic Chemistry	2.002B		2.033L
III	2.003M	Organometallic Chemistry	2.002B		
III	2.013B	Synthetic Organic Chemistry	2.003B		
III	2.013C	Advanced Inorganic Chemistry	2.042C	2.003C	
III	2.013D	Advanced Inorganic Chemistry	2.002D	2.003D	
III	2.013L	Chemistry and Enzymology of Foods	2.002B		2.043L, 2.023L, 2.053L
III	2.013M	Thermo-Chemistry	2.002A		
III	2.023A	Chemical Physics	2.002A *and* 10.211A		
III	2.023B	Natural Product Chemistry	2.003B		
III	2.023L	Biological and Agricultural Chemistry	2.002B		2.053L, 2.013L, 2.043L
III	2.033A	Physical Chemistry of Macromolecules	2.003J or 2.002B *and* 1.112C *or* 2.002A		
III	2.033L	Applied Organic Chemistry (double unit)†	2.002B		2.003L
III	2.043A	Environmental Chemistry	2.002A		

Level	No.	Title	Prerequi-sites	Co-requi-sites	Excluded
III	2.043L	Chemistry and Enzymology of Foods† (double unit)	2.002B		2.013L, 2.023L, 2.053L
III	2.053A	Chemical Kinetics and Reaction Mechanisms	2.002A		
III	2.053L	Biological and Agricultural Chemistry† (double unit)	2.002B		2.023L, 2.013L, 2.043L
III	2.063A	Advanced Molecular Spectroscopy	2.013A		

† Only *one* of these double units may be chosen.

391
Pure and Applied Chemistry
Full-time Course
Bachelor of Science
BSc

Year 1		Hours per week
1.011	Higher Physics I *or*	6
1.001	Physics I	
2.121	Chemistry IA *and*	6
2.131	Chemistry IB	
10.011	Higher Mathematics I *or*	6
10.001	Mathematics I *or*	
10.021	Mathematics IT	

Plus one of

5.010	Engineering A *and*	6
5.020	Engineering B *or*	
5.030	Engineering C	
	or	
17.011	Biology of Mankind *and*	6
17.021	Comparative Functional Biology *or*	
25.011	Geology I*	6
	or	
25.151	Geoscience IA *or*	6
27.801	Introduction to Physical Geography *and*	6
27.802	Introduction to Human Geography	

* Three field excursions, up to five days in all, are an essential part of the course.

Year 2

2.002A	Physical Chemistry	3
2.002B	Organic Chemistry	3
2.002D	Analytical Chemistry	3
2.003H	Molecular Spectroscopy and Structure	3
2.042C	Inorganic Chemistry	3
	Science Electives* (2 units)	6
	Two General Studies Electives	3
		24

* To be chosen from units in the Science and Mathematics course in accordance with Science course requirements. The following are recommended.

Mathematics

10.031	Mathematics	2
10.331	Statistics SS	2
10.111A		
10.111B	Mathematics II	6
10.211A		

Physics
Choose 2 of

1.912	Geometric Optics	3
1.922	Electronics	
1.932	Introduction to Solids	

Biological Sciences

17.011	Biology of Mankind	6
17.021	Comparative Functional Biology	
41.101	Introductory Biochemistry	12*
44.101	Introductory Microbiology	6*
73.011A	Principles of Physiology	6

Geology

25.011	Geology I	6
25.012	Geology IIA	6
25.022	Geology IIB	3
25.112B	Geoscience IIB	3

Year 3

		Hpw
2.003B	Organic Chemistry	3
2.003C	Inorganic Chemistry	3
2.003D	Analytical Chemistry	3
2.013A	Introductory Quantum Chemistry	3
	Advanced Electives* (4 units)	12
	One General Studies Elective	1½
		25½

* Chosen from Level II/III or Level III units offered by the School of Chemistry in the Science and Mathematics course and in accordance with Science and Mathematics course regulations.

Year 4 Honours

As prescribed by the School.

Part-time Course

The part-time course in Pure and Applied Chemistry is equivalent to the full-time course and extends over six part-time years, leading to the award of the degree of Bachelor of Science. Honours may be awarded on the completion of an additional year of full-time study or, in special circumstances, an additional two years of part-time study.

The part-time course has been designed for students employed in the chemical industry but employment in this industry is not obligatory for entrance to the course.

391
Pure and Applied Chemistry
Part-time course
Bachelor of Science
BSc

Stages 1 and 2

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

		Hours per week
1.011	Higher Physics I or	6
1.001	Physics I	
2.121	Chemistry IA and	6
2.131	Chemistry IB	
10.001	Mathematics I or	6
10.021	Mathematics IT	

Plus one of

5.010	Engineering A and	
5.020	Engineering B or	6
5.030	Engineering C	
	or	
17.011	Biology of Mankind and	
17.021	Comparative Functional Biology	6
	or	
25.011	Geology I*	6
	or	
25.151	Geoscience IA	6
	or	
27.801	Introduction to Physical Geography** and	
27.802	Introduction to Human Geography**	6

* Three field excursions, up to five days in all, are an essential part of the course.

** Field work (to be arranged by the School of Geography) is a compulsory component of each unit.

Stage 3

2.002A	Physical Chemistry	3
2.042C	Inorganic Chemistry	3
	Science Electives* (two units)	6
		12

*See footnote * under Year 2 full-time course.

Stage 4

2.002B	Organic Chemistry	3
2.002D	Analytical Chemistry	3
2.003H	Molecular Spectroscopy and Structure	3
	General Studies Electives	3
		12

Stage 5

2.003B	Organic Chemistry	3
2.003C	Inorganic Chemistry	3
2.003D	Instrumental Analysis	3
2.013A	Introductory Quantum Chemistry	3
	General Studies Elective	1½
		13½

Stage 6

	Advanced Electives* (4 units)	12

* See footnote under Year 3 full-time course.

Honours

The requirements for admission to the honours course are the same as for the full-time course. A student wishing to do honours on a part-time basis may complete the honours year over two part-time years. Students are, however, advised to make every effort to do the honours year full time.

395
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 qualified 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.

395
Optometry—Full-time course
Bachelor of Optometry
BOptom

Year 1		Hours per week
1.001	Physics I	6
2.121	Chemistry IA ⎫	6
2.131	Chemistry IB ⎭	
10.001	Mathematics I *or* ⎫	
10.011	Higher Mathematics I *or* ⎬	6
10.021	Mathematics IT ⎭	
17.011	Biology of Mankind *and* ⎫	
17.021	Comparative Functional Biology ⎬	6
		24

Year 2		Hours per week
31.811	Optometry I	8
31.821	Special Anatomy and Physiology	6
73.011A	Principles of Physiology	6
	General Studies Elective	1½
		21½

Year 3		
12.001	Psychology I	5
31.812	Optometry II	15
31.831	Diseases of the Eye	3
	Two General Studies Electives	3
		26

Year 4		Hours per week	
		S1	S2
12.741	Psychology	2	2
31.813	Optometry III	6	6
31.841	Clinical Optometry	15	14
74.001	Indication for Medical Referral	0	1
	General Studies Elective	1½	1½
		24½	24½

Conditions for the award of the double degree 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 double degree 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 and Mathematics Course regulations.

3. In order to qualify for the award of the degree of BOptom, students so admitted shall complete the requirements of the Optometry degree course.

** In Rule 1, the word 'undergraduates' includes graduands, ie a person may be admitted under these rules if he has met all requirements for a first degree which has not yet been conferred on him, and his admission under these rules shall be no bar to the subsequent award of the first degree.

Graduate Study
Conditions for the Award of Higher Degrees
Subject Descriptions and Textbooks

Sciences

Enrolment Procedures

Graduate Study

Higher Degree Research Programs

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

Re-enrolling Students
Candidates registered for Higher Degrees (Research) are required to re-enrol at the commencement of each academic year. **Unless advised to the contrary candidates should obtain re-enrolment forms and advice on procedure and fees from the office of the appropriate School** after 1 January 1977. Each candidate must complete a re-enrolment form and submit it to the Cashier. (See Enrolment Procedures earlier in this handbook).

A candidate who has completed all the work for a graduate degree except for the submission of a thesis is required to re-enrol as above *unless* the thesis is submitted by 18 March 1977 in which case the candidate is not required to re-enrol.

Masters Degree and Graduate Diploma Courses

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

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

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

Faculty of Biological Sciences
Master of Science (Biotechnology)
Biochemical Engineering (GradDip)
Room L112, Biological Sciences
Building

Friday 4 March
2.00 pm to 5.00 pm
6.00 pm to 8.00 pm

Master of Psychology (MPsychol)

New Students
School of Psychology
Room 924
The Sciences Building

Monday 7 March
10.00 am to 12.00 noon

Continuing Students
School of Psychology
Room 828
The Sciences Building

Thursday 3 March
2.00 pm to 5.00 pm

Faculty of Science

Current Science (GradDip)

Room WG12	Friday 4 March
Newton Building	2.00 pm to 5.00 pm
(Applied Physics)	6.00 pm to 8.00 pm
	or by arrangement with the School

Food and Drug Analysis (DipFDA)

Room 422	Friday 4 March
Robert Heffron Building	2.00 pm to 5.00 pm
(Chemistry)	6.00 pm to 8.00 pm
	or by arrangement with the School

Master of Chemistry (MChem)

Unisearch House	Friday 4 March
	2.00 pm to 5.00 pm

Master of Mathematics (MMath)

Room 1519	Tuesday 1 March
Sciences Building	4.00 pm

Master of Optometry (MOptom)

Unisearch House	Tuesday 1 March
	2.00 pm to 5.00 pm

Master of Physics (MPhysics)

Graduate Office	Friday 4 March
Room 61	2.00 pm to 5.00 pm
Main Building	6.00 pm to 7.30 pm

Master of Statistics (MStats)

Room 1205	Tuesday 1 March
Sciences Building	4.00 pm

Schools in the Faculties of Biological Sciences and Science except *Schools of Chemistry and Psychology*	Friday 4 March 2.00 pm to 5.00 pm 6.00 pm to 8.00 pm Office of the appropriate School
School of Chemistry	Friday 4 March 2.00 pm to 6.00 pm Unisearch House
School of Psychology	Tuesday 1 March 2.00 pm to 5.00 pm Room 909 The Sciences Building

Qualifying Programs
(for admission to Higher Degree Candidature)

Students may enrol in such programs after approval has been obtained from the relevant Higher Degree Committee.

Unless advised to the contrary successful applicants are required to attend for enrolment at the appropriate time and place as listed below. The letter offering a place must be taken to the enrolment centre.

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

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

**Faculty of Biological Sciences and
Faculty of Science**

Graduate Study

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 Biological Technology offers a graduate diploma course in Biochemical Engineering *and* a Master's course in Biotechnology by formal study, and the School of Psychology offers a Master of Psychology course with specializations in Experimental Clinical and Psycho-dynamic Clinical Psychology.

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 Biological Technology Honours
43.103 Botany Honours
44.103 Microbiology Honours
12.014 Psychology IV (Research)
45.103 Zoology Honours

The qualifying program is graded in the usual way, and in appropriate cases the results are expressed as a grading equivalent to Honours.

Alternative Qualifying Program
Applicants who cannot attend the University regularly may be admitted as external qualifying students to a program equivalent to a standard Honours year. The following are the alternative qualifying subjects:

41.999G Biochemistry
42.999G Biological Technology
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.

Biological Technology

532
Biochemical Engineering Graduate Diploma Course
GradDip

The School of Biological Technology, conjointly with the School of Chemical Engineering, 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
3.481G	Mass Heat and Momentum Transfer	4	0
3.482G	Thermodynamics	4	0
3.483G	Process Dynamics and Bio-chemical Engineering Design	0	8
42.211G	Principles of Biology	3	0
42.212G	Principles of Biochemistry	3	0
42.213G	Biochemical Methods	0	3
42.214G	Biotechnology	0	3
44.111G	Microbiology	3	3
		17	17

Master of Science (Biotechnology)

The School also offers a formal graduate course at the Masters' level (Master of Science (Biotechnology)). The course includes advanced treatments of the more important areas of biotechnology such as microbial process control and enzyme technology. The course is open to graduates who have reached honours level in biological technology or who have acquired equivalent qualifications by completion of the qualifying courses offered in the School. Intending students are referred to conditions for the award of graduate degrees set out later in this handbook.

The course consists of lectures, tutorials, practical sessions, case history studies and a supervised project. The minimum period of registration before the award of the degree is two sessions for full-time students and four sessions for part-time students.

To qualify for the degree students must satisfy the examiners in the prescribed examinations, which include the submission and assessment of a report on the specified project.

826
Master of Science (Biotechnology)
MSc(Biotech)

		Hours per week	
		S1	S2
42.301G	Microorganism Productivity	0	5
42.302G	Enzyme Technology	0	5
42.303G	Microbial Process Control	5	0
42.304G	Biodeterioration and Biodegradation	5	0
42.305G	Case Studies	0	2
42.306G	Project	7	7
		17	19

Psychology

The School of Psychology offers graduate training at the Master's level (Master of Psychology).

Master of Psychology

The course is designed to provide professional training at an advanced level for honours graduates.

The normal entrance requirements are: **1.** A degree of Bachelor with Honours Class I or Class II in Psychology; and **2.** completion of approved courses in learning, perception and cognition, physiological psychology, psychological statistics, psychometrics and abnormal psychology, or in such other fields as may be prescribed by the Head of the School. Prerequisite courses may vary according to the specialization being undertaken for the award of the Master's degree.

A student who does not satisfy the above requirements may be permitted to undertake a qualifying course prescribed by the Head of the School, satisfactory completion of which will be accepted as meeting entrance requirements.

Selection of students will be based on academic qualifications and suitability for the course. It may be necessary to limit the number of new enrolments in any year. Intending students are referred to conditions for the award of graduate degrees set out later in this handbook.

The course consists of lectures, seminars, demonstrations, practical work, supervised clinical and community work, and a research thesis. The minimum period of registration before the award of the degree is three 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.

In each of the first two sessions, full-time students must undertake 10 units of study (a unit is defined as two hours of course work per week extending over the whole of the session). Four units of study must be selected from Section I. At least three of the Section I units must be taken from one of 12.221G, 12.232G or 12.235G. The remainder of the four units required must be selected in consultation with the Head of the School. Two units of study must be selected from Section II, but, in special circumstances, an approved program of study may be substituted for all or part of Section II. All four units in Section III are compulsory.

In addition, a total of 250 hours of professional practice must be completed in the first year of the course. The content of the practical work must be related to the choice of units from Section I.

In Year 2, five units of study must be undertaken. Two units must be selected from Section I, and the whole of Section II must be included. In addition, a further 200 hours of professional practice must be completed.

Part-time students normally will be expected to take half the full-time program in any one session.

825
Master of Psychology
MPsychol

Year 1
Sessions 1 and 2

Section I (at least 4 units are to be taken)	Unit Value
12.221G Experimental Analysis and Modification of Problem Behaviour	4
12.232G Theory and Practice of Psychodynamic Therapy	4
12.235G Community Psychology	4

Section II (usually 2 units are to be taken)	
12.236G Community Health	1
16.904G Australian Health Care System	1
12.233G Psychodiagnosis and Clinical Assessment	1
12.238G Group Techniques	1

Section III (compulsory)	
12.239G Research Methods in Clinical and Community Psychology	1
12.228G Research Project	1
12.240G Graduate Seminar	1
12.241G Graduate Colloquium	1
12.231G Professional Practice (250 hours)	

Year 2
Session 1

Section I (2 units are to be taken)	
12.221G Experimental Analysis and Modification of Problem Behaviour	2
12.232G Theory and Practice of Psychodynamic Therapy	2
12.235G Community Psychology	2

Section II (compulsory)	UV
12.240G Graduate Seminar	1
12.228G Research Project	2
12.231G Professional Practice (200 hours)	

Faculty of Science

Facilities are available in each of the Schools for research leading to 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 Current Science
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.

*The School of Mathematics also offers the pass degree of MA (see the Faculty of Arts Handbook).

All Schools of the Faculty of Science and
The Division of Postgraduate Extension Studies

The Faculty of Science offers to graduates and professional workers in science and science-based disciplines a course designed to enable them to renew their acquaintance with basic aspects of their subject and to learn of the latest developments in that area or in some other area or areas of science that have become of importance to their current work.

552
Graduate Diploma Course in Current Science
GradDip

In order to qualify for the award, a candidate must pursue a program of studies selected from the current list of the subjects offered in the Graduate Diploma course, and approved by the Higher Degree Committee of the Faculty on the recommendation of the Coordinator of Studies. A candidate must complete the approved course, comprising at least 12 units of study, within 2 years. The unit values of the subjects offered are stated in the table below. A unit comprises approximately 28 hours of tuition in the case of subjects not involving laboratory or similar exercises, or approximately 42 hours if laboratory, computing or other work is involved.

An approved course normally extends over two years, but in special cases approval may be given to a course that would satisfy requirements for the award of the Graduate Diploma in one year of full-time study.

The subjects offered are in general designed so that any practising scientist (or engineer, etc.) can pursue any of them effectively and profitably. Dependent upon an adequate number of candidates in each, the subjects offered are:

		Unit value
1.119G	Basic Solid-State Physics	1
1.129G	Solid-State Device Physics	1
1.139G	Biophysics	1
1.149G	Physical and Applied Acoustics	1
1.319G	Measurement and Data-Handling	1
1.329G	The Physics of Strong Materials	1
1.519G	Laser Physics and Applications	1
2.150G	Chemistry of Natural and Synthetic High Polymers	2
2.251G	Toxicology, Occupational and Public Health	2
2.153G	Recent Advances in Chemistry	2
2.154G	Advanced Analytical Chemistry	2
2.155G	and Chemical Instrumentation,	2
2.156G	Units A, B & C	2
4.261G	Modern Microscopy of Materials	1
10.372G	Statistics and Experimental Design	1
10.373G	Advanced Mathematical Analysis of Data	1
10.401G	Seiches and Tides	1
97.010G	Basic FORTRAN IV Programming I & II	1

		UV
42.211G	Principles of Biology	1
42.212G	Principles of Biochemistry	1
42.401G	Chemical Transformations in the Environment	1
44.111	Microbiology	1
97.0049	Psychology of Communication	1
97.0329	Basic Information Theory	1

To maintain the *current* nature of the Graduate Diploma course the Faculty from time to time may at short notice incorporate new or modified units offered by this or other Faculties and may delete existing units.

Chemistry

877
Master of Chemistry
MChem

The Master of Chemistry Course should be of interest to chemistry graduates who are involved in the practice or teaching of analytical chemistry. The program consists of a number of lecture courses (examinable). In addition, each student undertakes a critical literature survey or review or a short research project. Laboratory instruction (experience) and visits to laboratories are also included in the course. The course is full-time. In future the course may also be extended to part-time students. Details of the program are:

1. *2.581G Advanced Analytical Chemistry Lecture Courses*

Students are required to take *all* of the following nine core courses of lectures:

A Analytical flame spectroscopy;
B Advanced electrochemical analysis;
C Chromatography;
D Analytical chemistry of pollutants;
E Emission, IR, Mass and XRF spectroscopy;
F Calculations and statistics in analytical chemistry;
G Chemical analysis of organic and biological materials;
H Operations and applications of minicomputers in chemistry;
I Chemical microscopy.

The lecture time for the whole course is a minimum of 140 hours in a full year.

2. *Laboratory Instruction (Experience) and Visits to Laboratories*

An additional minimum of 150 hours is spent by students in one full year in selected areas of laboratory practice, instruction and visits to laboratories.

3. *Research Project or Critical Literature Survey*

A short research project (with report) of approximately 4 months duration full-time (400 hours laboratory work) may be selected in relation to the combined interests of the student and his supervisor. If the student requires more varied experi-

ence, a series of shorter projects may be carried out in two or three areas of analytical chemistry. Alternatively, each student may undertake a survey of the literature in a field of interest to himself and present a critical review in the form of a report.

Assessment

Each lecture course is examined separately. Each report is assessed by two examiners. The students may also be required to undergo an oral examination.

551
Food and Drug Analysis Graduate Diploma Course
GradDip

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 practise as public analysts. 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	Foods and Drugs I	4*
2.371G	Treatment of Analytical Data	1†
2.281G	Instrumental Techniques in Food and Drug Analysis	4
		9

Year 2

2.242G	Food and Drugs II Pharmacognosy and Microscopy of Crude Drugs	4
2.251G	Toxicology, Occupational and Public Health	3
44.111	Microbiology	3
		10

* 5 hours per week for 8 weeks in latter part of year.
† For 20 weeks.

History and Philosophy of Science

The School of History and Philosophy 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 disciplines 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.

878
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 class-work and additional private study.

The following 4 core units are common to the programs of all candidates:
62.701G Philosophy and Methodology of Science
62.702G Logic and Strategy of Scientific Progress
26.567G Interdisciplinary Seminars and Project*

Candidates may select 4 further units from the following groupings initially offered from 1977:

A 62.703G Technology and Society in the Twentieth Century
   62.704G Science, Technology and Social Responsibility
B 53.306G Science and Government I
   53.307G Science and Government II
C 15.715G Science, Society and Institutions
   15.716G Science, Technology and Economic Development
D 62.705G Science and the Military-Industrial Complex I
   62.706G Science and the Military-Industrial Complex II

Students may undertake a third-year MScSoc honours program of advanced study which includes a dissertation based on supervised research into particular aspects of the relationships between science and technology and science and its institutions.

* 2 units.

Mathematics

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.)

Elective Graduate Subjects   **Hpw**

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.** (a) Advanced Contact Lens Studies (b) Advanced Contact Lens Practice **2.** Clinical Photography **3.** Advanced Physiological Optics
Occupational Optometry	**1.** Occupational Optometry **2.** Pleorthoptics and Binocular Vision **3.** Advanced Physiological Optics
Orthoptics	**1.** Pleorthoptics and Binocular Vision **2.** Clinical Photography

Physics

The School of Physics offers a graduate course leading to the award of the Master of Physics degree (MPhysics). The course is intended for honours graduates, but others may be admitted after completing a qualifying course. It may be completed in one year of full-time study or two years of part-time study. The conditions for the award are set out later in this handbook.

The course consists of *two* core subjects, *six* elective subjects and either a short research project or a critical literature survey in a specified field of physics. The core subjects each occupy two hours per week for two sessions and are treated primarily by formal lectures. The elective subjects each occupy the equivalent of one hour per week for two sessions and are treated in seminars. The critical literature survey or research project occupies a total of approximately 250 hours. All core and elective subjects are examined and, in addition, students are required to submit a report on their research project or literature survey.

873
Master of Physics
MPhysics

Core Subjects: Methods of experimental physics, methods of theoretical physics. *Elective Subjects:* Acoustics, atomic physics, biophysics, crystallography, solid state transport, magnetic materials, materials irradiation, surface physics. *Research Project. Literature Survey.*

Not all the electives may be available in any one year.

Conditions for the Award of Higher Degrees

First Degrees

Rules, regulations and conditions for the award of first degrees are set out in the appropriate Faculty Handbooks.

For the list of undergraduate courses and degrees offered see **Disciplines of the University: Faculty Table (Undergraduate Study) in the Calendar.**

Higher Degrees

The following is the list of higher degrees and graduate diplomas of the University, together with the publication* in which the conditions for the award appear.

For the list of graduate degrees by research and course work, arranged in faculty order, see **Disciplines of the University: Faculty Table (Graduate Study) in the Calendar.**

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

Title	Abbreviation	Calendar/Handbook
Doctor of Science	DSc	Calendar
Doctor of Letters	DLitt	Calendar
Doctor of Laws	LLD	Calendar
Doctor of Medicine in the Faculty of Medicine	MD	Calendar Medicine
Doctor of Philosophy	PhD	Calendar and all faculties
Master of Applied Science	MAppSc	Applied Science
Master of Architecture	MArch	Architecture
Master of Arts	MA(Hons)	Arts Military Studies
	MA	Arts Military Studies

Higher Degrees

* Not including General Studies Handbook.

Title	Abbreviation	Calendar/Handbook
Master of Building	MBuild	Architecture
Master of Business Administration	MBA	Commerce**
Master of Business Administration	MBA	AGSM
Master of Chemistry by Formal Course Work	**MChem**	**Sciences***
Master of Commerce (Honours)	MCom(Hons)	Commerce
Master of Commerce by Formal Course Work	MCom	Commerce
Master of Education	MEd	Professional Studies
Master of Engineering **Master of Engineering without Supervision**	**ME**	Applied Science Engineering Military Studies **Sciences***
Master of Engineering Science	MEngSc	Engineering
Master of General Studies	MGenStud	General Studies
Master of Health Administration	MHA	Professional Studies
Master of Health Personnel Education	MHPEd	Calendar†
Master of Health Planning	MHP	Professional Studies
Master of Landscape Architecture	MLArch	Architecture
Master of Laws by Research	LLM	Law
Master of Librarianship by Formal Course Work Master of Librarianship by Research	MLib	Professional Studies
Master of Mathematics	**MMath**	**Sciences***
Master of Optometry	**MOptom**	**Sciences***
Master of Physics	**MPhysics**	**Sciences***
Master of Psychology	**MPsychol**	**Sciences‡**
Master of Public Administration	MPA	AGSM
Master of Science **Master of Science without Supervision**	**MSc**	Applied Science Engineering Medicine Military Studies Professional Studies **Sciences*‡**
Master of Science (Acoustics)	MSc(Acoustics)	Architecture
Master of Science and Society by Formal Course Work	**MScSoc**	**Sciences***
Master of Science (Biotechnology)	**MSc(Biotech)**	**Sciences‡**
Master of Science (Building)	MSc(Building)	Architecture
Master of Science (Building Services)	MSc(Building Services)	Architecture
Master of Social Work by Research Master of Social Work by Formal Course Work	MSW	Professional Studies
Master of Statistics	**MStats**	**Sciences***
Master of Surgery	MS	Medicine
Master of Surveying	MSurv	Engineering
Master of Surveying without Supervision		
Master of Surveying Science	MSurvSc	Engineering
Master of Town Planning	MTP	Architecture

Title	Abbreviation	Calendar/Handbook
Graduate Diplomas Graduate Diploma	GradDip	Applied Science Architecture Engineering **Sciences*‡**
Graduate Diploma in the Faculty of Professional Studies	DipArchivAdmin DipEd DipLib GradDip	Professional Studies

** Course withdrawn at end of 1977.
* Faculty of Science.
† Professorial Board.
‡ Faculty of Biological Sciences.

Doctor of Philosophy (PhD)

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

Qualifications

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

A hold an honours degree from the University of New South Wales; or

B hold an honours degree of equivalent standing from another approved university; or

C if he holds a degree without honours from the University of New South Wales or other approved university, has achieved by subsequent work and study a standard recognised by the appropriate Faculty or Board of Studies as equivalent to honours; or

D in exceptional cases, submit such other evidence of general and professional qualifications as may be approved by the Professorial Board on the recommendation of the Faculty or Board of Studies.

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

Registration

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

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

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

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

A a candidate fully engaged in advanced study and research for his degree, who before registration was engaged upon research to the satisfaction of the Faculty or Board of Studies, may be exempted from not more than two academic sessions;

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

C in exceptional cases, the Professorial Board on the recommendation of the Faculty or Board of Studies may grant permission for a candidate to be exempted from not more than two academic sessions.

6. A candidate who is fully engaged in research for the degree shall present himself for examination not later than ten academic sessions from the date of his registration. A candidate not fully engaged in research shall present himself for examination not later than twelve academic sessions from the date of his registration. In special cases an extension of these times may be granted by the Faculty or Board of Studies.

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

A the Faculty or Board of Studies may permit a candidate on application to undertake a limited amount of University teaching or outside work which in its judgment will not interfere with the continuous pursuit of the proposed course of advanced study and research;

B a member of the full-time staff of the University may be accepted as a part-time candidate for the degree, in which case the Faculty or Board of Studies shall prescribe a minimum period for the duration of the program;

C in special circumstances, the Faculty or Board of Studies may, with the concurrence of the Professorial Board, accept as a part-time candidate for the degree a person who is not a member of the full-time staff of the University and is engaged in an occupation which, in its opinion, leaves the candidate substantially free to pursue his program in a school of the University. In such a case the Faculty or Board of Studies shall prescribe for the duration of his program a minimum period which, in its opinion, having regard to the proportion of his time which he is able to devote to the program in the appropriate University school is equivalent to the six sessions ordinarily required.

8. Every candidate shall pursue his program under the direction of a supervisor appointed by the Faculty or Board of Studies from the full-time members of the University staff. The work, other than field work, shall be carried out in a School of the University save that in special cases the Faculty or Board of Studies may permit candidates to conduct their work at other places where special facilities not possessed by the University may be available. Such permission will be granted only if the direction of the work remains wholly under the control of the supervisor.

9. Not later than two academic sessions after registration the candidate shall submit the topic of his research for approval by the Faculty or Board of Studies. After the topic has been approved it may not be changed except with the permission of the Faculty or Board of Studies.

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

11. On completing his course of study every candidate must submit a thesis which complies with the following requirements:

Thesis

A the greater proportion of the work described must have been completed subsequent to registration for the PhD degree;

B it must be an original and significant contribution to the knowledge of the subject;

C it must be written in English except that a candidate in the Faculty of Arts may be required by the faculty on the recommendation of the supervisor to write the thesis in an appropriate foreign language;

D it must reach a satisfactory standard of expression and presentation.

12. The thesis must present the candidate's own account of his research. In special cases work done conjointly with other persons may be accepted, provided the Faculty or Board of Studies is satisfied on the candidate's part in the joint research.

13. Every candidate shall be required to submit with his thesis a short abstract of the thesis comprising not more than 600 words.

The abstract shall indicate:

A *the problem investigated;*

B *the procedures followed;*

C *the general results obtained;*

D *the major conclusions reached;*

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

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

Entry for Examination

15. The candidate shall give in writing two months' notice of his intention to submit his thesis and such notice shall be accompanied by the appropriate fee.

16. Four copies of the thesis shall be submitted together with a certificate from the supervisor that the candidate has completed the course of study prescribed in his case. The four copies of the thesis shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses.* The candidate may also submit any work he has published whether or not such work is related to the thesis.

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

18. There shall normally be three examiners of the thesis, appointed by the Professorial Board on the recommendation of the Faculty or Board of Studies, at least one of whom shall be an external examiner.

19. After examining the thesis the examiners may:

A decide that the thesis reaches a satisfactory standard; or

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

C recommend without further test that the candidate be not awarded the degree of Doctor of Philosophy.

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

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

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

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

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

Master of Chemistry (MChem) by Formal Course Work

1. An application to register for the degree of Master of Chemistry by formal course work shall be made on the prescribed form which shall be lodged with the Registrar at least six weeks before the commencement of the term in which the candidate desires to register.

2. A An applicant for registration shall hold an approved degree of Bachelor with Class I or Class II honours in Chemistry.

B An applicant for registration with an approved degree at a standard below honours Class II may be accepted following satisfactory performance at a qualifying examination approved by the Faculty of Science.

C In special circumstances a person may be permitted to register as a candidate for the degree if he submits evidence of such academic and professional attainments as may be approved by the Faculty of Science on the recommendation of its Higher Degree Committee.

3. A candidate for the degree shall be required to undertake the appropriate course of study and pass the prescribed examinations. Under the supervision of a member of the academic staff, a candidate shall be required to write a critical review of the literature or present a report on a short research project (approximately 400 hours laboratory work) to be assessed by two examiners.

4. Three copies of the report shall be submitted by the candidate and shall be retained by the University. The University shall be free to allow the report to be consulted or borrowed and, subject to the provisions of the Copyright Act, 1968 the University may issue the report in whole or in part, in photostat or microfilm or other copying medium.

5. An approved applicant shall register as either a full-time or part-time student and shall pay such fees as may be determined from time to time by the Council.

6. A candidate shall not be considered for the award of the degree until the lapse of one academic year from the date of registration in the case of a full-time candidate or two academic years from the date of registration in the case of a part-time candidate.

Master of Engineering (ME)

1. The degree of Master of Engineering may be granted by the Council on the recommendation of the Professorial Board to a candidate who has demonstrated ability to carry out research by the submission of a thesis embodying the results of an original investigation.

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

3. A An applicant for registration for the degree shall have been admitted to the degree of Bachelor in the University of New South Wales, or other approved University, in an appropriate school.

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

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

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

6. An approved applicant shall register in one of the following categories:

A student in full-time attendance at the University;

B student in part-time attendance at the University;

C student working externally to the University;

and shall pay such fees as may be determined from time to time by the Council.

7. Every candidate for the degree shall be required to carry out a program of advanced study, to take such examinations and perform such other work as may be prescribed by the Faculty. The program shall include the preparation and submission of a thesis embodying the results of an original investigation, three copies of which shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses.* The candidate may submit any work he has published whether or not such work is related to the thesis.

8. 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.

9. The investigation and other work as provided in paragraph **7.** shall be carried out under the direction of a supervisor appointed by the Faculty or under such conditions as the Faculty may determine.

10. No candidate shall be considered for the award of the degree until the lapse of four complete sessions from the date from which registration becomes effective save that, in the case of a candidate who obtained the degree of Bachelor with Honours or who has had previous research experience, this period may, with the approval of the Faculty, be reduced by up to two sessions.

11. For each candidate there shall be at least two examiners appointed by the Professorial Board, on the recommendation of the Faculty, one of whom shall, if possible, be an external examiner.

Master of Mathematics (MMath)

1. An application to register for the degree of Master of Mathematics by formal course work shall be made on the prescribed form which shall be lodged with the Registrar at least six weeks before the commencement of the session in which the candidate desires to register.

2. A An applicant for registration shall hold an approved degree of Bachelor with Class I or Class II honours in Mathematics.

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

B An applicant for registration, with an approved degree at a standard below honours Class II may be accepted following satisfactory performance at a qualifying examination approved by the Faculty of Science.

C In special circumstances a person may be permitted to register as a candidate for the degree if he submits evidence of such academic and professional attainments as may be approved by the Faculty of Science on the recommendation of its Higher Degree Committee.

3. A candidate for the degree shall be required to undertake the appropriate course of study and pass the prescribed examinations. Under the supervision of a member of the academic staff, a candidate shall be required to submit a report consisting of a critical review of the literature in an approved branch of Mathematics or a report on a short research project. In either case the report will be assessed by two examiners, and the candidate may be required to attend an oral examination. The report is to be presented in a form approved by the Head of the School of Mathematics.

4. An approved applicant shall register as either a full-time or part-time student and shall pay such fees as may be determined from time to time by the Council.

5. A candidate shall not be considered for the award of the degree until the lapse of one academic year from the date of registration in the case of a full-time candidate or two academic years from the date of registration in the case of a part-time candidate.

1. An application to register for the degree of Master of Optometry shall be made on the prescribed form which shall be lodged with the Registrar at least one full calendar month before the commencement of the course.

Master of Optometry (MOptom)

2. A An applicant for registration for the degree of Master of Optometry shall have been admitted to the degree of Bachelor in the discipline of optometry in the University of New South Wales or other approved University.

B In special circumstances a person may be permitted to register as a candidate for the degree if he submits evidence of such academic and professional attainments as may be approved by the Faculty on the recommendation of its Higher Degree Committee.

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

4. A candidate for the degree shall be required to undertake the appropriate course of study and pass the prescribed annual examinations. Under the supervision of a member of the academic staff a candidate shall be required to undertake a specified project, the satisfactory completion of which shall be regarded as part of the annual examinations.

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

1. An application to register for the degree of Master of Physics by formal course work shall be made on the prescribed form which shall be lodged with the Registrar at least six weeks before the commencement of the session in which the candidate desires to register.

Master of Physics (MPhysics)

2. A An applicant for registration shall hold an approved degree of Bachelor with Class I or Class II honours in Physics.

B An applicant for registration, with an approved degree at a standard below honours Class II, may be accepted following satisfactory performance at a qualifying examination approved by the Faculty of Science.

C In special circumstances a person may be permitted to register as a candidate for the degree if he submits evidence of such academic and professional attainments as may be approved by the Faculty of Science on the recommendation of its Higher Degree Committee.

3. A candidate for the degree shall be required to undertake the appropriate course of study and pass the prescribed examinations. Under the supervision of a member of the academic staff, a candidate shall be required to submit a report consisting of a critical review of the literature in an approved branch of Physics or a report on a short research project. In either case the report will be assessed by two examiners, and the candidate may be required to attend an oral examination. The report is to be presented in a form approved by the Head of the School of Physics.

4. An approved applicant shall register as either a full-time or part-time student and shall pay such fees as may be determined from time to time by the Council.

5. A candidate shall not be considered for the award of the degree until the lapse of one academic year from the date of registration in the case of a full-time candidate or two academic years from the date of registration in the case of a part-time candidate.

Master of Psychology (MPsychol)

1. An application to register for the degree of Master of Psychology shall be made on the prescribed form which shall be lodged with the Registrar at least six weeks before the commencement of the academic year.

2. A An applicant for registration shall hold an approved degree of Bachelor with Honours Class I or Class II in Psychology.

B An applicant for registration, with an approved degree at a standard below Honours Class II, may be accepted following satisfactory completion of a qualifying course and examination approved by the Faculty of Biological Sciences.

C In special cases a person may be permitted to register as a candidate for the degree if he submits evidence of such academic and professional attainments as may be approved by the Faculty of Biological Sciences on the recommendation of its Higher Degree Committee.

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

4. A candidate for the degree shall be required to undertake the specified courses of advanced study and pass the prescribed examinations. Under the supervision of a member of the academic staff, a candidate shall be required to undertake a specified research project, the satisfactory completion of which shall be regarded as part of the examinations.

5. An approved applicant shall register as a student in full-time or part-time attendance at the University.

6. The minimum period of registration before the award of the degree shall be three sessions for full-time students, and six sessions for part-time students.

7. 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.

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

1. The degree of Master of Science may be granted by the Council on the recommendation of the Professorial Board to a candidate who has demonstrated ability to undertake research by the submission of a thesis embodying the results of an original investigation.

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

3. A An applicant for registration for the degree shall have been admitted to the degree of Bachelor of Science in the University of New South Wales, or other approved University, in an appropriate School or Department.

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

4. Notwithstanding any other provisions of these conditions the Faculty or Board of Studies may require an applicant to demonstrate fitness for registration by carrying out such work and sitting for such examinations as the Faculty or Board of Studies may determine.

5. In every case before permitting an applicant to register as a candidate the Faculty or Board of Studies shall be satisfied that adequate supervision and facilities are available.

6. An approved applicant shall register in one of the following categories:

A student in full-time attendance at the University;

B student in part-time attendance at the University;

C student working externally to the University;

and shall pay such fees as may be determined from time to time by the Council.

7. Every candidate for the degree shall be required to submit three copies of a thesis embodying the results of an original investigation or design, to take such examinations and to perform such other work as may be prescribed by the Faculty or Board of Studies. The thesis shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses.* The candidate may submit also for examination any work he has published whether or not such work is related to the thesis.

8. 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.

9. The investigation, design and other work as provided in paragraph **7.** shall be carried out under the direction of a supervisor appointed by the Faculty or Board of Studies or under such conditions as the Faculty or Board of Studies may determine.

At least once a year and at any other time that the Higher Degree Committee sees fit, the candidate's supervisor shall present to the Head of School in which the candidate is registered a report on the progress of the candidate. The Committee shall review the report and as a result of its review may cancel registration or take such other action as it considers appropriate.

10. Unless otherwise recommended by the Committee, no candidate shall be awarded the degree until the lapse of four complete sessions from the date of registration, save that in the case of a candidate who obtained the degree of Bachelor with Honours or who has had previous research experience, this period may be reduced by up to two sessions with the approval of the Committee. A candidate who is fully engaged in research for the degree shall present himself for examination not later than six academic sessions from the date

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

of registration. A candidate not fully engaged in research shall present himself for examination not later than twelve academic sessions from the date of his registration. In special cases an extension of these times may be granted by the Committee.

11. A A candidate shall give in writing to the Registrar two months' notice of his intention to submit his thesis.

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

C After examining the thesis an examiner may:

1. recommend that the candidate be awarded the degree without further examination

or

2. recommend that the candidate be awarded the degree subject to minor corrections as listed being made to the satisfaction of the Head of School

or

3. recommend that the candidate be not awarded the degree but be permitted to resubmit his thesis in a revised form after a further period of study and/or research

or

4. recommend that the candidate be not awarded the degree and be not permitted to resubmit his thesis.

D In considering a recommendation made in terms of clause **3.** of sub-condition **C** of this condition the Committee may specify the period within which the thesis is to be resubmitted.

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

Master of Science (Biotechnology) (MSc(Biotech))

1. An application to register for the degree of Master of Science (Biotechnology) shall be made on the prescribed form which shall be lodged with the Registrar at least six weeks before the commencement of the academic year.

2. A An applicant for registration shall hold an approved degree of Bachelor with Honours Class I or Class II in Biological Technology or other relevant discipline.

B An applicant for registration with an approved degree at a standard below Honours Class II may be accepted following satisfactory completion of a qualifying course of not less than one year and examination approved by the Faculty of Biological Sciences.

C In special cases, a person may be permitted to register as a candidate for the degree if he submits evidence of such academic and professional attainments as may be approved by the Faculty of Biological Sciences on the recommendation of its Higher Degree Committee.

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

4. A candidate for the degree shall be required to undertake the specified course of advanced study and pass the prescribed examinations. Under the supervision of a member of the academic staff, a candidate shall be required to undertake a specified project, the satisfactory completion of which shall be regarded as part of the examinations.

5. An approved applicant shall register as a student in full-time or part-time attendance at the University.

6. The minimum period of registration before the award of the degree shall be two sessions for full-time students and four sessions for part-time students.

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

1. The Degree of Master of Science and Society may be awarded at honours or pass level by the Council on the recommendation of the Professorial Board to a candidate who has satisfactorily completed the approved course, comprising at least eight units which normally will be taken over four sessions and, in the case of honours candidates, an additional two session program of advanced study including a dissertation based on research approved by the Higher Degree Committee of the Faculty of Science (hereinafter referred to as 'the Committee') on the recommendation of the School of History and Philosophy of Science

Master of Science and Society (MScSoc) by Formal Course Work

2. A An applicant for registration for the degree shall have been admitted to a degree of Bachelor in the University of New South Wales or other approved university or tertiary education institution of acceptable standing, at a level approved by the Committee. Normally an honours degree or equivalent in science, applied science/technology, a social science or other relevant discipline, or a pass degree together with suitable professional experience would be deemed an appropriate qualification.

Qualifications

B In exceptional cases an applicant may be registered as a candidate for the degree if he submits evidence of such academic and professional attainment as may be approved by the Committee.

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

3. A An application to register as a candidate for the degree of Master shall be made on the prescribed form which should be lodged with the Registrar at least four (4) weeks before the commencement of the course.

Registration

B An approved applicant shall register as a student in part-time attendance at the University.

C No candidate shall be considered for the award of the degree until the lapse of four sessions in the case of a pass candidate or six sessions in the case of an honours candidate.

D The progress of a candidate shall be reviewed annually by the Committee and as a result of such review the Committee may terminate the candidature or take such other action as it considers appropriate.

4. Consequent upon consideration of the candidate's results in the course assessment, the Committee shall recommend to the Professorial Board whether the candidate may be admitted to the degree.

Recommendation for admission to Degree

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

Fees

Master of Statistics (MStats)

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

2. A An applicant for registration for the degree 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.

B In special circumstances a person may be permitted to register as a candidate for the degree if he submits evidence of such academic and professional attainments as may be approved by the Faculty on the recommendation of its Higher Degree Committee.

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

4. A candidate for the degree shall be required to undertake the appropriate course of study and pass the prescribed annual examinations. Under the supervision of a member of the academic staff a candidate shall be required to undertake a specified project, the satisfactory completion of which shall be regarded as part of the annual examinations.

5. No candidate shall be considered for the award of the degree until a lapse of four complete sessions from the date of registration, save that in the case of a candidate who obtained the degree of Bachelor with Honours in Statistics this period may, with the approval of the Faculty, be reduced by up to two sessions by exemption from appropriate specified courses of study.

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

Graduate Diplomas

Graduate Diploma (GradDip)

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

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

A a graduate of the University of New South Wales or other approved university,

B a person with other qualifications as may be approved by Faculty.

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

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

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

Subject Descriptions and Textbooks

Identification of Subjects by Numbers

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

1. The School offering a subject is indicated by the number before the decimal point;

2. If a subject is offered by a Department within a School, the first number after the decimal point identifies that Department;

3. The position of a subject in a sequence is indicated by the third number after the decimal point. For example, 2 would indicate that the subject is the second in a sequence of subjects;

4. Graduate subjects are indicated by the suffix G.

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

Those subjects taught in each Faculty are listed in full in the handbook of that Faculty, together with the subject description and the required textbook list, in the section entitled Subject Descriptions and Textbooks.

The **identifying numbers** for each School are set out below.

Reference book lists are not published here, but are available from the various Schools.

For General Studies subjects see the Board of Studies in General Education Handbook, which is available free of charge.

Information Key

The following is the key to the information supplied about each subject listed below: S1 (Session 1); S2 (Session 2); F (Session 1 *plus* Session 2, ie full year); S1 or S2 (Session 1 *or* Session 2, ie choice of either session); SS (single session, ie which session taught not known at time of publication); L (Lecture, followed by hours per week); T (Laboratory/Tutorial, followed by hours per week).

Physics

Undergraduate Study

Physics Level I Units

1.001
Physics I.   F L3T3

Prerequisite:

	HSC Exam Grade Required
2 unit Mathematics *or*	1 or 2
3 unit Mathematics *or*	1, 2 or 3
4 unit Mathematics *and*	1, 2, 3, 4 or 5 (Grade 5 at a standard acceptable to the Professorial Board)
2 unit Science (incl. Physics and /or Chem.) *or*	1, 2 or 3
4 unit Science (incl. Physics and/or Chem.)	1, 2 or 3

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.

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

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

1.011
Higher Physics I   F L3T3

For students of all Faculties except Medicine and Architecture who have a good secondary school record and who wish to do a more challenging course.

As for 1.001 with additional topics: space physics, mechanical properties of real materials, rotational dynamics, physics of biological systems, AC and charged particle dynamics, physics of energy resources and conversion.

Textbooks
Russell G. J. & Mann K. *Alternating Current Circuit Theory* NSWUP
Weidner R. T. & Sells R. L. *Elementary Physics, Classical and Modern* Allyn & Bacon

Physics Level II Units

1.012
Mechanics and Thermal Physics   S1 L3T2

Prerequisites: 1.001 or 1.011, 10.001. Co-requisite: 10.211A. Excluded: 1.112C, 1.122C.

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

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

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

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

1.022
Electromagnetism and
Modern Physics   S2 L3T2

Prerequisites: 1.001 or 1.011, 10.001. Co-requisite: 10.211A. Excluded: 1.112A, 1.122A, 1.112B, 1.122B, 1.212C, 1.932.

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

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

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

Textbooks
Armstrong R. L. & King J. D. *The Electromagnetic Interaction* Prentice-Hall
Arya A. P. *Elementary Modern Physics* Addison-Wesley
For students intending to proceed to Level III physics:
Arya A. P. *Fundamentals of Atomic Physics* Allyn & Bacon

1.032
Laboratory   F T3

Prerequisites: 1.001 or 1.011, 10.001. Excluded: 1.112A, 1.122A, 1.112B, 1.122B, 1.212B, 1.922.

Alternating current circuits, complex impedance, resonance, mutual inductance, introductory electronics, diode characteristics and circuits, power supplies, transistor characteristics, single stage and coupled

amplifiers, experiments using AC circuits. Experimental investigations in a choice of areas including radioactivity, spectroscopy, properties of materials, Hall effect, nuclear magnetic resonance, photography, vacuum systems.

Textbooks

No set texts.

1.112A
Electromagnetism   S2 L2½T3½

Not available to students unless completing a set of Physics Level II units. For details of arrangements consult School of Physics.

Electrostatics in vacuum and in dielectrics. Magnetostatics in vacuum and in magnetic materials. Maxwell's equations and simple applications.

Textbook

Armstrong R. L. & King J. D. *The Electromagnetic Interaction* Prentice-Hall

1.112B
Modern Physics   S1 L2½T3½

Not available to students unless completing a set of Physics Level II units. For details of arrangments consult the School of Physics.

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

Textbook

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

Terminating Physics Level II Units

1.912
Geometrical Optics   S1 L1T2

Prerequisites: *1.001 or 1.011, 10.001 or 10.011 or 10.021. Excluded: 1.212A, 31.212, 31.182.*

The concept of the ray of light and the point image. Reflection. Fresnel's laws. Refraction. The thin lens. The thick lens and the lens systems. Instruments and their aberrations. Introduction to optical computations. Photometry.

Textbook

Fincham W. H. A. & Freeman M. H. *Optics* 8th ed Butterworths

1.922
Electronics   S1 L1T2

Prerequisites: *1.001 or 1.011, 10.001 or 10.011 or 10.021. Excluded: 1.212B, 1.032.*

The application of electronics to other disciplines. Includes: principles of circuit theory and analogue; computing; amplifiers, their specification and application; transducers; electronic instrumentation; industrial data acquisition.

Textbook

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

1.932
Introduction to Solids   S2 L2T1

Prerequisites: *1.001 or 1.011, 10.001 or 10.011 or 10.021. Excluded: 1.022, 1.212C.*

Introductory quantum mechanics and atomic physics; crystal structure; point and line defects; introductory band theory; conductors, semiconductor and insulators; energy level diagrams.

Textbook

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

Physics Level III Units

1.013
Quantum Mechanics and
Nuclear Physics   F L1½T½

Prequisites: *1.012, 1.022, 10.211A. Excluded: 1.113A, 1.123A, 1.123D, 2.023A, 10.222F.*

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

Detecting instruments for nuclear particles, counting statistics, Rutherford scattering, radioactivity, radiative processes, reactions, optical model, parity, introduction to particle physics, mesons, baryons, quarks.

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

Textbook

White R. P. *Basic Quantum Mechanics* McGraw-Hill

1.023
Statistical Mechanics and
Solid State Physics   S1 L3T1

Prerequisites: *1.012, 1.022, 10.211A. Co-requisite: 1.013. Excluded: 1.113C, 1.123B, 1.123C.*

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

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

Textbooks

Mandl F. *Statistical Physics* Wiley
Blakemore J. S. *Solid State Physics* Saunders

1.033
Electromagnetism and Optical Physics   S2 L3T1

Prerequisites: 1.012, 1.022, 10.211A. Excluded: 1.113B, 1.123B, 10.222C.

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

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

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

Textbook

Hecht E. & Zajac A. *Optics* Addison-Wesley.

1.043
Experimental Physics   F T6

Prerequisites: 1.012, 1.022, 1.032. Excluded: 1.113A, 1.113B, 1.113C, 1.113D, 1.123A, 1.123B, 1.123C, 1.123D.

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

Textbooks

No set texts.

1.133
Electronics   S1 L2T4

Prerequisite: 1.922 or 1.032. Excluded: 1.143B.

Extension of AC circuit theory. Revision of transistors, parameters. Multistage discrete amplifiers, bias, coupling, stability. Positive feedback, oscillators. Integrated amplifiers, properties. Negative feedback. Regulated power supplies. Narrow band amplifiers, power and pulse amplifiers. Modulation, AM FM chopper amplifiers. Pulse circuits, gates, flip-flops, scalers, Schmitt trigger, integrated circuits. Thyristors.

Textbook

Benedict R. R. *Electronics for Scientists and Engineers* 2nd ed Prentice-Hall

1.143
Biophysics   S1 L2T1

Prerequisites: 1.012, 1.022. Excluded: 1.143A.

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.

Textbooks

No set texts.

1.153
Biophysical Techniques   S2 L2T1

Prerequisites: 1.012, 1.022, 1.032. Excluded: 1.143A.

The theory and application of physical techniques of relevance to the study of biological systems.

Techniques considered may include optical and electron microscopy X-ray and neutron diffraction, magnetic resonance, lasers, light scattering, calorimetry, fluorescence, electrochemical techniques and electrophysiological methods and dielectric measurements.

Textbooks

No set texts.

1.163
Astrophysics   S1 L1½T½

Prerequisite: 1.022. Excluded: 1.113D.

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. Normal galaxies, radio galaxies. The solar atmosphere.

Textbook

Taylor R. J. *The Stars — Their Structure and Evolution* Wykeham Science Series

1.173
Conceptual Framework of Physics   S2 L2T1

Prerequisites: 1.012, 1.022. Co-requisites: 1.013, 1.023. Excluded: 1.143D.

Physics and metaphysics, the place of speculation in theory formation.

Sciences

Space and time, coordinate systems, nature of time. Fundamental physical phenomena, electrical, gravitational, inertial, nuclear phenomena, entropy and probability.

Field theory, formulation, action at a distance, propagation, energy. Relativity, postulates, simultaneity, limiting speeds, mass energy. Relationship between micro and macrocosmos, statistics, entropy and information, arrow of time.

Matter and anti-matter and energy, conservation laws, inertial mass, field energy.

Quantum processes, granularity, measurements and uncertainty principle, determinism versus indeterminism, nuclear phenomena.

Textbooks

No set texts.

1.313
Physics of Materials S2 L2T4 or F L1 T2

Prerequisite: 1.023. Excluded: 31.113A.

Properties of technically important materials related to their structure. Review of atomic and electronic structures of crystalline materials. Electrons and holes in semiconductors. Structure of alloys, polymers, ceramics, glasses and liquids. The properties and significance of structural defects — point, line and surface. Solid-state devices. Photoconductivity. Optical absorption. Luminescence. Dielectric and magnetic phenomena. Phase changes and crystal growth. Elastic and anelastic behaviour. Diffusion. Strength and fracture. Adhesion. Friction and lubrication.

Textbooks

Adler R. B. Smith A. C. & Longine R. L. *Introduction to Semiconductor Physics* Wiley

Jastrzebski Z. D. *The Nature and Properties of Engineering Materials* Wiley

1.323
Physics of Measurement S1 L2T4

Prerequisite: 1.032. Excluded: 31.113B.

Basic considerations of resolution, accuracy and sensitivity of measuring instruments. Errors of observation and their treatment. Data handling and use of computers. Electrical transducers for mechanical, optical, thermal and fluid measurements, etc. Electrical measurements. Dynamics of measurement, servomechanisms, control systems. Digital electronic instruments. Photometry and optical measurements. Noise limitations. Measurements under adverse and extreme conditions.

Textbooks

Blatt J. M. *Introduction to Fortran IV Programming* Goodyear
Doebelin E. O. *Measurements Systems — Application & Design* McGraw-Hill

1.333
Applications of Radiation S2 L2T4

Co-requisite: 1.033. Excluded: 31.113C.

The present and potential uses of electro-magnetic radiation over the whole spectrum are studied. Applications of acoustic radiation.

Microscopy, interferometry and optical spectroscopy. Applications of thermal radiation, microwaves, radio waves, polarized light and lasers. Holography. X-ray spectroscopy, diffractometry and radiography. Special radiation sources and detectors.

Textbooks

No set texts.

1.513
Plasma and Laser Physics S2 L3T1

Prerequisites: 1.012, 1.022.

Experimental and theoretical problems in plasma physics. Plasma waves, magnetohydrodynamics, magnetic confinement of plasmas for nuclear fusion, laboratory, extraterrestrial and chemical plasmas. Theory of lasers; lasers of various types and properties. Interaction of high intensity lasers with plasmas; experiments and theory of plasma properties and nonlinear effects, absorption, self-focusing. Laser compressed nuclear reaction plasmas, relativistic effects, pair production.

Textbooks

No set texts.

1.523
Relativity and Electromagnetism S1 L3T1

Prerequisites: 1.012, 1.022, 10.211A, 10.111A, 10.111B.

Scalars and vectors in non-Cartesian frames. Principle of relativity and signal propagation. Space-time. Four vectors. Mass-energy. Four-momentum. Electromagnetic field equations. Gauges. Wave equation. Solutions. Introduction to tensors. Field tensor. Stress tensor. Four-momentum of free field. Moving charges. Electromagnetic mass.

Textbooks

No set texts.

1.913
Marine Acoustic and Seismic Methods
(Oceanography Unit) F L2T1

Component given by School of Physics (S1):

Wave Theory: General wave equation for fluids, viscoelastic media and solids. Travelling and standing wave solutions. *Wave Guides:* Fluid and solid waveguides, ray and mode theories. *Sound Transmission in the Ocean:* Applications of reflection and refraction theory, scattering and diffraction effects. *Experiments relating to the above:* Including fluid waveguide, solid waveguide, measurement of absorption and reflection coefficients.

Component given by School of Applied Geology (S2):

Ray Theory Interpretation and Applications: Seismic refraction methods, seismic reflection methods, computational methods. *Instrumentation and Processing:* Seismic and acoustic sources, recording systems, signal processing. *Geological and Physical Interpretation. Practical work relating to the above:* Instrumentation, recording and interpretation of field data.

Textbook

Kinsler L. E. & Frey A. R. *Fundamentals of Acoustics* 2nd ed Wiley
or
Tucker D. G. & Gazey B. K. *Applied Underwater Acoustics* Pergamon

150

1.113A
Wave Mechanics†   S1 L2½T3½

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

Textbooks

No set texts.

1.113D
Astrophysics and
Nuclear Physics†   S2 L2½T3½

The observational environment, optical astronomy, radio astronomy, X-ray astronomy, stellar evolution, radio sources, the sun.

Detecting instruments and accelerators for nuclear particles, Rutherford scattering, nuclear atom, neutrino, radioactive processes, nuclear reactions, angular distributions, mesons, baryons, excited nuclear states.

Textbook

Tayler R. J. *The Stars: Their Structure and Evolution* Wykeham Sci Series.

Higher Physics Level III Units

1.123A
Quantum Mechanics†   S1 L2½T3½

Concepts, measurements, expectation values, wave mechanics, matrix mechanics, free particle and barrier problems, hydrogen atom, spin, exclusion principle, stationary and time dependent perturbation methods, scattering. Born approximation and partial waves.

Textbook

Gasiorowicz S. *Quantum Physics* Wiley

1.123B
Electromagnetic Theory
and Statistical Mechanics†   S1 L2½T3½

Metallic boundary conditions, eigenfunctions and eigenvalues, cavities, wave guides, scattering by a conductor, wave equation for potentials, radiation fields, Hertz potential, dipole and multi-pole radiation, radiated energy and angular momentum.

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

Textbooks

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

1.123C
Solid State and
Nuclear Physics†   S2 L2½T3½

Crystallography, binding energy, phonons, lattice conduction, free electron gas, band theory.

Nuclear models, binding energy, nuclear forces, elementary particles, nuclear reactions, radioactive decay.

Textbooks

Burcham W. E. *Nuclear Physics, an Introduction* Longman
Kittel C. *Introduction to Solid State Physics* 4th ed Wiley

1.123D
Atomic Physics and
Spectroscopy†   S2 L2½T3½

Collision parameters, transport coefficients, potential functions, atomic collisions, scattering of heavy particles, scattering of electrons, avalanche formation, recombination, radiation processes, stimulated emission, detectors.

Spectrum of hydrogen, fine structure, electron spin, vector treatment of spectroscopy, emission and absorption of radiation, diatomic molecules.

Textbook

McDaniel E. W. *Collision Processes in Ionised Gases* Wiley

1.104
Physics IV (Honours)

Comprises the units 1.114, 1.124, 1.134, 1.144, 1.154. Students doing the normal honours course should enrol in the single subject 1.104 only. Students taking only a part of the honours course should enrol in the desired unit numbers.

1.114
Quantum Mechanics   S1 L2T0

Time dependent perturbation theory, semi-classical radiation theory, selection rules. Relativistic wave equations, Dirac equation, spin, the hydrogen atom, negative energy solutions. Scattering theory, Born approximation, partial waves, phase shifts, optical theorem, resonances, scattering matrix, inelastic scattering, distorted wave and close coupling approximations.

Textbooks

No set texts.

1.124
Statistical Mechanics   F L1T0

Basic theory, fluctuations, quantum gases, equations of state for bosons and fermions. Bose condensation, quantum mechanical ensemble theory, density matrix, classical cluster expansion, virial

† Not available to students unless completing a set of Physics Level III units. For details of arrangements consult the School of Physics.

expansion Debye-Huckel theory, theory of phase transitions, critical exponents Ising model, liquid helium, Boltzmann equation, H theorem, Brownian motion, fluctuation — dissipation theorem, Onsager relations.

Textbook

Pathria R. K. *Statistical Mechanics* Pergamon

1.134
Solid State Physics   F L1T0

Bond theory of solids, NFE and tight binding approximations, electron and hole dynamics, Fermi surface studies, theory of semiconductors, impurity statistics, transport properties.

Magnetism, ionic moments, crystal field effects, Stevens operations, quenching, molecular field theory, Curie-Weiss law, exchange in metals and insulators, domains, magnetic bubbles, applications.

Textbooks

Kittel C. *Introduction to Solid State Physics* Wiley

Morrish A. H. *The Physical Principles of Magnetism* Wiley

1.144
Atomic Physics and
Nuclear Physics   S2 L2T0

Simple spectra fine structure, Zeeman effect. Complex Spectra — electrostatic and magnetic interactions, multiplets, coupling schemes, X-ray spectra — structure of X-ray levels, X-ray line spectra. Configuration interaction.

2 nucleon systems, deuteron, (np) and (pp) scattering, complex nuclei, nuclear reactions, Breit-Wigner theory, optical model, theory of α, β decay.

Textbooks

To be advised.

1.154
Projects   F

1.304
Applied Physics IV (Honours)

Comprises the units 1.314, 1.324, 1.334, 1.344, 1.354. Students doing the normal honours course should enrol in the single subject 1.304 only. Students taking only part of the honours course should enrol in the desired unit numbers.

1.314
Advanced Physics
of Materials   S1 L2T4

An advanced subject on the relation of structure of materials to their physical properties.

Solid surfaces, adhesion, static, dynamic and rolling friction. Revision of ideal liquids. Dispersed systems; sols, colloids, emulsions, gels.

Viscosity, elasticity and network formation. Foams, stability and structure. Electrical properties of plastics. Dielectric properties, conductivity and breakdown. Polymers, viscoelasticity dynamic properties, rubber/ textile composites. Rheological properties in manufacturing. Dislocation structures, properties and interactions. Thermal and radiation hardening and damage. Oxidation and corrosion mechanisms and kinetics. Electro-plating, polishing and machining. Surface strengthening and protection. Fibre and particle composites; structure, strengthening mechanisms, properties and manufacture.

Textbooks

No set texts.

1.324
Advanced Physical Instruments   S1 L1T5

The basic principles, the techniques employed, and the modes of operation of advanced physical instruments in the following fields: electron beam examination, spectroscopic analysis, chromatography, thermal analysis and mechanical testing.

Textbooks

No set texts.

1.334
Introduction to
Industrial Practice   F L1T2

Lectures, each followed by a tutorial discussion covering: patents and the scientist; applied physics in electric power engineering; the emergence of electronic technology in Australia; reliability engineering in industry; sources of information for Australian industry; industrial technical reporting; operations research, systems research and budgeting of resources; the work of a physicist in the electronics industry; quality assurance; functions of an applications laboratory; economics of industrial R&D; critical-path analysis and network planning; the physicist in the mining industry.

Textbooks

No set texts.

1.344
Special Studies

Consult the Department of Applied Physics for details.

1.354
Projects   F

1.504
Theoretical Physics IV (Honours)

Comprises the units 1.114, 1.124, 1.544 and two of 1.134, 1.144, 1.514, 1.524, 1.534. Students doing the normal honours course should enrol in the single subject 1.504 only. Students taking only part of the honours course should enrol in the desired unit numbers.

1.514
Plasma Theory   S1 L2

Magnetohydrodynamics, Euler equations, Schluter equations, Liouville equations, kinetic theory, macroscopic equations. Plasma frequency, Alfven waves, collisions, diffusion, MHD equilibria. Waves in Plasma.

Textbooks

No set texts.

1.524
Waves in
Continuous Media   S2 L2

Reflection of waves, radiation pressure and transfer of momentum; Goos-Haenchen effect. Unsolved problems. Propogation in inhomogeneous media and generation of nonlinear forces. Application to plasmas: absorption, dynamics, parametric instabilities. Momentum in dielectrics.

Textbooks

No set texts.

1.534
Quantum Theory
of Solids   S2 L2

Energy band theory, pseudopotentials, Wannier functions, plasmons, lattice dynamics, phonons, anharmonic effects, quantum solids, light scattering, polaritons, electron-phonon interaction, polarons, exchange interaction, Heisenberg model magnons, local moments, Kondo effect, magnon-phonon interaction, superconductivity, BSC theory, Josephson effect.

Textbook

Harrison W. A. Solid State Theory McGraw-Hill

1.544
Projects   F

Graduate Study

Not all graduate subjects are necessarily offered in any one year.

1.115G
Critical Literature Review

For MPhysics students.

1.125G
Research Project

For MPhysics students.

1.135G
Atomic Physics

For MPhysics students.

Ionization of gases. electron scattering, impact ionization, ion sources, atomic spectroscopy.

1.145G
Biophysics

For MPhysics students.

NMR studies of ions in living systems, thermodynamics of irreversible processes applied to ion accumulation and membrane potentials, electrical properties of membranes, nerve excitation, feedback systems in man.

1.155G
Crystallography

For MPhysics students.

Diffraction and lattice dynamics, improved methods of structure determination, X-ray and neutron diffraction.

1.165G
Solid State Transport

For MPhysics students.

Thermogalvanomagnetic effects in semiconductors, lattice conductivity, high field transport in insulators. electrical breakdown, effects of defects and dislocations on diffusion.

1.175G
Magnetic Materials

For MPhysics students.

Ferromagnetic properties of rare-earth and transition-metal alloys, high field magnetization, electron spin resonance, magnetic properties of transition-metal oxides, phase transitions, magnetic minerals.

1.185G
Surface Physics

For MPhysics students.

Surface properties of semiconductors and metals, low-and-high energy electron diffraction from surfaces, EPR and Auger spectroscopy applied to surfaces, surface mating, surface barriers.

1.195G
Materials Irradiation

For MPhysics students.

Interaction of energetic charged particles and photons with solids, channelling, blocking and sputtering phenomena, radiation damage, strength of solids, fracture propagation.

1.105G
Acoustics

For MPhysics students.

Acoustic waves in solids. Effects of radiation-induced defects on ultrasonic propagation, internal friction, acoustic spectroscopy, propagation in heterogeneous media, transients.

1.917G
Vibration and Wave Theory I   S1 L2T1

For MSc(Acoustics) students.

Simple oscillator, damped oscillator, ordinary differential equations, complex numbers, forced vibrations and resonance, coupled oscillators. Plane waves, interference and diffraction.

1.927G
Acoustic Theory   S2 L1½T½

For MSc(Acoustics) students.

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.

1.937G
Acoustic Measuring Systems   S1 L1T0

For MSc(Acoustics) students.

Microphones, amplifiers, loudspeakers, filters, recorders, pick-ups, noise generators. Acoustic measuring instruments.

1.947G
Advanced Physical Acoustics
(Elective)   S1 L3T1

For MSc(Acoustics) students.

Vibrating systems; coupled oscillators, beams, membranes, plates, resonators, acoustic filters; analogs, analogue computer simulation of vibrating systems; transfer of energy from one system to another. Reflection and transmission at walls, rigid walls, flexible walls, multiple walls, impulsive excitation. Sound absorbers; porous absorbers, perforated panel absorbers, sonic and ultrasonic measurement techniques, relation to properties of materials.

1.957G
Acoustic Laboratory and Analysis   S1 L1T2

For MSc(Acoustics) students.

Practical experiments related to the subject matter of 1.927G Acoustic Theory.

Theory and practice of digital methods of analysis in the time and frequency domains.

1.967G
Vibration and Wave Theory II   S2 L2½T½

For MSc(Acoustics) students.

Fourier analysis, guided waves, electrical analogs, analysis of networks. Statistical distributions, probability, noise, correlation, sampling and digital procedures.

1.977G
Electro-Acoustics   S2 L1T0

For MSc(Acoustics) students.

Sound reinforcement systems; ambiophony; assisted resonance. Special requirements for translation; language laboratories.

1.118G
Methods of Theoretical Physics

For PhD, MSc and MPhysics students.

Part 1. Response functions and Green's functions.

Part 2. Symmetry and group theory.

Part 3. Many particle systems.

Part 4. Tensor calculus and variational techniques.

1.128G
Methods of Experimental Physics

For PhD, MSc and MPhysics students.

Part 1. General Methods: Signal processing, characterization of specimens, vacuum, high temperatures, low temperatures.

Part 2. Non-Specific Techniques: Thermal diffusion and electro-diffusion, electrical transport in solids, thermal conductivity, ultrasonic properties, specific heat, static magnetic measurements.

Part 3. Advanced Techniques: Spectroscopic methods, diffraction and scattering methods.

Not all these topics are covered in any one year.

1.119G
Basic Solid State Physics   S1 L2T0

For GradDip in Current Science students.

Crystals. Crystal structures and their determination. Binding. Elasticity. Phonons and thermal properties of solids. Defects and dislocations. Electron theory of metals. Free electron theories. Energy bands. Semiconductors. Bulk and junction properties. Optical properties. Magnetism and dielectric phenomena. Diamagnetism, paramagnetism and ferromagnetism. Magnetic resonance. Dielectrics and ferroelectrics. Superconductivity. Phenomenological and microscopic theories. Type I and type II superconductivity.

1.129G
Solid State Device Physics   S2 L2T0

For GradDip in Current Science students.

Semiconductor diodes and transistors. Power diodes. High frequency diodes. Tunnel diodes. Backward diodes. Varactors. High frequency transistors. Thyristors. Microelectronics. Semiconductor transport devices. Thermistors. Hall and magnetoresistance devices. Thermoelectric and thermomagnetic energy convertors. Acoustoelectric effect. Gunn effect. Photo-devices. Photoconductors for visible and infrared radiation. Photovoltaic cells. Electroluminescence. Semiconductor lasers. Magnetic and dielectric devices. Microwave ferrites. Magnetic memories. Applications of ferroelectricity. Piezoelectric devices. Superconducting devices. Superconducting electronic devices. High-field superconductors. Tunnelling devices.

1.139G
Biophysics   S2 L2T1

For GradDip in Current Science students.

Thermodynamic equilibrium. Relationships between thermodynamic variables, chemical potential. Diffusion in the steady state. Diffusion through membranes. Desalination techniques. Diffusion of electrolytes through membranes, Nernst, Planck and modern developments in bioelectric potentials. Excitability and the nerve impulse. Fixed charge systems in living cells. The Donnan equilibrium.

1.149G
Physical and Applied Acoustics   S1 L2T1

For GradDip in Current Science students.

Physical acoustics: ultrasonic measurement techniques, resonance methods, pulse-echo methods, optical diffraction and Brillouin scattering methods. Ultrasonic waves in solids, determination of elastic constants, internal friction due to viscoelastic and thermoelastic effects, dislocation damping, effects of deformation and radiation, acoustic emission, ultrasonic holography. Surface waves on crystals, propagation conditions, generation and detection, acoustic amplification in piezoelectric semiconductors. Sound waves and their properties, subjective acoustics, auditory response, audiology and deafness, articulation and intelligibility, loudness, speech and interference, critical band marking, damage risk criteria, impulsive noise conservation and compensation. Noise reduction: measurement and analysis, noise sources and their characteristics, material and systems—absorption and transmission loss, room acoustics, barriers and enclosures, noise control.

1.319G
Measurement and Data-handling   SS L1T2

For GradDip in Current Science students.

Electrical measurement techniques, ranging from DC to UHF. Transducers for conversion of measures of various physical quantities to electrical form. Noise in circuits. Digital instruments. Errors of observation and their treatment by statistical methods, using computers and desk calculators. Problems of measurement under adverse conditions.

1.329G
Physics of Strong Materials   SS L1T2

For GradDip in Current Science students.

Revision of bonding and structures in crystalline and non-crystalline solids; elastic and plastic properties. Ideal and real strength of solids; cracks in brittle and ductile materials. Strengthening of metallic and polymeric materials. Natural and synthetic fibrous composites and aggregates.

1.519G
Laser Physics and Applications   SS L2T0

For GradDip in Current Science students.

After reviewing some results of laser properties, technology and applications, the physical principles for lasers and basic concepts of quantum theory and optics are presented. Description of lasers: solid-state, liquid, gas, dye, chemical, semiconductor (junction lasers and electron beam excited lasers) from far infrared to X-rays and γ-rays, and present status of achieved results.

Chemistry

Students wishing to take 8 or more Level III Chemistry units are required to transfer to the Pure and Applied Chemistry Course (391) before the commencement of Year 2. If Year 2 studied in the Science and Mathematics course is similar to Year 2 of Course 391, the transfer may still be made before the commencement of Year 3.

The Pure and Applied Chemistry Course which enables specialization in Chemistry is described in detail earlier in this handbook.

Undergraduate Study

2.111
Introductory Chemistry†   S1 L2T4

Classification of matter and the language of chemistry. The gas laws and the Ideal Gas Equation, gas mixtures and partial pressure. The structure of atoms, cations and anions, chemical bonding, properties of ionic and covalent compounds. The Periodic classification of elements, oxides, hydrides, halides of selected elements. Acids, bases, salts, neutralisation. Stoichiometry, the mole concept. Electron transfer reactions. Qualitative treatment of reversibility and chemical equilibrium, the pH scale. Introduction to the diversity of carbon compounds.

Textbooks
Aylward G. A. & Findlay T. J. V. *SI Chemical Data* Wiley
Laboratory Manual, Chemistry 2.111, 2.121 and 2.131 UNSW
Mahan B. H. *University Chemistry* 3rd ed Addison-Wesley

† Students who have passed 2.121 may not subsequently enrol in 2.111.

2.121
Chemistry IA   S1 or S2 L2T4

Prerequisites:

	HSC Exam Grade Required
2 unit Science (any strands)	1, 2 or 3
or	
4 unit Science (any strands)	1, 2, or 3
or	
2.111	

Stoichiometry and solution stoichiometry. The Ideal Gas Model and the kinetic theory, real gases and the van der Waals Equation. Liquids and liquid-vapour equilibrium. Solids. packing of spheres, solid-liquid-vapour equilibria. Thermochemistry, internal energy and enthalpy changes. Homogeneous and heterogeneous equilibria, equilibrium constants, probability and change, entropy changes, free energy changes, the relationship between equilibrium and standard free energy changes. Ideal solutions, colligative properties. Equilibrium in electrolyte solutions, strengths of acids and bases. acid-base equilibria, buffers, solubility equilibria. Redox equilibria and electrochemical cells, standard electrode potentials.

Textbooks

As for 2.111 Introductory Chemistry.

2.131
Chemistry IB   S1 or S2 L2T4

Prerequisite: 2.111 or 2.121.

The rate of a chemical change and chemical kinetics, catalysis, order and molecularity, activation energy, the Arrhenius Equation, reaction mechanism. Electronic structure of atoms in terms of the quantum mechanical model. Structure of the Periodic Table and its relationship to electronic configuration. Chemical bonding, hybridization, molecular shape, multiple bonding, bond polarity, intermolecular forces. Properties of compounds of selected elements, acid-base character of oxides and hydroxy compounds, relative stability of oxidation states. Chemistry of carbon compounds, stereoisomerism reactions of aliphatic and aromatic hydrocarbons, alcohols, phenols, ethers, alkyl halides, aldehydes, ketones, carboxylic acids and their derivatives, esters, acyl halides, anhydrides, amides, amines.

Textbooks

As for 2.111 Introductory Chemistry.

plus

De Puy C. H. & Rinehart K. L. *Introduction to Organic Chemistry* 2nd ed Wiley

2.002A
Physical Chemistry   L3T3

Prerequisites: 2.121 and 10.011 or 10.001 or 10.021.

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.

Textbooks

Barrow G. M. *Physical Chemistry* 3rd ed McGraw-Hill

Shaw D. J. *Introduction to Colloid and Surface Chemistry* 2nd ed Butterworths

2.002B
Organic Chemistry   L3T3

Prerequisite: 2.131

Chemistry of the more important functional groups; aliphatic hydrocarbons, monocyclic aromatic hydrocarbons, halides, alcohols, phenols, aldehydes, ketones, ethers, carboxylic acids and their derivatives, nitro compounds, amines and sulphonic acids.

Textbooks

Morrison R. T. & Boyd R. N. *Organic Chemistry* 3rd ed IntStudEd Allyn & Bacon

or

Solomons T. W. G. *Organic Chemistry* Wiley Int Ed

Only if proceeding to further study of Organic Chemistry:
Vogel A. I. *Elementary Practical Organic Chemistry* Pt II *Qualitative Organic Analysis* Longman

2.002D
Analytical Chemistry   L2T4

Prerequisites: 2.121, 2.131, 10.001, 10.011 or 10.021.

Chemical equilibria in analytical chemistry. Acid-base, complex formation, redox systems, solid/solution, and liquid/liquid equilibria with applications to volumetric, gravimetric and complexometric analysis, and to liquid/liquid extractions. Spectrophotometry, basic principles. Chromophores. Fundamentals of precision. Electrochemistry, theory and applications to electrodeposition and potentiometry; ion selective electrodes. Radioactive tracer techniques. Data evaluation in analytical chemistry. Qualitative analysis.

Textbooks

Ewing G. W. *Instrumental Methods of Chemical Analysis* 4th ed McGraw-Hill

Peters D. G., Hayes J. M. & Hieftje G. M. *Chemical Separations and Measurements* Saunders

2.042C
Inorganic Chemistry   L2T4

Prerequisites: 2.121, 2.131.

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

Textbook

Cotton F. A. & Wilkinson G. *Basic Inorganic Chemistry* Wiley

2.003E
Nuclear and Radiation Chemistry　　L2T4

Prerequisites: 2.121, 2.131 and 10.001, 10.011 or 10.021.

Fundamental particles, nuclear structure and properties. Nuclear transformations. Properties of nuclear radiations. Interaction of radiation with matter. Detection and measurement of nuclear radiations. Nuclear pulse spectrometry. Nuclear instrumentation. Radiation chemistry: primary and secondary processes in the absorption of ionizing radiation in gases, liquids and solids. Free radical detection and reactions. Technological applications and techniques. Preparation of radionuclides in high energy machines and nuclear reactors. Radiochemical techniques. Handling precautions. Chemistry of nuclear transformations. Chemistry of reactor fuel cycles. Applications of radionuclides in chemistry, biology and industry.

Textbooks

Carswell D. J. *Introduction to Nuclear Chemistry* Elsevier

or

Friedlander G., Kennedy J. & Miller J. M. *Nuclear and Radiochemistry* 2nd ed Wiley

or

Harvey B. *Introduction to Nuclear Physics and Chemistry* Prentice-Hall

2.003H
Molecular Spectroscopy
and Structure　　S2 L3T3

Prerequisite: 2.121, 2.131.

Absorption and emission of radiation. Atomic spectra. Molecular spectroscopy: vibrational, including infrared and Raman; UV-visible; instrumentation and sample handling. Magnetic resonance. Mass spectrometry with particular reference to structure determination. Laboratory and tutorial work to illustrate the above, including inspection of major instruments.

Textbook

Silverstein R. M., Bassier C. G. & Morrill T. C. *Spectrometric Identification of Organic Compounds* 3rd ed Wiley

2.003J　　L2T4
Fundamentals of Biological Chemistry

Prerequisites: 2.121, 2.131. Excluded: 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.

Textbooks

Acheson R. M. *Introduction to the Chemistry of Heterocyclic Compounds* Interscience

Barker R. *Organic Chemistry of Biological Compounds* Prentice-Hall

2.003K
Solid State Chemistry　　L2T4

Prerequisites: 2.121, 2.131 and 10.001 or 10.011.

The determination of crystal structures by single crystal diffraction: X-ray and neutron diffraction methods. Practical and automated aspects of the solution of crystal structures: applications to inorganic, molecular and macromolecular crystals. Patterns of solid state structure: the structures of crystals with unusual and valuable chemical and physical properties. Solid state reactions, surface properties and catalysis. Applications of EPR, NMR and mass spectrometry.

Textbooks

Bond G. C. *Catalysis by Metals* Academic

Greenwood N. N. *Ionic Crystals, Lattice Defects and Non-stoichiometry* Butterworths

Stout G. H. & Jensen L. H. *X-Ray Structure Determination* Macmillan

2.013A
Introductory Quantum Chemistry　　L2T4

Prerequisites: 1.001 or 1.011, 2.121, 2.131 and 10.001, 10.011 or 10.021.

Quantum mechanical concepts. Particle in a box. Rotational and vibrational motions — spectra. The hydrogen atom. Angular momentum. Many electron atoms; effects of electron spin; atomic spectra. Molecular spectroscopy and valence: electronic structure and spectra of molecules. The Frank-Condon principle. Delocalization; Huckel M. O. theory. Ligand field theory. Photoelectron spectroscopy. Magnetic resonance: basic principles and experimental techniques; spin density effects in ESR spectra; theory of nuclear shielding and spin-spin coupling; relaxation processes.

Textbooks

Barrow G. M. *Physical Chemistry* 3rd ed McGraw-Hill

Dixon R. N. *Spectroscopy and Structure* Methuen

2.003A
Physical Chemistry　　L3T3

Prerequisite: 2.002A.

Thermodynamics, including non-ideal systems; advanced electrochemistry; statistical thermodynamics; applications to gases, liquids and chemical equilibria; states of matter.

Textbook

Barrow G. M. *Physical Chemistry* 3rd ed McGraw-Hill

2.003B
Organic Chemistry   L2T4

Prerequisite: 2.002B

Alicyclic Chemistry. Stereochemistry of acyclic systems; classical and
non-classical strain in cyclic systems; stereochemistry and confor-
mation of monocyclic and polycyclic compounds; synthesis. reactions
and rearrangement of monocyclic compounds including
stereochemical selectivity; transannular reactions in medium rings.
Synthesis and reactions of fused and bridged polycyclic systems.

Heterocyclic Chemistry. Synthesis and reactions of the following
heteroaromatic systems; pyridine. quinoline, isoquinoline. Flavones
and isoflavones; pyrimidine; pyrrole. furan, thiophen. Indole,
imidazole.

Textbooks

Morrison R. T. & Boyd R. N. *Organic Chemistry* 3rd ed IntStud Ed Allyn
& Bacon
or
Roberts J. D. & Caserio M. C. *Basic Principles of Organic Chemistry*
Benjamin

Joule J. A. & Smith G. F. *Heterocyclic Chemistry* Van Nostrand
Reinhold

McQuillin F. J. *Alicyclic Chemistry* CUP

Vogel A. I. *Elementary Practical Organic Chemistry* Pt II *Qualitative
Organic Analysis* Longman

Whittaker D. *Stereochemistry and Mechanism* Clarendon

2.003C
Inorganic Chemistry   L2T4

Prerequisite: 2.042C.

Coordination chemistry: valence bond and crystal bond and crystal field
theory and their application to magnetic and spectral properties of
complexes. Factors affecting the stability of complexes: unusual oxi-
dation states of transition metals. Chemistry of the groups IIIA (the
lanthanides and actinides). IVA, VA, VIA and VIIA. More advanced
chemistry of groups IIIB. IVB. VB. VIB and VIIB and the noble gases.

Textbook

Cotton F. A. & Wilkinson G. *Advanced Inorganic Chemistry* 3rd ed
Wiley

2.003D
Instrumental Analysis   L2T4

Prerequisites: 2.002A and 2.002D.

Selected spectrophotometric methods of analysis: infrared, emission,
flame. precision spectroscopy, spectrofluorimetry. X-ray fluorescence,
mass spectroscopy. Instrumental chromatography. thermal analysis.
Electrochemical and kinetic methods. Introduction to automation and
data processing.

Textbook

Ewing G. W. *Instrumental Methods of Chemical Analysis* 4th ed
McGraw-Hill

2.003L
Applied Organic Chemistry   L1T2

Prerequisite: 2.002B. Excluded: 2.033L.

Discussion at advanced level of the chemistry of selected commercially
important groups of organic materials. Mechanisms of reaction and
physical properties, together with methods of examination, in overall
unit approach, correlating structure with behaviour. Emphasis on
breakdown to model systems.

Theory of physical techniques. refractometry, polarimetry etc. from
basis of additivity. Fatty acids with emphasis on unsaturation, thermal
and oxidative polymerizations. alkyl resins, analysis of mixtures. Waxes
and sterols; selected natural and synthetic macromolecules;
polymerization processes, including treatment of initiators, chain trans-
fer agents, retarders. Vulcanization and sulphur-olefin reactions.
Photochemical processes; electro-organic chemistry. Fine chemicals,
soaps and detergents. Aspects of metal catalysis in industry.

Textbooks

No set texts. A list of reference books is provided by the School.

2.003M
Organometallic Chemistry   L2T4

Prerequisite: 2.002B.

Synthesis, structure and reactions of metal alkyls and aryls; metal car-
bonyls. isonitriles and acetylides; compounds of metals with unsatu-
rated hydrocarbons; organic chemistry of boron, silicon, phosphorus
and arsenic; application of organometallic compounds in organic syn-
thesis and homogeneous catalysis.

Textbooks

Coates G. E., Green M. L. H., Powell P. & Wade K. *Principles of
Organometallic Chemistry* Methuen

Pauson P. *Organometallic Chemistry* Arnold

Swan J. M. & Black D. St. C. *Organometallics in Organic Synthesis*
Chapman & Hall

2.013B
Synthetic Organic Chemistry   L2T4

Prerequisite: 2.003B.

Introduction, aims, stereochemical and positional problems, recog-
nition of sub-units. Modern functional group transformations with
particular reference to positional and stereochemical control. Spectro-
scopic markers. Electrocyclic reactions, formation, contraction and
expansion of rings, Diels-Alder and related cycloadditions, photo-
chemistry, Woodward-Hoffman rules, protecting groups. Represen-
tative syntheses of compounds of theoretical and biological interest, eg
cubane, Dewar benzene, caryophyllene, reserpine, corrins.

Textbook

Carruthers W. *Some Modern Methods of Organic Syntheses* CUP.

2.013C
Advanced Inorganic Chemistry   L2T4

Prerequisite: 2.042C. Co-requisite: 2.003C.

Reaction mechanisms involving metal complexes. Spectroscopic methods for investigating metal complexes, including infrared, electronic, and Mössbauer spectroscopy. Inorganic crystal chemistry: structures and properties of simple compounds. Cluster compounds, metal-metal bonding, extended electronic interactions. π-Complexes, carbonyls, nitrosyls, ethylene complexes, and sandwich-type compounds; methods of preparation, reactions, evidence for structures and type of bonding involved.

Textbook

Cotton F. A. & Wilkinson G. *Advanced Inorganic Chemistry* 3rd ed Wiley

2.013D
Advanced Analytical Chemistry   L2T4

Prerequisite: 2.002D. Co-requisite: 2.003D.

Sampling of biological, environmental and industrial materials. Preparation for analysis. Approaches to analysis of gases, waters, soils and geological materials, plants and biological materials, ceramics, ferrous and non-ferrous metals and alloys. Chemical microscopy.

Textbooks

Ewing G. W. *Instrumental Methods of Chemical Analysis* 4th ed McGraw-Hill

Kolthoff I. M., Sandell E. B., Meehan E. J. & Bruckenstein S. *Quantitative Chemical Analysis* Macmillan

2.013L
Chemistry and Enzymology of Foods   L1T2

Prerequisite: 2.002B. Excluded: 2.043L, 2.023L, 2.053L.

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

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

Textbooks

No set texts. A list of reference books is provided by the School.

2.013M
Thermochemistry   L2T4

Prerequisite: 2.002A.

Thermochemistry of metal complex and organometallic reactions: Dissociation of molecules and bond energies; solvation of ions and molecules; reactions in non-aqueous solution; substitution reactions; Lewis acid-base reactions; formation of inorganic polymers. Energy induced reactions. Mechanism of inorganic substitution, electron-transfer and free-radical reactions; reactions of coordinated ligands; template synthesis; porphyrin complexes.

Textbook

Benson D. *Mechanisms of Inorganic Reactions in Solution* McGraw-Hill

2.023A
Chemical Physics   L4T1

Prerequisites: 2.002A, 10.211A.

Wave mechanics — linear operators: Schrödinger wave equation, applications, methods of solution; variation principle, linear combinations, perturbation theory. Many-electron problems — central field method; electron spin; Fermi-Dirac statistics; angular momentum operators; Coulomb repulsion two-electron operator; spin-orbit coupling; Russell-Saunders and jj coupling; Zeeman effect: vector coupling and Wigner coefficients; allowed transitions. Group theory — symmetry operations; matrix representation; irreducible representation; characters of a group; non-rigid molecules; antisymmetry operators.

Textbook

Golding R. M. *Applied Wave Mechanics* Van Nostrand

2.023B
Natural Product Chemistry   L2T4

Prerequisite: 2.003B.

The isolation, structure determination, synthesis and biosynthesis, and the reactions of selected classes of organic compounds of biological significance. The chemistry of plant and animal products — terrestrial and marine. Examples from carbohydrates, terpenoids and steroids, alkaloids and other naturally-occurring heterocyclic systems. Interdisciplinary aspects of the topic.

Textbook

Tedder J. M., Nechevatal A., Murray A. W. & Carnduff J. *Basic Organic Chemistry* Part IV Wiley

2.023L
Biological and Agricultural Chemistry   L1T2

Prerequisite: 2.002B. Excluded: 2.053L, 2.013L, 2.043L.

Water supplies, bore water, methods of examination and assessment. Origin of plant constituents of importance to food industries. Oxygen and nitrogen heterocyclic chemistry as required for natural pigments, phenolics, tannins, methods of estimation. Photochemical processes. Toxic and nontoxic constituents, alkaloids, enzyme inhibitions, preparation, assessment and active site concepts.

Animal feeds, fodders, silage formation. Soil and plant nutrients. Fractionations of carbohydrates, proteins. Structure and glyceride fractionation of fats.

Agricultural chemicals, feed additives. Insecticides, pesticides, natural and synthetic. Fungicides, herbicides and plant growth hormones. Synthesis formulation, stability and degradation processes. Extensions in vitamin chemistry. Trace metals in plant and animal metabolites.

Textbooks

No set texts. A list of reference books is provided by the School.

2.033A
Physical Chemistry of
Macromolecules   L2T4

Prerequisites: 1.012 or 2.002A and 2.002B or 2.003J.

Macromolecules in solution; determination of molecular size; gel permeation chromatography, diffusion, sedimentation, viscometry, osmometry and light scattering. Spectroscopic properties: circular dichroism and optical rotary dispersion; conformation of macromolecules in solution; helix-random coil transitions. Macromolecules in the solid state; X-ray diffraction; basic structural features.

Textbook

Van Holde K. E. *Physical Biochemistry* Prentice-Hall

2.033L
Applied Organic Chemistry‡   F L2T4

Prerequisite: 2.002B. Excluded: 2.003L.

As for 2.003L but in greater detail and depth.

Textbooks

No set texts. A list of reference books is provided by the School.

2.043A
Environmental Chemistry   L3T3

Prerequisites: 2.002A, 2.002D.

Physico-chemical aspects of atmosphere chemistry: dispersion of colloids and solid matter, photochemical reactions. Hydrological cycle: reactions in the sea, rivers and estuaries; chemical characteristics of surface and sub-surface waters. Corrosion of metals.

plus

either*:
Simple digital and analogue computer models of ecological systems based on chemical data and physico-chemical properties.

or
Distribution of elements and nutrient cycles in water; organic carbon cycles, oxygen balance (redox processes in aquatic systems). Chemical models of these processes (including an introduction to simple computing). Practical project (mostly field work) dealing with nutrient cycles.

Textbooks

Hamilton C. H. *Chemistry in the Environment* Freeman

plus
either:
Dickson T. R. *The Computer and Chemistry* Freeman
Schaum Outline Series *Numerical Analysis* McGraw-Hill

or:
Wallace S. B. *Chemical Oceanography* Harcourt, Brace, Jovanovich

2.043L
Chemistry and
Enzymology of Foods‡   F L2T4

Prerequisite: 2.002B. Excluded: 2.013L, 2.023L, 2.053L.

As for 2.013L but in greater detail and depth.

Textbooks

No set texts. A list of reference books is provided by the School.

2.053A
Chemical Kinetics and
Reaction Mechanisms   L3T3

Prerequisite: 2.002A.

Basic kinetic concepts, mechanisms of elementary processes and fundamental theories of kinetics. Gas-phase systems, unimolecular and free-radical reactions. Reactions involving excited species, pyrolysis, photolysis, mass spectrometry; comparison of flash photolysis and pulse radiolysis. Reactions in solution. Surface kinetics and catalysis. Fast reactions. Applications of the above concepts to inorganic and organic reaction mechanisms.

Textbooks

Gardiner W. C. *Rates and Mechanisms of Chemical Reactions* Benjamin
Sykes P. *The Search for Organic Reaction Pathways* Longman

2.053L
Biological and
Agricultural Chemistry‡   F L2T4

Prerequisite: 2.002B. Excluded: 2.023L, 2.013L, 2.043L.

As for 2.023L but in more detail and depth.

Textbooks

No set texts. A list of reference books is provided by the School.

2.063A
Advanced Molecular Spectroscopy   L2T4

Prerequisite: 2.013A.

Theory: Born-Oppenheimer approximation; theory of transition probabilities; group theory; normal mode analysis.

Spectra: rotational, vibrational and electronic structure in molecular spectra, including microwave, infrared, Raman, UV-visible and photoelectron spectra. Kinetic spectroscopy. Lasers.

Textbook

Dixon R. N. *Spectroscopy and Structure* Methuen

* Students are given the choice of these two topics.
‡ Only one of these double units may be chosen.

Graduate Study

2.150G
The Chemistry of Natural & Synthetic High Polymers* S2 L2T4

2.153G
Recent Advances in Chemistry* F L2T4

Prerequisites and Exluded: None.

Recent advances in a number of areas of fundamental experimental and theoretical chemistry. Four topics are covered but the selection of topics may vary from year to year. Although little or no previous knowledge of a topic is assumed in its presentation, each topic is developed to allow appreciation of recent advances in the area.

The course offered is a double unit comprising approximately 14 lectures in each of the four topical sections, together with relevant experimental demonstrations and/or practical and/or project work.

In a given year, areas of chemistry from which the topics are selected include:

Molecular spectroscopic techniques
Catalysis — homogeneous and heterogeneous
Theoretical chemistry
Inorganic chemistry
Lasers in chemistry
Molecular structure determination by spectroscopy
Mass spectrometry
Synthetic organic chemistry
Chemistry of natural products
Chemical kinetics and reaction mechanisms
Isotopes in chemistry

Textbooks
No set texts.

2.154G, 2.155G, 2.156G
Advanced Analytical Chemistry and Chemical Instrumentation* Units A, B and C

2.231G and 2.242G
Food and Drugs I and II— (Including Pharmacognosy and Microscopy of Crude Drugs) F L1T3

Regarded as a unit, and may be spread over two years.

Treatment of the food section develops from considerations of proximate analysis — gross determination of classes of food components — to detailed examinations within the groups for more important compounds. Conversely the course in drug work progresses from the examination of simple materials, including identification of unknowns by macro and micro procedures to the examination of compounded materials.

A background section on food handling is included, while some attention is given to chemotherapy, etc., in the drug course.

Subject-matter covers treatment of the main classes of foodstuffs, such as:

Foods: Origin, general introduction to analytical methods, relation to likely adulterations and impurities, groups of constituents; carbohydrates, sugars, by physical and chemical methods, jams and preserves, pectin, agar, alginates, oils and fats; protein foods, meat, gelatin, fish products; dairy products, milk, cream, cheese, etc.; fermented liquids, beer, wine, spirits, minor constituents. Principles of food processing, dehydration, quick freezing, canning; cereal products; beverages and flavouring essences; nutritional aspects, vitamins in detail; preservatives and food additives; radiation chemistry of food products. *Drugs:* Elements of pharmacology chemotherapy and modes of action, galenicals, identification tests for alkaloids, etc. Analytical chemistry of analgesics, sedatives, hypnotics, steroid hormones, antihistamines, etc. Antibiotics, penicillin, streptomycin, aureomycin, sulphonamides. Activity of enzyme preparations; antiseptics and disinfectants; soaps and detergents.

Pharmacognosy and Microscopy of Crude Drugs

A graded course of 20 hours, progressing from relatively simple structures to the examination of adulterated mixtures.

Examples from the series: hairs and textile fibres of natural origin, woods, stems, leaves, and barks. Seeds, fruits, rhizomes and roots. Flowers, dried juices and gums. Reactions of cell wall and cell contents. Steps in characterization of unknown powders, adulterants of food and drug powders.

2.251G
Toxicology, Occupational and Public Health F L1T2

Important classes of toxic materials found in the environment; treatment of pesticide residues, industrial chemicals of various types, toxic gases, mould metabolites and bacterial toxins occurring in food, carcinogenic substances, toxic metals etc. Effects of these substances on living organisms, particularly man. Practical work: pesticide residue analysis, blood and urine analysis, gas sampling and analysis, trace metal determination and experiments on the animal metabolism of toxic substances.

2.271G
Chemistry and Analysis of Foods F L1T3

Illustrates the bases and application of analytical techniques as applied to foods. Emphasis is placed on the design of methods, on the preparation of material for instrumental analysis and on the interpretation of data.

Includes: proteins and flesh foods, carbohydrates and saccharine foods, fats and oils, dairy and fermentation products, vitamins, food additives — preservatives and colouring matters, pesticide residues, metal contaminants — food microscopy.

2.281G
Instrumental Techniques in Food and Drug Analysis F L1T3

Principles involved in modern instrumental techniques; detailed application and interpretation of results. UV, IR, NMR, and ESR, emission and atomic adsorption spectroscopy, polarography, X-ray methods, 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.

* Units available to students enrolled in the Graduate Diploma in Current Science course.

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 are discussed under the headings: 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 electro-chemical 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* or *Critical Literature Survey.*

Engineering

Undergraduate Study

5.010
Engineering A   SS   L4T2

Prerequisite:

	HSC Exam Grade Required
Either	
2 unit Science (incl. Physics)	*1, 2 or 3*
or	
4 unit Science (incl. Physics)	*1, 2, 3 or 4*
or	
2 unit Industrial Arts	*1, 2 or 3*
or	
3 unit Industrial Arts	*1, 2, 3 or 4*

Students who wish to enrol in this subject can make up for the lack of the prerequisite by work taken in Physics in the first half of first year.

Statics: Composition and resolution of forces. laws of equilibrium. Friction. Statics of rigid bars, pin jointed frames and beams. Simple states of stress. Statics of fluids.

Introduction to Engineering Design: Engineering method, problem identification. creative thinking, mathematical modelling. computer aided design. materials and processes. communication of ideas, the place of engineering in society.

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

Textbooks

Svensson N. L. *Introduction to Engineering Design* NSWUP
For *Statics:*
To be advised.
and
For *Introduction to Materials Science:*
Gordon J. E. *The New Science of Strong Materials. or Why You Don't Fall through the Floor* Pelican
Scientific American *Materials* Freeman

5.020
Engineering B   SS L4T2

Co-requisite: 5.010.

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

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

Textbooks

For *Statics II* and *Engineering Dynamics:*
To be advised
For *Mechanics of Solids I:*
Hall A. S. *Introduction to Mechanics of Solids* Wiley

5.030
Engineering C   SS L4T2

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

And one of the following options (determined by the course of study):

1. (Mechanical, Industrial and Aeronautical Engineering and Naval Architecture students must take this option) *Design for Manufacture I:* Approximately 30 hours of workshop training, including casting. fitting, machining, welding. Principles of design for manufacture.

2. *Production Technology:* 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.

3. *Introduction to systems and Computers:* Introduction to computers to follow the computer work in Mathematics I. To develop: A familiarity with algorithms; B the use of procedure oriented languages; and C an introduction to computing equipment.

Systems. To give students an appreciation of some of the concepts used in engineering, to relate the concepts to phenomena within their experience, and to illustrate them by case histories and engineering examples. Quantities. Concepts. Components. Systems.

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

5. (Metallurgy students must take this option) *Introduction to Metallurgical Engineering:* 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.

6. (Mining Engineering students must take this option) *Introduction to Mining Engineering:* 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.

7. (Electrical Engineering students must take this option) *Introduction to Computing:* Introduction to computer program design with emphasis on the design of correct, reliable programs. The subject is organized on a tutorial basis and a number of simple fundamental programming tasks are illustrated. Programs are written in a high level language which provides facilities for the specification of algorithms and data structure.

8. (Industrial Chemistry students must take this option) *Introduction to Chemical Technology:* Introduction to computation in chemical technology: process flow diagrams, information flow diagrams, flow charts in computer programming, developing of algorithms. Principle of operation of processors. Batch and real-time processing. Concepts of steady-state and unsteady-state simulation. Programming in Fortran IV and Real-Time Basic and of programmable calculators. Concepts of on-line data acquisition and reduction. Data processing laboratory and plant data.

9. (Ceramic Engineering students must take this option) *Introduction to Ceramic Engineering:* The nature of ceramics. Classification of materials. The materials science approach. History of ceramics. The ceramic engineer and society. The origin, classification, physical properties and uses of clay minerals and other non-clay raw materials. Principal unit operations used in the ceramic industry. Drying and firing of ceramics, melt forming, pot forming and other forming procedures.

10. (Civil Engineering students must take this option) *Introduction to Materials II:* Creep of materials. Relaxation. Fatigue. Experimental loading. Casting, annealing, normalizing. Physical and mechanical properties of polymers and elastomers including wood.

and

Introduction to Engineering Construction: All students are required to visit a nominated construction project as an integral part of the course. Introduction to engineering construction, equipment and methods. The scope of engineering construction, typical projects and decision agents.

Textbooks

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

For *Designs for Manufacture* and *Production Technology:*
De Garmo E. P. *Materials and Processes in Manufacturing* Macmillan

For *Introduction to Systems and Computers:*
Karbowiak A. E. & Huey R. M. eds *Information, Computers, Machines and Man* Wiley

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

For *Introduction to Computing:*
Wirth N. *Systematic Programming: An Introduction* Prentice-Hall

For *Introduction to Materials II:*
Gordon J. E. *The New Science of Strong Materials* Pelican
Richards C. W. *Engineering Materials Science* Chapman & Hall
Street A. *Metals in the Service of Man* Penguin
or
Polakowski N. H. & Ripling E. J. *Strength and Structure of Engineering Materials* Prentice-Hall
or
Wyatt O. & Dew-Hughes D. *Metals, Ceramics and Polymers* CUP

Computer Science

Undergraduate Study

6.601A
Introduction to
Computer Science   S1 L3T2 and F L1½T1

Prerequisite: 10.001.

Introduction to programming: algorithm and data structure design; programming in a high level algorithmic language which provides simple, high level program-control and data-structuring facilities. Introduction to data structures. Program verification. Introduction to computer organization: simple machine architecture, logical design; data storage devices; simple operating system concepts.

Textbooks

Gear C. W. *Introduction to Computer Science* SRA
Jensen K. & Wirth N. Pascal *User Manual and Report* Springer Study Edition Springer-Verlag

6.601B
Assembler Programming and
Non-numeric Processing
S2 L3T2 and F L1½T1

Prerequisite: 10.001. Co-requisite: 6.601A.

Computer structure, machine language, instruction execution, addressing techniques and digital representation of data. Symbolic coding. Manipulation of strings, lists and other data structures.

Textbooks

PDP 11/40 *Processor Handbook* Digital Equipment Corporation

Griswold R. E., Poage J. F. & Polansky I. P. *The SNOBOL 4 Programming Language* Prentice-Hall

Gray L. D. *A Course in APL/360 with Applications* Addison-Wesley

or

Gilman G. & Rose P. *APL: an Interactive Approach* 2nd ed Wiley

or

Polivka K. & Pakin R. *APL: the Language and its Usage* Prentice-Hall

6.602A
Computer Systems I   S1 L2T3

Prerequisite: 6.601B.

Switching algebra, simplification of switching functions, synchronous sequential networks, digital systems. Flow tables, cycles, races, hazards. Number systems, codes, computer arithmetic. Memory techniques and organization, microprogramming.

Textbook

Booth T. L. *Digital Networks and Computer Systems* Wiley

6.602B
Computer Systems II   S2 L3T2

Prerequisite: 6.601B.

Introduction to operating systems via an intensive case study of a particular system. Includes system initialization memory management, process management, handling of interrupts, basic input/output and file systems.

Textbooks

To be advised.

6.602C
Computer Applications   S1 L3T2

Prerequisite: 6.601A.

A selection of topics from: Computer simulation. Modelling of discrete event systems, with applications to queueing; Pseudo random number generation and testing; simulation languages, especially SIMULA. Optimization techniques: "hill climbing", critical path method, dynamic programming, linear programming. The simplex and revised simplex methods. Job shop scheduling. Data processing; file and data management systems; use of COBOL; searching and sorting of files. Information retrieval: search on secondary keys, inverted files. Artificial intelligence. Social consequences of computer technology.

Textbooks

Simula Reference Manual Control Data

Cohen C. & Stein J. *M.P.O.S. Users Guide* Northwestern Univ

6.602D
Programming Languages and
Compiling Techniques   S2 L3T2

Prerequisite: 6.601A.

Compiling Techniques: data structures; table look-up; language description; lexical analysis; syntax analysis; semantic analysis/code generation; interpretation/program execution.

Programming Languages: a comparative study.

Mathematics

Undergraduate Study†

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

10.001
Mathematics I   F L4T2

Prerequisite:

	HSC Exam Grade Required
2 unit Mathematics	*1 or 2*
or	
3 unit Mathematics	*1, 2 or 3*
or	
4 unit Mathematics	*1, 2, 3, 4 or 5 (Grade 5 at a standard acceptable to the Professorial Board)*

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

Preliminary Reading List

Allendoerfer C. B. & Oakley C. O. *Principles of Mathematics* McGraw-Hill

Bell E. T. *Men of Mathematics* 2 vols Pelican

Courant R. & Robbins H. *What is Mathematics?* OUP

† When a unit is listed as a prerequisite or co-requisite, the appropriate higher unit may be substituted.

Polya G. *How to Solve It* Doubleday Anchor

Sawyer W. W. *A Concrete Approach to Abstract Algebra* Freeman

Sawyer W. W. *Prelude to Mathematics* Pelican

Textbooks

Blatt J. M. *Basic Fortran IV Programming. Miditran Version* Computer Systems (Aust.)

Shields P. C. *Elementary Linear Algebra* 2nd ed Worth

Thomas G. B. *Calculus and Analytic Geometry* 4th ed Addison-Wesley

10.011
Higher Mathematics I   F L4T2

Prerequisite:

	HSC Exam Grade Required
3 unit Mathematics or	1 or 2
4 unit Mathematics	1, 2, 3, 4 or 5 (Grade 5 at a standard acceptable to the Professorial Board)

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

Preliminary Reading List

As for 10.001 plus:

Arnold B. H. *Intuitive Concepts in Elementary Topology* Prentice-Hall

David F. N. *Games, Gods and Gambling* Griffin

Felix L. *The Modern Aspect of Mathematics* Science

Huff D. *How to Lie with Statistics* Gollancz

Reid C. *From Zero to Infinity* Routledge

Textbooks

Blatt J. M. *Basic Fortran IV Programming. Miditran Version* Computer Systems (Aust.)

Clark C. *The Theoretical Side of Calculus* Wadsworth

Thomas G. B. *Calculus and Analytic Geometry* 4th ed Addison-Wesley

10.021
Mathematics IT   F L4T2

Prerequisite: As for 10.001.

Calculus, analysis, analytic geometry, algebra, probability theory, elementary computing.

Textbooks

Blatt J. M. *Basic Fortran IV Programming. Miditran Version* Computer Systems (Aut.)

Greening M. G. *First Year General Mathematics* NSWUP

Saltz D. *A Short Calculus* Goodyear

10.031
Mathematics (one Level II unit)†   F L1T1

Prerequisite: 10.001 or 10.021 (Cr).

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

Textbook

Keane A., Senior S. A., Giles E. & Prokhovnik S. J. eds *Mathematical Methods* 3rd ed Science Press

10.032
Mathematics (one Level III unit)†   F L1T1

Prerequisite: 10.031.

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

Textbook

Keane A., Senior S. A., Giles E. & Prokhovnik S. J. eds *Mathematical Methods* 3rd ed Science Press

10.041
Introduction to Applied
Mathematics   S2 L4T2

Co-requisite: 10.001.

Combinatorial mathematics, finite differences, games and networks, hydrostatics, mathematical models.

Pure Mathematics

10.111A
Pure Mathematics II
— Linear Algebra   F L1½T½

Prerequisite: 10.001. Excluded: 10.121A.

Vector spaces, linear transformations and matrices, change of basis. Eigenvalues and eigenvectors, generalised eigenvectors. Functions of matrices. Linear systems of differential equations including the use of Laplace transform. Inner products, orthogonalisation, projections. Unitary and self-adjoint transformations. Quadratic and Hermitian forms.

† These units are also available to Faculty of Science students as a sequence of two units constituting a terminating service course in mathematics. As such they are mutually exclusive to any other Level II or Level III units in Pure and/or Applied Mathematics and/or Theoretical Mechanics.

10.111B
Pure Mathematics II — Analysis   F L1½T½

Prerequisite: 10.001. Excluded: 10.121B.

Real analysis: partial differentiation. multiple integrals. Analysis of real valued functions of one and several variables. Complex analysis: analytic functions, Taylor and Laurent series, integrals, Cauchy's theorem, residues, evaluation of certain real integrals. maximum modulus principles.

Textbook

Session 2
Churchill R. V. *Complex Variables and Applications* ISE McGraw-Hill

10.1111
Pure Mathematics II
— Group Theory   S1 L1½T½

Prerequisite: 10.001. Co-requisites: 10.111A, 10.111B, 10.211A. Excluded: 10.121A.

Mathematical systems, groups, determination of small groups, homomorphisms and normal subgroups.

10.1112
Pure Mathematics II — Geometry   S2 L1½T½

Prerequisite: 10.001. Co-requisites: 10.111A, 10.111B, 10.211A, 10.1111. Excluded: 10.121C.

Elementary concepts of Euclidean. affine and projective geometries.

Textbook

Gans D. *Transformations and Geometries* Appleton-Century-Crofts

10.121A
Higher Pure
Mathematics II — Algebra   F L2T½

Prerequisite: 10.011. 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.

Textbooks

Clark A. *Elements of Abstract Algebra* Wadsworth
Hoffman K. & Kunze R. *Linear Algebra* Prentice-Hall

10.121B
Higher Pure Mathematics II Real and
Complex Analysis   F L2T½

Prerequisite: 10.011. Excluded: 10.111B

Construction of reals; uniform convergence; implicit and inverse function theorems; analytic functions; Laurent and Taylor series; calculus of residues.

Textbooks

Session 1
Williamson R. E. & Trotter H. F. *Multivariable Mathematics: Linear Algebra, Differential Equations. Calculus* Prentice-Hall

Session 2
Knopp K. *Elements of the Theory of Functions* Dover

10.121C
Higher Pure Mathematics II — Number
Theory and Geometry   F L2T½

Prerequisite: 10.011. Co-requisites: 10.121A, 10.121B, 10.221A or 10.211A. Excluded: 10.1112, 10.1121.

Galois fields, quadratic reciprocity. quadratic forms, continued fractions, number theoretic functions; axioms for a geometry. affine geometry, Desargues' theorem. projective geometry.

10.112B
Pure Mathematics III —
Real Analysis   F L1½T½

Prerequisite: 10.111A, 10.111B. Co-requisite: 10.211A. Excluded: 10.122B.

Convergence of sequences and series; Taylor series; metric spaces; contraction mapping principle; sequences and series of functions; uniform convergence; Fourier series.

Textbook

Clark C. *The Theoretical Side of Calculus* Wadsworth

10.112C
Pure Mathematics III — Differential
Geometry   F L1½T½

Prerequisites: 10.111A, 10.111B. Co-requisite: 10.211A. Excluded: 10.122C.

Curves and surfaces in space. Differential forms. Frame fields. Gaussian curvature, Gauss-Bonnet theorem.

Textbook

O'Neill B. *Elementary Differential Geometry* Academic

10.1121
Pure Mathematics III — Number
Theory   S1 L1½T½

Prerequisite: *** Co-requisites: 10.111A, 10.111B, 10.211A. Excluded: 10.121C.

Euclidean algorithm. congruences, sums of squares, diophantine equations.

*** Students are not normally permitted to attempt a Level III Pure Mathematics unit unless they have completed at least one Level II unit from 10.111A, 10.111B and 10.211A and are concurrently attempting the remaining units of these three units

10.1122
Pure Mathematics II — Algebra　　S2 L1½T½

Prerequisite: 10.111A. Co-requisites: 10.111B, 10.1111, 10.211A. Excluded: 10.122A.

Rings, polynomials, fields.

Textbook
Dean R. A. *Elements of Abstract Algebra* Wiley

10.1123
Pure Mathematics III —
Set Theory　　S1 L1½T½

Prerequisite: ***. Co-requisites: 10.111A, 10.111B, 10.211A.

Intuitive and axiomatic set theory. Cardinal and ordinal numbers. The axiom of choice.

Textbook
Gray J. D. *Lecture Notes on Set Theory and Transfinite Arithmetic* Author

10.1124
Pure Mathematics III —
Combinatorial Topology　　S2 L1½T½

Prerequisite: 10.111B. Co-requisites: 10.111A, 10.211A.

Elementary combinatorial topology of surfaces.

Textbook
Frechet M. & Fan K. *Initiation to Combinatorial Topology* Prindle, Weber & Schmidt

10.1125
Pure Mathematics III —
Ordinary Differential
Equations　　S1 L1½T½

Prerequisite: ***. Excluded: 10.122E.

Systems of ordinary differential equations; variations of constants formula; stability; Poincaré space; Lyapunov's direct method.

Textbook
Leighton W. *An Introduction to the Theory of Ordinary Differential Equations* Wadsworth

10.1126
Pure Mathematics III —
Partial Differential
Equations　　S2 L1½T½

Prerequisite: ***. Co-requisite: 10.1125.

Systems of partial differential equations; characteristic surfaces; classifications; Cauchy problem; Dirichlet and Neumann problems; the maximum principle; Poisson's formula; conformal mapping.

Textbook
Dennemeyer R. *Introduction to Partial Differential Equations and Boundary Value Problems* McGraw-Hill

10.1127
Pure Mathematics III — History
of Mathematics　　S2 L1T1

Prerequisites:. 10.111A, 10. 111B, 10.211A.

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.

Textbooks
Midonick H. O. ed *The Treasury of Mathematics* Penguin
Struik D. J. *A Concise History of Mathematics* Dover

10.122A
Higher Pure Mathematics III
— Algebra　　F L2T½

Prerequisite: 10.121A. Excluded: 10.1122.

Field theory and theory of rings and modules.

Textbook
Stewart I. *Galois Theory* Chapman & Hall

10.122B
Higher Pure Mathematics III —
Integration and Functional
Analysis　　F L2T½

Prerequisite: 10.121B. Excluded: 10.112B.

Lebesgue Integration; Fourier series; normed vector spaces; Hilbert spaces; measure theory.

10.122C
Higher Pure Mathematics III —
Topology and Differential
Geometry　　F L2T½

Prerequisite: 10.121A, 10.121C. Excluded: 10.1124, 10.112C.

The axiom of choice. metric and topological spaces, compactness. Compact surfaces, triangulations, geodesics, Gauss-Bonnet theorem.

Textbook
Simmons G. F. *Introduction to Topology and Modern Analysis* ISE McGraw-Hill

*** Students are not normally permitted to attempt a Level III Pure Mathematics unit unless they have completed at least one Level II unit from 10.111A, 10.111B and 10.211A and are concurrently attempting the remaining units of these three units

10.122E
Higher Pure Mathematics III —
Complex Analysis and
Differential Equations　　　　　F L2T½

Prerequisite: 10.121B. Excluded: 10.1125.

Analytic continuation; entire and meromorphic functions; elliptic functions; normal families and further advanced topics in complex analysis. Existence and uniqueness theorems for ordinary differential equations; linear systems; qualitative theory of autonomous systems; equations on manifolds.

Textbooks
Session 1
Knopp K. *Theory of Functions. Part II* Dover

Session 2
Roxin E. O. *Ordinary Differential Equations* Wadsworth

10.123
Pure Mathematics IV

An honours program consisting of the preparation of an undergraduate thesis together with advanced lecture courses on topics chosen from fields of current interest in Pure Mathematics. With the permission of the Head of Department, the subject may also include advanced lecture courses given by other Departments or Schools.

For textbooks, see lecturers concerned.

Applied Mathematics

10.211A
Applied Mathematics II —
Mathematical Methods　　　　　F L1½T½

Prerequisite: 10.001. Excluded: 10.221A.

Review of functions of two and three variables, divergence, gradient, curl; line, surface, and volume integrals; Green's and Stokes' theorems. Special functions, including gamma and Bessel functions. Differential equations and boundary value problems, including vibrating string and vibrating circular membrane; Fourier series.

Textbooks
Boas M. L. *Mathematical Methods in the Physical Sciences* Wiley
Spiegel M. R. *Advanced Mathematics for Scientists and Engineers* Schaum
Spiegel M. R. *Theory and Problems of Vector Analysis* Schaum

10.211D
Applied Mathematics II—Introduction to
Optimization Theory and its
Applications　　　　　F L1½T½

Prerequisite: 10.001. Excluded: 10.221D.

Linear programming: origin of problems, fundamental theorem (without proof), simplex method, application to diet, allocation, and transport problems. Calculus and Lagrange multiplier methods. Numerical search methods: one dimensional and simple multivariable methods. Dynamic programming: multistage decision processes, resource allocation to number of activities, reliability problems. Branch and bound methods: scheduling problems and the knapsack problem. Integer programming: travelling salesman problem. Heuristic methods.

Textbook
Nicholson T. A. J. *Optimization in Industry* Vol 1 *Techniques* Longman

10.221A
Higher Applied Mathematics II—
Mathematical Methods　　　　　F L1½T1

Prerequisite: 10.011 or 10.001 (Dist). Excluded: 10.211A.

As for 10.211A but in greater depth.

Textbooks
Queen N. M. *Vector Analysis* McGraw-Hill
Rabenstein A. L. *Introduction to Ordinary Differential Equations* Academic Int. ed

10.221D
Higher Applied Mathematics II—
Introduction to Optimization
Theory and its Applications　　　　　F L1½T½

Prerequisite: 10.011 or 10.001 (Dist). Excluded: 10.211D.

As for 10.211D but in greater depth.

Textbooks
As for 10.211D

10.212A
Applied Mathematics III—Numerical
Analysis　　　　　F L1T1

Prerequisites: 10.211A, 10.111A. Excluded: 10.222A.

Polynomial approximation, interpolation and extrapolation, numerical quadrature, solution of ordinary differential equations, sets of linear equations, matrix eigenvalues and eigenvectors, boundary value problems, partial differential equations. Practical work using a computer.

Textbook
Conte S. D. & de Boer C. *Elementary Numerical Analysis* 2nd ed McGraw-Hill

10.212L
Applied Mathematics III —
Optimization Methods　　　　　F L1½T½

Prerequisites: 10.211A, 10.111B, 10.111A. Co-requisite: 10.211D. Excluded: 10.222L.*

* Effective from 1978 only. Students enrolling in 10.212L (10.222L) in 1977 should not enrol in 10.211D (10.221D).

Linear programming: proof of fundamental theorem, revised simplex method, duality, postoptimal analysis, solution of transportation and network flow problems. Fundamentals of nonlinear programming: Kuhn-Tucker conditions and duality. Multivariable search methods: projected gradient and penalty function methods. Separable programming. Integer programming: Gomory's algorithm. Geometric programming. Applications of these methods to resource allocation, production problems, capital investment, and models of the economy.

Textbook

Cooper L. & Steinberg D. *Introduction to Methods of Optimization* Saunders

10.212M
Applied Mathematics III—
Optimal Control Theory   F L1½T½

Prerequisites: 10.211A, 10.111A, 10.111B. Excluded: 10.222M.

Optimal control of systems described by difference equations, continuous-time dynamic programming, calculus of variations, Pontryagin maximum principle, stochastic decision processes. Applications of control theory to resource allocation, control of production, investment, inventory, and advertising, and to models of the economy.

Textbooks

Connors M. M. & Teichroew D. *Optimal Control of Dynamic Operations Research Models* International Textbook Co

Jacobs O. L. R. *Introduction to Control Theory* OUP

10.222A
Higher Applied Mathematics III—
Numerical Analysis   F L1T1

Prerequisites: 10.221A or 10.211A (Dist), 10.121A or 10.111A (Dist). Excluded: 10.212A.

As for 10.212A but in greater depth.

10.222C
Higher Applied Mathematics III—
Maxwell's Equations and
Special Relativity   F L1½T½

Prerequisites: 10.221A or 10.211A (Dist), 10.121B or 10.111B (Dist), 1.001. Excluded: 1.033.

Electrostatic and quasi-static magnetic fields: mathematical formulation of basic laws, field equations, methods of solution, general theorems, polarization, energy and mechanical forces. Electromagnetic fields: Maxwell's equations, Poynting theorem, Maxwell stress tensor, electromagnetic momentum and radiation pressure, electromagnetic potentials, radiation, vector wave equation, solutions, cavity resonators, waveguides. Relativity: relativistic kinematics, dynamics and electrodynamics, radiation from moving charges, radiation damping.

Textbook

Jackson J. D. *Classical Electrodynamics* Wiley

10.222F
Higher Applied Mathematics III—
Quantum Mechanics   F L1½T½

Prerequisites: 10.221A or 10.211A (Dist), 10.121A or 10.111A (Dist), 10.121B or 10.111B (Dist). Excluded: 1.013.

Review of physical basis for quantum mechanics, simple harmonic oscillator, hydrogen atom. General formalism, angular momentum, perturbation theory and other approximation methods. Scattering problems.

Textbook

Merzbacher E. *Quantum Mechanics* 2nd ed Wiley

10.222L
Higher Applied Mathematics III—
Optimization Methods   F L1½T½

Prerequisites: 10.221A or 10.211A (Dist), 10.121A or 10.111A (Dist), 10.121B or 10.111B (Dist). Co-requisite: 10.221D or 10.211D. Excluded: 10.212L.*

As for 10.212L but in greater depth.

Textbooks

Adby P. R. & Dempster M. A. H. *Introduction to Optimization Methods* Chapman & Hall

Intrilligator M. D. *Mathematical Optimization and Economic Theory* Prentice-Hall

10.222M
Higher Applied Mathematics III—
Optimal Control Theory   F L1½T½

Prerequisites: 10.221A or 10.211A (Dist), 10.121A or 10.111A (Dist), 10.121B or 10.111B (Dist). Excluded: 10.212M.

As for 10.212M but in greater depth.

Textbooks

Connors M. M. & Teichroew D. *Optimal Control of Dynamic Operations Research Models* International Textbook Co

Jacobs O. L. R. *Introduction to Control Theory* OUP

10.223
Applied Mathematics IV

An honours program consisting of the preparation of an undergraduate thesis together with advanced lecture courses. Lecture topics include selections from: advanced optimization and control theory, functional analysis and applications, numerical analysis, mathematics of economic models and of economic prediction, stability theory of differential and differential-difference equations, stochastic processes, statistical mechanics, quantum physics, astro-physics. With permission of the Head of Department, the subject may also include advanced lecture courses given by other Departments or Schools.

Textbooks

No set texts.

Sciences

10.233
Applied Mathematics IV (Short Course)

6 units consisting of the preparation of an undergraduate thesis together with advanced lecture courses. Lecture topics include selections from: advanced optimization and control theory, functional analysis and applications, mathematics of economic models and of economic prediction, stability theory of differential and differential-difference equations, stochastic processes. With permission of the Head of Department, the subject may also include advanced lecture courses given by other Departments or Schools.

Textbooks
No set texts.

Statistics

10.311A
Theory of Statistics II —
Probability and Random
Variables   S1 L4T3

Prerequisite: 10.001 or 10.021 (Cr). Excluded: 10.321A, 10.331, 45.101.

An introduction to axiomatic treatment of probability. Variates (univariates, multivariates, expectations, moment generating and characteristic functions). Standard distributions. Sampling distributions.

Introductory Reading
Moroney M. J. Facts from Figures Pelican
Mosteller F. ed Statistics by Example Vols 1-4 Addison-Wesley
Schmidt M. J. Understanding and Using Statistics Heath
Tanur J. M. ed Statistics: A Guide to the Unknown Holden-Day

Textbooks
Larson H. J. Introduction to Probability and Statistical Inference 2nd ed Wiley
Statistical Tables

10.311B
Theory of Statistics II —
Basic Inference   S2 L4T3

Prerequisite: 10.311A. Excluded: 10.321B, 10.331, 45.101.

Point estimation (moments, maximum likelihood, minimum χ^2, etc.) Confidence interval estimation, exact and approximate. Elementary Neyman-Pearson theory of tests of significance, standard significance tests. Regression (including curvilinear) on a single fixed variable.

Textbooks
Larson H. J. Introduction to Probability and Statistical Inference 2nd ed Wiley
Larson H. J. Introduction to the Theory of Statistics Wiley
Statistical Tables

10.321A
Higher Theory of Statistics II —
Probability and
Random Variables   S1 L5T3

Prerequisite: 10.001. Excluded: 10.311A, 10.331, 45.101.

10.311A at greater depth and covering a slightly wider field.

Introductory Reading
As for 10.311A.

Textbooks
Hogg R. V. & Craig A. T. Introduction to Mathematical Statistics 3rd ed Collier-Macmillan
Kendall M. G. & Stuart A. The Advanced Theory of Statistics Vol 1 Griffin
Larson H. J. Introduction to Probability and Statistical Inference 2nd ed Wiley
Larson H. J. Introduction to the Theory of Statistics Wiley
Statistical Tables

10.321B
Higher Theory of Statistics II —
Basic Inference   S2 L5T3

Prerequisite: 10.321A. Excluded: 10.311B, 10.331, 45.101.

10.311B at greater depth and covering a slightly wider field.

Textbooks
Hogg R. V. & Craig A. T. Introduction to Mathematical Statistics 3rd ed Collier-Macmillan
Kendall M. G. & Stuart A. The Advanced Theory of Statistics Vol 2 3rd ed Griffin
Larson H. J. Introduction to Probability and Statistical Inference 2nd ed Wiley
Larson H. J. Introduction to the Theory of Statistics Wiley
Statistical Tables

10.312A
Theory of Statistics III —
Probability and
Stochastic Processes   S1 L2T2

Prerequisites: 10.311A, 10.111A, 10.111B, 10.211A. Excluded: 10.322A.

Elementary treatment of probability and moment generating functions and characteristic functions. Convergence in distribution. Central Limit Theorem. Convergence in probability. Weak law of large numbers. Poisson processes. Elementary treatment of Markov chains. Birth-and-death processes. Queueing theory.

Textbooks
Bailey N. J. T. Elements of Stochastic Processes with Applications to the Natural Sciences Wiley
Heathcote C. R. Probability: Elements of the Mathematical Theory Allen & Unwin

10.312B
Theory of Statistics III —
Experimental Design
(Applications) and Sampling   S2 L2T2

Prerequisite: 10.311B or 10.331 (normally Cr). Co-requisite: 10.211A. Excluded: 10.322B.

Principles of good experimental design. Completely randomized experiment, randomized block experiment in detail. Latin squares. Contrasts. Analysis of factorial experiments. Multiple comparison methods. Random models. Split plot design. Sampling theory.

10.312C
Theory of Statistics III —
Experimental Design (Theory)   S1 L2T2

Prerequisites: 10.311B, 10.111A, 10.111B, 10.211A. Co-requisites: 10.312B, plus any two level III Pure Mathematics or Applied Mathematics or Theoretical Mechanics units. Excluded: 10.322C.

Matrix theory. Cochran-James theorem. Multivariate normal. Quadratic forms. Independence. The General Linear Hypothesis. Gauss-Markov theorem. Hypothesis testing. Analysis of variance.

Textbook

Graybill F. A. *An Introduction to Linear Statistical Models* McGraw-Hill

10.312D
Theory of Statistics III —
Probability Theory   S2 L2T2

Prerequisites: 10.311A, 10.111A, 10.111B, 10.211A. Excluded: 10.322D

Rigorous treatment of probability and moment generating functions and characteristic functions. Convergence in probability. Weak law of large numbers. Almost sure convergence. Strong law of large numbers. Compound distributions. Branching processes. Advanced treatment of Markov chains. Markov chains with continuous parameter.

Textbook

Heathcote C. R. *Probability: Elements of the Mathematical Theory* Allen & Unwin

10.312E
Theory of Statistics III —
Statistical Inference   S2 L2T2

Prerequisites: 10.311B, 10.111A, 10.111B, 10.211A. Co-requisites: Any two level III Pure Mathematics or Applied Mathematics or Theoretical Mechanics units. Excluded: 10.322E.

Bayesian inference and decision theory. Classical inference. Contingency tables (large sample and exact tests). Order Statistics. Non-parametric methods.

Textbooks

Mood A. M., Graybill F. A. & Boes D. C. *Introduction to the Theory of Statistics* 3rd ed McGraw-Hill

Kendall M. G. & Stuart A. *The Advanced Theory of Statistics* Vol 2 Griffin

10.322A
Higher Theory of Statistics III —
Probability and Stochastic
Processes   S1 L2½T2

Prerequisites: 10.321A, 10.111A, 10.111B, 10.211A. Excluded: 10.312A.

As for 10.312A but in greater depth.

Textbooks

Bailey N. J. T. *Elements of Stochastic Processes with Applications to the Natural Sciences* Wiley

Heathcote C. R. *Probability: Elements of the Mathematical Theory* Allen & Unwin

10.322B
Higher Theory of Statistics III —
Experimental Design (Applications)
and Sampling   S2 L2½T2

Prerequisites: 10.321B, 10.111A, 10.111B, 10.211A. Excluded: 10.312B.

As for 10.312B but in greater depth.

Textbooks

Cochran W. G. & Cox G. M. *Experimental Designs* I. S. E. Wiley
Statistical Tables

10.322C
Higher Theory of Statistics III —
Experimental Design (Theory)   S1 L2½T2

Prerequisites: 10.321B, 10.111A, 10.111B, 10.211A. Co-requisites: 10.322B, plus any two level III Pure Mathematics or Applied Mathematics or Theoretical Mechanics units. Excluded: 10.312C.

As for 10.312C but in greater depth.

Textbooks
As for 10.312C.

10.322D
Higher Theory of Statistics III —
Probability Theory   S2 L2½T2

Prerequisites: 10.321A, 10.111A, 10.111B, 10.211A. Excluded: 10.312D.

As for 10.312D but in greater depth.

Textbooks
As for 10.312D.

10.322E
Higher Theory of Statistics III —
Statistical Inference   S2 L2½T2

Prerequisites: 10.321B, 10.111A, 10.111B, 10.211A. Co-requisites: Any two level III Pure Mathematics or Applied Mathematics or Theoretical Mechanics units. Excluded: 10.312E.

As for 10.312E but in greater depth.

Textbooks
As for 10.312E.

10.323
Theory of Statistics IV

Specialised study, from the topics set out, for students attempting honours in the Science and Mathematics or Arts courses with a major in Statistics. Mathematical basis. Experimental design; response surfaces. Stochastic processes. Theories of inference. Sequential analysis. Non-parametric methods. Multivariate analysis. Mathematical programming. Information theory. Discrete distributions. Project.

10.331
Statistics SS   F L1½T½

Prerequisite: 10.001 or 10.021 (Cr). Excluded: 10.311A, 10.311B, 10.321A, 10.321B, 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.

Textbooks
Freund J. E. *Mathematical Statistics* 2nd ed Prentice-Hall
or
Kreyszig E. *Introductory Mathematical Statistics* Wiley
Statistical Tables

Theoretical and Applied Mechanics

10.411A
Theoretical Mechanics II —
Hydrodynamics   S2 L3T1

Prerequisite: 10.001. Co-requisite: 10.411B. Excluded: 10.421A.

Conservation laws and Bernoulli's equation for one-dimensional flow. Equations of continuity and Euler's equation. Kelvin's Theorem. Incompressible, irrotational flow in two and three dimensions, including applications of complex variables, method of images, harmonic functions, and axially symmetric flow. Introduction to compressible and viscous fluids.

Textbook
Prandtl L. & Tietjens O. G. *Fundamentals of Hydro- and Aeromechanics* Dover

10.411B
Theoretical Mechanics II —
Principles of Theoretical Mechanics S1 L3T1

Prerequisites: 10.001, 1.001 or 10.041 or 5.010.
Co-requisites: 10.211A, 10.111B. Excluded: 10.421B

Revision of vectors, kinematics of particles and rigid bodies. Dynamics of particles including simple harmonic and projectile motion. Systems of particles: conservation principles, collisions, rocket motion, the catenary. Work and energy. Rotating frames; moments of inertia.

Elementary problems derived from continuum mechanics including conservation laws, one-dimensional fluid flow, extension and bending of beams.

Textbook
Smith R. C. & Smith P. *Mechanics* Wiley

10.421A
Higher Theoretical Mechanics II —
Hydrodynamics   S2 L3T1

Prerequisite: 10.011 or 10.001 (Dist). Co-requisite: 10.421B. Excluded: 10.411A.

As for 10.411A but in greater depth.

10.421B
Higher Theoretical Mechanics II —
Principles of Theoretical Mechanics S1 L3T1

Prerequisites: 10.011 or 10.001 (Dist), 1.001 or 5.010 or 10.041.
Co-requisites: 10.221A, 10.111B. Excluded: 10.411B.

As for 10.411B but in greater depth.

Textbook
Symon K. R. *Mechanics* 3rd ed Addison-Wesley

10.412A
Theoretical Mechanics III —
Dynamical and
Physical Oceanography   F L1½T½

Prerequisites: 10.211A or 10.031, 1.001. It is recommended that one of the following be taken concurrently: 10.411A or 1.012 or 1.913.

1. The physical properties of the oceans and their measurement, including: salinity, temperature, density, dynamic heights. Currents, waves and tides. 2. Theoretical models of current and waves.

Up to seven days field/laboratory work per year.

10.412B
Theoretical Mechanics III — Continuum Mechanics   F L1½T½

Prerequisites: 10.211A, 10.111A, 10.111B. Co-requisite: 10.411A or 1.012 or 1.913. Excluded: 10.422B.

Cartesian tensors, stress and strain in continuous media. Equations of equilibrium and motion. Equations of elasticity. Bending and torsion of beams. Plane elasticity (if time available). Viscous flow of liquids (if time available).

10.412D
Theoretical Mechanics III — Mathematical Methods   F L1½T½

Prerequisites: 10.211A, 10.111A, 10.111B. Excluded: 10.422D.

Sturm-Liouville equation, eigenvalues, expansion in orthonormal functions. Fourier, Fourier-Bessel and Legendre series as special cases. Fourier and Laplace transforms, with application to ordinary and partial differential equations. Diffusion equation and transmission-line equation. Wave equation.

Textbooks

Rabenstein A. L. *Introduction to Ordinary Differential Equations* Academic   .
Stephenson G. *An Introduction to Partial Differential Equations for Science Students* 2nd ed Longmans

10.422A
Higher Theoretical Mechanics III — Fluid Dynamics   S2 L3T1

Prerequisite: 10.421A or 10.411A (Dist). Co-requisite: 10.422B.

Compressible flow, viscous flow, boundary layers, hydrodynamic stability, simple wave motions in fluids.

Textbook

Bachelor G. K. *An Introduction to Fluid Dynamics* C.U.P.*

10.422B
Higher Theoretical Mechanics III — Mechanics of Solids   S1 L3T1

Prerequisites: 10.111A, 10.111B, 10.211A, 10.421B or 10.411B (Dist) or 1.012. Excluded: 10.412B.

As for 10.412B but in greater depth.

10.422D
Higher Theoretical Mechanics III — Mathematical Methods   F L1½T½

Prerequisites: 10.221A or 10.211A (Dist), 10.121A or 10.111A (Dist), 10.121B or 10.111B (Dist). Excluded: 10.412D.

Functions of a complex variable, contour integration. Fourier, Laplace and Mellin transforms, solutions of ordinary and partial differential equations. Asymptotic expansions.

10.423
Theoretical Mechanics IV

An honours program consisting of the preparation of an undergraduate thesis together with advanced lecture courses on topics chosen from fluid mechanics, solid mechanics, planetary science and special mathematical and numerical techniques applied to partial differential equations. With the permission of the Head of Department, the subject may also include advanced lecture courses given by other Departments or Schools on topics such as optimal control theory, optimization theory, thermodynamics, numerical analysis or statistics.

Textbooks
No set texts.

Graduate Study

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.

10.073G
Advanced Mathematical Analysis of Data

Basic concepts, potential theory, Hilbert Transforms: Interpolation of time series; interpretation of field data, eg 'smoothing' procedures, noise elimination; filter theory, reduction of field data; approximation techniques, eg evaluation of slowly convergent series, estimation of geometric properties of equations.

10.194G
Advanced Mathematics Lecture Courses

Each year a selection of courses is offered in the following areas:

Algebraic geometry; algebraic topology; categorical and homological algebra; commutative algebra; group theory; Lie groups and algebras; representation theory; group theory and its physical applications; advanced quantum mechanics; differential geometry; differential equations; optimal control theory; functional analysis; applied functional analysis; operator theory; harmonic analysis; advanced numerical analysis; theory of functions; finite mathematics; number theory; logic; theoretical astrophysics; history of mathematics; recent advances in mathematics; mathematical economics; optimization and control.

10.372G
Statistics 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 analysis, purpose of randomisation; how the physical circumstances of an experiment are related to its formal model on which its analysis is based; the internal estimate of error obtained from

the variation left after accounting for all sources of systematic variation, these points illustrated by considering in some detail the fully randomised design, the randomised block design, the 2^2 factorial fully randomised design, and the fully randomised design with one concomitant variable.

Survey Sampling: the distinction between a survey sample and an experiment planned to compare a set of treatments, and how it affects the inferences that may be made; simple random sampling, stratified random sampling.

10.381G
Experimental Design I

Modified designs for fixed effects models. Incomplete and balanced incomplete block designs. Confounding and fractional replication. Randomization theory. Multiple comparisons.

Textbooks
Kempthorne O. *The Design and Analysis of Experiments* Wiley
John P. W. M. *Statistical Design and Analysis of Experiments* Macmillan

10.382G
Experimental Design II

Extensive treament 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.

Textbooks
Cox D. R. & Smith W. *Queues* Methuen
Feller W. *An Introduction to Probability Theory and its Applications* Vols I & II Wiley

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.

Textbook
Jenkins G. M. & Watts D. G. *Spectral Analysis and its Applications* Holden-Day

10.385G
Multivariate Analysis I

Likelihood ratio tests for means, variances and structure. Discriminant, principal component, canonical and factor analysis.

Textbook
Anderson T. W. *An Introduction to Multivariate Statistical Analysis* Wiley

10.386G
Multivariate Analysis II

The general linear hypothesis and analysis of dispersion. Tests based on roots, distribution theory.

Textbooks
Anderson T. W. *An Introduction to Multivariate Statistical Analysis* Wiley
Kshirsagar A. M. *Multivariate Analysis*. Marcel Dekker

10.387G
Non-Experimental Statistics

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.

Textbook
Wald A. *Sequential Analysis* Wiley

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, advanced order statistics, population statistics, non-linear programming, discrete distribution theory and other topics.

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.

Psychology

Undergraduate Study

12.001
Psychology I   F L3T2

Introduction to the content and methods of psychology as a behavioural science, with special emphasis on (a) the biological and social bases of behaviour, (b) learning, and (c) individual differences. Includes training in methods of psychological enquiry, and the use of elementary statistical procedures.

Textbooks

Lumsden J. *Elementary Statistical Method* Rev ed WAUP

Mednick S. A., Higgins J. & Kirschenbaum J. *Psychology: Explorations in Behavior and Experience* Wiley Int ed
or
Morgan C. T. & King R. A. *Introduction to Psychology* 5th ed McGraw-Hill

Selected *Scientific American reprints* as advised by the School

12.004
Psychology IV   F

Prerequisites: All other Course requirements.

Psychology IV in the BSc in Psychology course. A program of selected study from the School's Advanced Electives, chosen in consultation with the Head of School or his representative, plus a research thesis or project. Combinations of electives are available for students intending to specialize in areas of professional practice (eg clinical, industrial, social psychology) or in research.

12.014
Psychology IV (Research)   F

Prerequisites: 12.001, 12.052, 12.062, 12.152, 12.153 and 3 other Psychology Level III units at an average level of Credit or better.

Psychology IV in the Science and Mathematics Course. Research and thesis, course work and readings to be determined in consultation with the Head of School.

12.042
Psychology IIA   F L2T2

Prerequisite: 12.001. Co-requisites: 12.052, 12.062, 12.152.

BSc in Psychology students only.

12.044
Psychology IV (Course Work)   ·   F

Prerequisites: 12.001, 12.052, 12.062, 12.152, 12.153, 12.163 and 6 other Psychology Level III units at an average level of Credit or better.

Psychology IV in the Science and Mathematics Course. Course work, practicum, project and readings to be determined in consultation with the Head of School.

12.052
Basic Psychological Processes II   S1 L2T2

Prerequisite: 12.001.

The basic phenomena of behaviour and experience in a biological context.

Textbooks

Gray J. A. *The Psychology of Fear and Stress* World Univ Library

Haber R. N. & Hershenson M. *The Psychology of Visual Perception* Holt, Rinehart & Winston

Seligman M. E. P. *Helplessness* Freeman

12.062
Complex Psychological
Processes II   S2 L2T2

Prerequisite: 12.001.

Students select for concentrated study two areas from visual perception, social bases of behaviour, and information processing and cognitive functioning.

Information Processing and Cognitive Functioning

Textbook

Horton D. L. & Turnage T. W. *Human Learning* Prentice-Hall

Perception

Textbook

Haber R. N. & Hershenson M. *The Psychology of Visual Perception* Holt, Rinehart & Winston 1973

†

12.152
Research Methods II
F L2T1

Prerequisite: 12.001.

Introduction to the design and analysis of experiments; hypothesis testing, estimation, power analysis; general treatment of simple univariate procedures; correlation and regression.

Textbooks

Anderson B. F. *The Psychology Experiment: An Introduction to Scientific Method* 2nd ed Brooks/Cole

Welkowitz J., Ewen R. B. & Cohen J. *Introductory Statistics for the Behavioral Sciences* Academic

12.153
Research Methods IIIA
S1 L2T2

Prerequisites: 12.052, 12.062, 12.152.

Analysis of variance — one way and complete factorial designs. Elementary Fortran programming, emphasizing editing of data for use in package programs.

Textbook

Hays W. L. *Statistics* International ed Holt, Rinehart & Winston

12.163
Research Methods IIIB
S2 L2T2

Prerequisite: 12.153.

Experimental Design; complex analysis of variance; planned and *post hoc* comparisons; multivariate procedures as data reduction techniques.

Textbook

Hays W. L. *Statistics* International ed Holt, Rinehart & Winston

12.173
Psychological Issues*

Historical background to modern psychology, emphasizing philosophical, conceptual, and methodological problems. Literature project.

12.253
Learning IIIA
S1 L2T2

Prerequisites: 12.052, 12.062, 12.152.

The basic operations and processes in classical and operant conditioning. Includes reinforcement, punishment, behavioural contrast, adjunctive behaviours, the classical conditioning of skeletal responses (sign-tracking), and the operant conditioning of autonomic responses.

Textbook

Mackintosh N. J. *The Psychology of Animal Learning* Academic

12.263
Learning IIIB
S2 L2T2

Prerequisite: 12.253.

The conditions under which animals select stimuli to become signals for other events. Theories concerned with how this is accomplished. Includes blocking, conditioned inhibition, higher-order conditioning, CS-US specificity, and long-delay learning.

Textbook

Mackintosh N. J. *The Psychology of Animal Learning* Academic

A list of papers that are required reading for the course is available from the School office.

12.303
Personality IIIA
S1 L2T2

Prerequisites: 12.052, 12.062, 12.152.

The development of personality, with reference to biological and social determinants. Personality dynamics and structure. Human potential: the humanist-existential tradition.

12.313
Personality IIIB*

Prerequisites: 12.052, 12.062, 12.152. Excluded: 12.623.

The psychology of interpersonal relationships and transactions. Techniques of interpersonal influence.

12.323
Motivation IIIA*

Prerequisites: 12.052, 12.062, 12.152.

The conditions governing the arousal and direction of behavioural sequences, with particular reference to the social determinants of the goals of behaviour.

12.373
Psychological Assessment
(Testing) IIIA
S1 L2T2

Prerequisites: 12.052, 12.062, 12.152.

Principles and techniques of psychological assessment. Types of tests and their application in selection and allocation procedures.

12.383
Psychological Assessment (Psychometric Theory) IIIB*

Prerequisites: 12.052, 12.062, 12.152.

* Not offered in 1977.

12.402
Physiological Psychology   F L2T2

Prerequisites: 12.001, 17.011, 17.021.

BSc in Psychology students only.

Elementary neurophysiology, neuropharmacology, and neuroanatomy. Brain control of eating, aggression, copulation, memory, language and functional disorders. Physiological bases of human performance. Hormones and behaviour. Psychophysiology of selected psychological states such as stress, sleep, and relaxation. Psychosomatics. Psychopharmacology. Genetics and behaviour

Textbook

Thompson R. F. *Introduction to Physiological Psychology* Harper & Row

12.413
Physiological Psychology IIIA   S1 L2T2

Prerequisites: 12.052, 12.062, 12.152. Excluded: 12.402.

Elementary neurophysiology, neuropharmacology and neuroanatomy. Brain control of eating, aggression, copulation, memory, language and functional disorders.

Textbook

As for 12.402.

12.423
Physiological Psychology IIIB   S2 L2T2

Prerequisite: 12.413. Excluded: 12.402.

Physiological bases of human performance. Hormones and behaviour. Psychophysiology of selected psychological states such as stress, sleep and relaxation. Psychosomatics. Psychopharmacology. Genetics and behaviour.

Textbook

As for 12.402.

12.453
Human Information Processing IIIA   S1 L2T2

Prerequisites: 12.052, 12.062, 12.152.

The stages involved in the reception of stimulus information from the environment, its analysis, storage, and translation into responses. Particular emphasis will be given to the processes which have the effect of reducing the amount of information to be subsequently stored or further processed. Special attention will be given to the comprehension, storage and utilization of semantic information.

Textbooks

Horton D. L. & Turnage T. W. *Human Learning* Prentice-Hall
Wason P. C. & Johnson-Laird P. N. *Psychology of Learning* Harvard UP

12.463
Human Information Processing IIIB*

Prerequisite: 12.453.

12.473
Perception IIIA   S1 L2T2

Prerequisites: 12.052, 12.062, 12.152.

The characteristics and processes of visual perception. Topics include the basic requirement for visual perception and the relative contributions of the observer and the stimulus in a range of visual situations.

Textbooks

Haber R. N. & Hershenson M. *The Psychology of Visual Perception* Holt, Rinehart & Winston
McNicol D. *A Primer of Signal Detection Theory* Allen & Unwin 1972

12.483
Perception IIIB .   S2 L2T2

Prerequisites: 12.052, 12.062, 12.152.

Man in a spatial environment. A study of the organization and stability of the visual world with particular reference to the constancies, object movement, eye movement and locomotion.

Textbook

Haber R. N. & Hershenson M. *The Psychology of Visual Perception* Holt, Rinehart & Winston

12.503
Social Psychology IIIA   S1 L2T2

Prerequisites: 12.052, 12.062, 12.152.

Social influence, and the effects of others on judgements and behaviour in different situations.

Textbook

Aronson E. *The Social Animal* 2nd ed Freeman

12.513
Social Psychology IIIB   S2 L2T2

Prerequisite: 12.503.

Current concepts, and developments in the analysis of social behaviour.

Textbook

A reading list is available from the School.

* Not offered in 1977.

12.553
Developmental Psychology IIIA   S1 L2T2

Prerequisites: 12.052, 12.062, 12.152.

An introduction to the study of cognitive development set loosely within the framework of Piagetian theory. Includes the development of perception with special reference to the nativism/empiricism issue, the development of operational thought with emphasis on its origins in sensori-motor intelligence, the development of language and its relationship to the development of thought, and the development of reading.

Textbooks

Dale P. S. *Language Development: Structure ond Function* Dryden
Ginsburg H. & Opper S. *Piaget's Theory of Intellectual Development* Prentice-Hall.
Selected *Scientific American reprints* as advised by the school.

12.563
Developmental Psychology IIIB   S2 L2T2

Prerequisites: 12.052, 12.062, 12.152.

If offered in 1977, subject description and a detailed reading list is available from the School.

12.603
Abnormal Psychology IIIA   S1 L2T2

Prerequisites: 12.052, 12.062, 12.152.

Conflict, anxiety and avoidance behaviour. Anti-social behaviour, psychosomatic disorders, brain pathology, mental deficiency, schizophrenia, depression, sexual anomalies, methods of diagnosis and treatment.

12.613
Abnormal Psychology IIIB*

Prerequisite: 12.603.

Techniques and findings of experimental psychopathology. Measurement and assessment problems relating to description and prediction in the field of abnormal behaviour. Evaluation of treatment and intervention programs.

12.623
Guidance and Counselling III   S2 L2T2

Prerequisites: 12.052, 12.062, 12.152. Excluded: 12.313.

A review of significant therapeutic approaches from prior to Freud through to the present day and their implied views of man. The concluding section of the course is concerned with the problems of evaluation of effects of psychotherapy. The direct sources of the theories of eg Freud, Miller & Dollard, Wolpe, Ellis, Rogers, Perls, Janov.

12.653
Industrial Psychology III   S1 L2T2

Prerequisites: 12.052, 12.062, 12.152.

The role of the psychologist in industry. Problems of power, authority and control. Theories of human nature and motivation, and their use by industrial psychologists. Work organization and physical conditions affecting work behaviour.

Textbook

A reading list is available from the School.

12.663
Ergonomics III   S2 L2T2

Prerequisites: 12.052, 12.062, 12.152.

A restricted unit for potential Psychology IV students approved by the Head of School.

Aspects of human performance relevant to work design. The principles involved in designing the environment in general, and work in particular, to suit man's capabilities.

Textbooks

Edholm O. G. *The Biology of Work* World University Library
Singleton W. T. *Introduction to Ergonomics* WHO

12.703
Psychological Techniques III   S2 L2T2

Prerequisites: 12.052, 12.062, 12.152, 12.373.

A restricted unit for potential Psychology IV students approved by the Head of School.

Observation, and other forms of appraisal, eg ratings, interviewing, testing and reporting on assembled data about individuals.

12.713
Behaviour Control and
Modification III   S2 L2T2

Prerequisites: 12.052, 12.062, 12.152. Excluded: 12.042.

Aversive and appetitive reinforcement in the control and modification of undesirable behaviour. Conditions which influence behaviour; attitude change. Ethical Issues.

12.733
Laboratory Instrumentation III   S2 L2T2

Prerequisites: 12.052, 12.062, 12.152.

A restricted unit for potential Psychology IV students approved by the Head of School.

* Not offered in 1977.

Use of laboratory equipment, and experimental techniques in Psychology. Care of laboratory animals. Basic electricity and elementary circuit design. Use of polygraphs for physiological recording. Audio and visual perception equipment, and techniques for manipulating auditory and visual factors in experiments.

12.741
Psychology (Optometry)   F L2T0

Prerequisite: 12.001.

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 will be placed on an examination of relevant experimental data. *Abnormal Psychology* — The concept of normality-abnormality, and an examination of the principal psychodynamic processes. Causes and symptoms of various mental disorders are introduced with some emphasis on symptoms and their importance in optometrical practice.

Textbooks

Part A: Visual Perception

Haber R. N. & Hershenson M. *The Psychology of Visual Perception* Holt, Rinehart & Winston

Part B: Abnormal Psychology

Coleman J. C. *Abnormal Psychology and Modern Life* 4th ed Scott, Foresman

Graduate Study

12.221G
Experimental Analysis and Modifications of Problem Behaviour

The application of the principles of experimental psychology to the understanding and modification of a range of clinical problems (eg, anxiety reactions, sexual disorders, alcoholism and other addictions, enuresis, speech problems and the behaviour problems of children) using a range of techniques (eg, systematic desensitization, aversive controls, operant conditioning of individual and social behaviour). Methods of behavioural modification through verbal and non-verbal interpersonal influences. Problems of self regulation of behaviour.

12.228G
Research Project

An individual research project in the general area of clinical or community psychology with supporting seminars covering the selection and formulation of a problem, the choice of a design, the planning of the general methodology and the treatment of data.

12.229G
Graduate Seminar

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.

12.231G
Professional Practice

Supervised clinical practice in approved institutions, or other approved practical experience.

12.232G
Theory and Practice of Psychodynamic Therapy

The application of psychodynamic systems and psychological theories of development to the diagnosis and treatment of a range of psychological disorders in children and adults. Theory and the clinical application of transference and counter-transference. The study and application of various systems of psychotherapy and the clinical management of psychological disorders by a variety of psychotherapeutic and interpersonal therapeutic procedures.

12.233G
Psychodiagnosis and Clinical Assessment

The application of psychological theories and techniques to the diagnosis and assessment of abnormal and deviant behaviour in children and adults.

12.235G
Community Psychology

Psychological theory and practice in relation to community health and community psychological health and the institutional management of psychological problems. Theory sections will include cultural and interpersonal influences on health; social factors (eg, social class, crises, community attitudes); economic and manpower problems of health delivery; politics of health care. Practical sections emphasize work in community health centres, and include community organization, research and evaluation, planning, health education, assessment of community attitudes, and social intervention.

12.236G
Community Health

Economic, ethnic and geographic factors in health status and health care; groups at risk; sexual and marital problems; drug usage and health.

12.238G
Group Techniques

Training in interpersonal sensitivity, group dynamics, family therapy or other group procedures.

Sciences

12.239G
Research Methods in Clinical and Community Psychology

Problems of experimental design in the clinical field; measurement and scaling; analysis of change, including sequential analysis, and the application of the experimental method to the individual case. Design and evaluation of community programs.

12.240G
Graduate Seminar

A series of seminars in areas of psychology of particular relevance to the field of specialization: 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.

12.241G
Graduate Colloquium

Participation in staff-graduate student colloquium.

Economics

Graduate Study

For students enrolled in the MScSoc degree course

15.715G
Science, Society and Institutions   S1L2

A conceptual and empirical examination of the changing relationships between the social structure of science, social and cultural institutions, and social values. Attention on England and Europe in the period 1750-1850, when intellectual advance in science was closely related to economic and social change in an ongoing manner.

15.716G
Science, Technology and Economic Development   S2L2

1. Historical case studies at the industry or sectoral level.

2. Critical survey of the approach to science and economy via the economists' production function. The somewhat different approach of the development economist is used in an attempt to specify the problems involved in the application of science to technology in today's less developed countries.

General Biology

Undergraduate Study

17.011
Biology of Mankind   S1 L2T4

Prerequisites:

	HSC Exam Grade Required
2 unit Science (any strands)	1, 2 or 3
or	
4 unit Science (any strands)	1, 2 or 3

Mankind evolving: primate evolution; background of early man. Evolution of technological man; biological problems associated with communication and tool-making; development of man as a hunting predator. Development of utilization of natural resources; development of man as a pastoralist and farmer; animal and plant domestication. Evolution of urban man, culture, society; reproductive biology and genetics of man; population growth, fluctuation, control; natural history of disease, background of medical and industrial microbiology. Effects of modern society; biology of social stress; effect of society in contemporary environments, planning and control.

Textbooks
Day M. H. *The Fossil History of Man* OUP
Miller G. T. *Living in the Environment* Wadsworth
Napier J. R. *Primates and their Adaptations* OUP

17.021
Comparative Functional Biology   S2 L2T4

Prerequisite: 17.011.

Maintenance of the organism: gas exchange systems in plants and animals; transport inside organisms; uptake, digestions, absorption; enzymes structure and function. Photosynthesis: process and structural relationships; metabolic systems, energy yields and pathways.

Developing organisms: sexual reproduction in plants and animals, general life cycle patterns; cell development and differentiation in flowering plants and mammals.

Control and co-ordination in organisms: organisms and water, uptake and effects; control mechanisms, urinary systems and kidney structure and function. Stimuli and responses: plant hormones, hormones in vertebrate animals, muscle activity and muscle structure, eye structure and vision mechanism; ear structure and hearing mechanism; nerves, central nervous system, nerve action, brain structure and functioning.

Textbooks
Abercrombie M. et al *A Dictionary of Biology* Penguin
Roberts M. B. V. *Biology: A Functional Approach* 2nd ed Nelson

Requirements for Practical Work
A list of equipment required for practical work is posted on the notice board in the ground floor of the Biological Sciences Building. Students must purchase this material *before* the first practical class.

17.012
General Ecology   S1 L2T4

Prerequisites: 17.011, 17.021.

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.

Textbooks

Odum E. P. *Fundamentals of Ecology* Saunders

Watt K. E. F. *Principles of Environmental Science* McGraw-Hill

Geology

Undergraduate Study

25.011
Geology I   F L3T3

Prerequisites:

	HSC Exam Grade Required
2 unit Science (any strands) or	1, 2 or 3
4 unit Science (any strands)	1, 2 or 3

Excluded: 25.151.

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

Crystallography and Mineralogy: Introduction to crystal symmetry, systems, forms, habit, twinning. Occurrence, form and physical properties of minerals. Mineral classification. Descriptive mineralogy. Principal rock forming minerals. Basic structures of silicate minerals.

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

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

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

Textbooks

Black R. M. *Elements of Palaeontology* CUP

Judson S., Deffeyes K. S. & Hargraves R. B. *Physical Geology* Prentice-Hall

Rutley F. *Elements of Mineralogy* Read H. H. ed Murby

Tyrrell G. W. *The Principles of Petrology* Methuen

25.012
Geology IIa   F L3T3

Prerequisites: 25.011, 2.121, 2.131.

Structural Geology: Origin, classification and description of structures in sedimentary, igneous, and metamorphic rocks. Introduction to the stereographic projection of structural elements, and analysis of simple fracture and fold systems. Introduction to tectonics.

Mineralogy, Igneous & Metamorphic Petrology: Principles of optical crystallography and the use of the polarizing microscope. Chemical and physical properties of the main groups of minerals.

Occurrence, genesis and classification of igneous rocks. Magmatic crystallization and differentiation. Simple binary and ternary systems.

Origin and classification of metamorphic rocks. ACF and AKF diagrams and metamorphic facies.

Practical: Mesoscopic and microscopic examination of rock forming and ore minerals, igneous and metamorphic rocks.

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

Field work of up to six days is a compulsory part of the course.

Textbooks
Structural Geology

Hobbs, B. E., Means W. D. & Williams P. F. *Outline of Structural Geology* Wiley Int

Ragan D. M. *Structural Geology: An Introduction to Geometrical Techniques* 2nd ed Wiley

Mineralogy, Igneous and Metamorphic Petrology

Bloss F. D. *An Introduction to the Methods of Optical Crystallography* Holt, Rinehart & Winston

Deer W. A., Howie R. A. & Zussman J. *An Introduction to the Rock-forming Minerals* Longman

Fyfe W. S. *Geochemistry* OUP

Hyndman P. W. *Petrology of Igneous and Metamorphic Rocks* McGraw-Hill

Mason B. & Berry L. G. *Elements of Mineralogy* Freeman

Photogeology

Von Bandat H. F. *Aerogeology* Gulf Pub. Co.

25.022
Geology IIB   F L1T2

Prerequisites: 25.011, 2.121, 2.131.

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

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

Field work of up to six days is a compulsory part of the course.

Textbooks

Blatt H., Middleton G. & Murray R. *Origin of Sedimentary Rocks* Prentice-Hall

Brown D. A., Campbell K. S. W. & Crook K. A. W. *Geological Evolution of Australia and New Zealand* Pergamon

Dunbar C. O. & Rodgers J. *Principles of Stratigraphy* Wiley

Moore R. C., Lalicker C. G. & Fischer A. G. *Invertebrate Fossils* McGraw-Hill

25.013
Geology IIIA   F L3T3

Prerequisites: 25.012, 25.022.

Economic Geology A: Principles and theories of ore formation. Magmatic, hydrothermal, submarine exhalative ore, and vulcanicity. Ore deposits and modern global tectonics. Biogenic processes, sedimentary ore deposits. Alluvial and residual deposits. Description of specific deposits illustrating various types of mineralization.

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

Mineralogy & Petrology

Mineralogy: Further optical crystallography; determination of refractive indices. Laboratory methods of mineral separation. Principles of X-ray diffraction; simple application of X-ray powder cameras and diffractometers. *Igneous Petrology:* Igneous activity at convergent and divergent plate boundaries. High pressure and low pressure fractionation. Influence of H_2O, CO_2 and O_2 on melting relationships. Primary magmas. Magmatic lineages. Mantle inhomogeneity. Significance of trace element and isotope studies. *Sedimentary Petrology:* The influence of transportation, deposition and diagenesis on the composition, texture and structure of detrital sedimentary rocks including limestones. The classification of the detrital sedimentary rocks. The chemically formed sedimentary rocks including the phosphates, zeolites, evaporites, ferruginous and siliceous deposits. Introduction to coal petrology.

Textbooks

Economic Geology A

Park C. F. & MacDiarmid R. A. *Ore Deposits* 2nd ed Freeman

Stanton R. L. *Ore Petrology* McGraw-Hill

Mineralogy & Petrology

Carmichael I. S., Turner F. J. & Verhoogen J. *Igneous Petrology* McGraw-Hill

Blatt H., Middleton G. & Murray R. *Origin of Sedimentary Rocks* Prentice-Hall

25.023
Geology IIIB   F L3T3

Prerequisites: 25.012, 25.022.

Geophysics

Global Geophysics: The physics, shape, structure and constitution of the earth: seismology, gravity, geology, geothermy, geomagnetism, palaeomagnetism, geo-electricity and geochronology. Geotectonics and geodynamics: geophysical expression and relation to geology and geochemistry. *Exploration Geophysics:* Introductory course in exploration geophysics covering the following methods: seismic, electrical, electromagnetic, gravity, magnetic and radioactive with applications mining, petroleum, engineering, hydrology and well logging.

Stratigraphy & Palaeontology

Stratigraphy: Theoretical stratigraphy including stratigraphic classification, reference points and stratotypes, correlation by fossil zones and physical methods. Continental margins, mobile zones, with a detailed study of the New England Fold Belt. Comparison between mobile zones and intracratonic basins. Intracratonic basins of Western and Southern Australia and effects of the dispersal of Gondwanaland. Mesozoic to Recent sedimentation in Papua New Guinea. Stratigraphic and structural development of anlacogenes. *Palaeontology:* Principles of systematics. Theory of evolution. Functional morphology and biostratigraphic significance of arthropods, echinoderms and graptolites. Introduction to Palaeobotany. Practical applications of palaeontology.

Field Mapping

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

A geological survey camp of 10 days' duration is a compulsory part of the course.

Textbooks

Geophysics

Bott M. H. P. *The Interior of the Earth* Arnold

Dobrin M. B. *Geophysical Prospecting* McGraw-Hill

Stratigraphy & Palaeontology

As for Stratigraphy and Palaeontology in 25.022 with:
Krumbein W. C. & Sloss L. L. *Stratigraphy and Sedimentation* 2nd ed Freeman

25.033
Geology IIIC   F L6T6

Prerequisites: 25.012, 25.022. Co-requisites: 25.013, 25.023.

Mathematical Geology and Geological Surveying

Mathematical Geology: An introduction to the mathematical techniques and concepts which may be applied to the analysis of geological data. Measurement scale, probability axioms, frequency analysis and basic geostatistics, sampling theory and techniques. FORTRAN computer programming forms a substantial part of the course with programming exercises in the analysis of map information and other geological data. Quantitative map interpretation with emphasis on trend surface analysis and automatic contouring techniques. *Geological Surveying:* levels, tacheometers and theodolites. Field techniques. Precision of angular measurements. Stadia surveying. Levelling. Field computations. Topographic maps.

Geochemistry and Petrology

Geochemistry: Some modern methods of rock and mineral analysis. Accuracy, precision and quality of geochemical data. The distribution

of elements in terrestrial rocks. Norms. *Clay Mineralogy:* The structures and properties of the clay mineral groups including the kandites, illites, smectites, chlorites, mixed layered and fibrous clay minerals. Techniques for the identification of the clay minerals. Clay-water systems and ion exchange. Chemical weathering and the origin of the clay minerals. *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 igneous and metamorphic rocks.

Advanced Structural Geology

Analysis of structural elements at the microscopic, mesoscopic and macroscopic scales. Modern methods of analysis, especially petrofabric analysis and A.V.A. Detailed studies of the analysis of metamorphic terrains, e.g. Otago Schists; Cooma Complex.

Sedimentary Basin Analysis and Geology of Hydrocarbons

Basin evolution. Analysis of sedimentary and paleoecological systems in fluvial deltaic, nearshore and deepwater environments. Structural systems formed by tensional, compressional and strike-slip tectonics. Geochemistry of hydrocarbons and formation fluids. Factors critical to occurrence of oil, gas and coal. Typical Australian and overseas occurrences. Techniques of exploration, assessment and development of reserves.

Field Mapping and Remote Sensing

Field Mapping: Field mapping in a complex geological terrain, with concentration on the structural geology of deformed and metamorphosed sequences. Writing geological reports, and drafting geological maps. *Remote Sensing:* Exercises in the combined usage of air photos and ERTS imagery for the interpretation of regional and structural geology.

In addition, *one* of the following topics will be selected after consultation with the Head of School:

1. *Economic Geology B, Mineragraphy, Experimental Petrology*

Economic Geology B: Detailed study of selected major deposits representing particular types of mineralization: geological setting, petrology, mineralogy and genetic aspects. Experimental work in ore genesis — isotope studies, trace elements, phase equilibria, inclusions in minerals. *Mineragraphy:* Reflected light optics: orthoscopic and conoscopic rotation phenomena, determinative methods, textural interpretation of ores. *Experimental Petrology:* Theoretical Petrology. Phase diagrams. Application of thermodynamics to petrological problems. Experimental petrology. *Laboratory:* Economic Geology and Mineragraphy: Study of regional setting, current research, petrology and mineragraphy of selected deposits dealt with in lectures.

2. *Micropalaeontology*
Morphology, stratigraphic distribution and significance of the principal microfossil groups: foraminifera, ostracoda, conodonts, spores and pollen, dinoflagellates, coccoliths and chitinozoa. Extraction techniques.

3. *Surficial Geology*
Processes: weathering and landforms, mass movement, gully and sheet erosion. Fluvial processes and drainage development. Aeolian, glacial, periglacial and coastal processes. Neotectonics.

Soil and surficial sediment evaluation: pedological processes, gilgai formation. Soil fabric analysis at all scales. Principles of surficial stratigraphy. Map analysis and preparation: contour patterns of landforms; geological and geomorphic interpretation of topographic maps. Soil classification, soil map preparation, lithogeomorphic maps.

Problems of mapping Quaternary geology. Quaternary geology: methods of dating, sea level change, glacial sequences, surficial geology of non-glaciated areas of Australia, especially the Riverine Plain. Quaternary sequences in Canada and Europe.

Field tutorials constitute and essential part of the course.

Textbooks
Mathematical Geology and Geological Surveying

Davis J. C. *Statistics and Data Analysis in Geology* Wiley
Blatt J. *Introduction to FORTRAN Programming* Prentice-Hall
Davis R. E., Foote F. S. & Kelly J. W. *Surveying* McGraw-Hill

Geochemistry and Petrology

Ahrens L. H. *Distribution of the Elements in our Planet* McGraw-Hill
Zussman J. *Physical Methods in Determinative Mineralogy* Academic
Loughnan F. C. *Chemical Weathering of the Silicate Minerals* Elsevier
Miyashiro A. *Metamorphism and Metamorphic Belts* Allen & Unwin

Advanced Structural Geology

As for Geology II together with:
Turner F. J. & Weiss L. E. *Structural Analysis of Metamorphic Tectonites* McGraw-Hill

Sedimentary Basin Analysis and Geology of Hydrocarbons

As for Structural Geology II and Stratigraphy II & III together with:
Ager D. V. *Principles of Palaeoecology* McGraw-Hill

Economic Geology B, Mineragraphy and Experimental Petrology
Economic Geology of Australia and Papua New Guinea Aus. Inst. Min. Met. Melbourne 1975
Edwards A. B. *Textures of the Ore Minerals* 2nd ed Aus. Inst. Min. Met. Melbourne
Ehlers E. G. *The Interpretation of Geological Phase Diagrams* Freeman

Micropalaeontology

Glaessner M. F. *Principles of Micropalaeontology* MUP Hafner Reprint 1963

Surficial Geology

Hunt C. B. *Geology of Soils, Their Evolution, Classification and Uses* Freeman
Thornbury W. D. *Principles of Geomorphology* 2nd ed Wiley*

25.1333
Geology for Geographers III   F L3T3

Prerequisites: 25.012, 25.022. Co-requisites: 25.013, 27.413, 27.423.

Geological Surveying

Levels, tacheometers and theodolites. Field techniques. Precision of angular measurements. Stadia surveying. Levelling. Field computations. Topographic maps.

Geochemistry

Some modern methods of rock and mineral analysis. Accuracy, precision and quality of geochemical data. The distribution of elements in terrestrial rocks. Norms.

* Paperback.

Clay Mineralogy

The structures and properties of the clay mineral groups including the kandites, illites, smectites, chlorites, mixed layered and fibrous clay minerals. Techniques for the identification of the clay minerals. Clay-water systems and ion exchange. Chemical weathering and the origin of the clay minerals.

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 igneous and metamorphic rocks.

Surficial Geology

Processes: weathering and landforms, mass movement, gully and sheet erosion. Fluvial processes and drainage development. Aeolian, glacial, periglacial and coastal processes. Neotectonics. Soil and surficial sediment evaluation: pedological processes, gilgai formation. Soil fabric analysis at all scales. Principles of surficial stratigraphy.

Map analysis and preparation: contour patterns of landforms; geological and geomorphic interpretation of topographic maps. Soil classification, soil map preparation, lithogeomorphic maps. Problems of mapping Quaternary geology.

Quaternary geology: methods of dating, sea level change, glacial sequences, surficial geology of non-glaciated areas of Australia, especially in the Riverine Plain. Quaternary sequences in Canada and Europe.

Field tutorials are an essential part of this course.

Textbooks

Geological Surveying

Davis R. E., Foote F. S. & Kelly J. W. *Surveying* McGraw-Hill

Geochemistry and Petrology

Ahrens L. H. *Distribution of the Elements in our Planet* McGraw-Hill

Zussman J. *Physical Methods in Determinative Mineralogy* Academic

Loughnan F. C. *Chemical Weathering of the Silicate Minerals* Elsevier

Miyashiro A. *Metamorphism and Metamorphic Belts* Allen & Unwin

Surficial Geology

Hunt C. B. *Geology of Soils, Their Evolution, Classification and Uses* Freeman

Thornbury W. D. *Principles of Geomorphology* 2nd ed Wiley*

25.623
Estuarine Geology   S2 L2T4

Prerequisites: 25.011, 25.022.

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 tutorials are an essential part of the course.

Textbooks

Barnes R. S. K. & Green J. H. *The Estuarine Environment.* Applied Sci Publ

Folk R. L. *Petrology of Sedimentary Rocks* Hemphill

25.633A
Hydrological Surveying   S2 L1T2

Prerequisites: None. Co-requisities: 27.413A.

General principles of surveying and the use of maps and charts, with particular reference to coastlines, geological features and offshore techniques. Geodesy, projections and grids. Mechanical, optical and electronic methods of measuring distance. The measurement of angles by theodolite, sextant and other methods. Triangulation. Measurement of heights and levelling. Tides, tidal streams and current measurement. Use of surveying marks ashore and afloat. Sounding techniques and corrections. Plotting of results.

Field tutorials are an essential part of the course.

Textbook

Admiralty Manual of Hydrographic Surveying HMSO

25.643
Marine Geology   S2 L3T3

Prerequisites: 25.011, 25.022. Co-requisite: 25.613. Exclusion: 1.913.

Ocean Basin Stratigraphy

Sediment types and distribution. Principal index fossil groups and systems of correlation and stratigraphical classification.

Basin Analysis

Continental margins and basin evolution. Analysis of sedimentary and palaeological systems in fluvial, deltaic, near-shore and deep-water environments. Boundary structures of sedimentary basins.

Marine Seismic Interpretation

Practical methods of interpretation of seismic reflection profile records; characteristic sedimentary and structural features of ocean basins.

Field tutorials are an essential part of the course.

25.404
Geology IV Honours

A field assignment with appropriate work in the laboratory on material collected, the results of both the field and laboratory investigations to be presented in a graduation thesis. Advanced lectures, practical work and seminars. Short laboratory assignments on specific problems may be given.

Further details of the Honours course may be had from the Head of School.

Textbooks

Mining and Petroleum Geology

Lawrence L. J. *Exploration and Mining Geology* Aust. Inst Min Met Melbourne

* Paperback.

25.151
Geoscience IA   F L3T3

Prerequisites:

	HSC Exam Grade Required
2 unit Science (any strands)	1, 2 or 3
or	
4 unit Science (any strands)	1, 2 or 3

Excluded: 25.011.

For students who do not intend studying geology beyond first year. The first part during Session 1 is identical to the first part of 25.011 Geology I. but during Session 2 certain additional topics are presented, while others are treated in less depth than in 25.011 Geology I. No further units in Geoscience are available after this course.

Physical Geology: The origins, structure and main surface features of the earth. Geological cycle: processes of erosion, transportation, sedimentation and lithification. Surface and subsurface water. Weathering, lakes, rivers, glacial phenomena, geomorphology under different climatic regimes. Vulcanism, earthquakes, orogenesis and epeirogenesis. Outlines of plate tectonic theory in relation to continental drift and oceanography.

Crystallography and Mineralogy: Introduction to crystal symmetry, systems, forms, habit, twinning. Occurrence, form and physical properties of minerals. Basic structures of silicate minerals. Mineral classification. Descriptive mineralogy. Principal rock forming minerals.

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

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

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

Textbooks

Judson S., Deffreyes K. S. & Hargraves R. B. *Physical Geology* Prentice-Hall

Rutley F. *Rutley's Elements of Mineralogy* Read H. H. ed Murby

Tyrrell G. W. *The Principles of Petrology* Methuen

25.613
Geological Oceanography   S1 L2T4

Prerequisite: 25.022.

The form and nature of ocean basins; the origin, transport and distribution of suspended matter, igneous and sedimentary rocks of the ocean floor and their distribution; the significance of oceanic igneous rocks, palaeontology, stratigraphical history and correlation of marine sedimentary rocks; magnetism and palaeomagnetism, tectonics of ocean basins.

Compulsory field work to be arranged.

Textbook

Gross M. G. *Oceanography* Prentice-Hall

General Studies

Graduate Study
For students enrolled in the MScSoc degree course

26.567
Interdisciplinary Seminars and Project   F L2

Chosen in consultation with the Program Co-ordinator, topics aim to exploit students' special interests.

Geography

Undergraduate Study

27.801
Introduction to
Physical Geography   S1 L2T2½

The mechanism of the physical environment, with particular exemplification within the Sydney region. Geological controls of landform development; fluvial, slope and coastal processes and landforms; cyclic and equilibrium approaches to landform studies. The global radiation budget and atmospheric circulation; weather and climate in the Sydney region. The hydrologic cycle. Processes and factors of soil formation and the soil profile. Controls of vegetation in the Sydney region. The ecosystem.

Laboratory classes include: study and use of geologic and topographic maps and air photographs; use of climatic data and the weather map; soil description. Two field tutorials, equivalent to 16 tutorial hours, are a compulsory part of the course. Students must provide basic drawing equipment.

Textbook

Van Riper J. E. *Man's Physical World* McGraw-Hill

27.802
Introduction to Human Geography S2 L2T2½

Problems of data, scale, distance and economic development. Development of human geography — traditions, approaches and basic problems, the human and natural environment. Spatial interaction including patterns of movement, gravity concept and diffusion. Pattern and structure of human activity: effect of level of economic development, man/land relationships and social and cultural factors on agriculture, manufacturing and tertiary services. Population — resources problem in context of economic development. Australian and South-East Asian examples are used where relevant.

Laboratory classes in data presentation and description. Course involves a compulsory field excursion equivalent to eight tutorial hours.

Textbooks

Hammond R. & McCullagh P. S. *Quantitative Techniques in Geography* OUP

Hurst M. E. *A Geography of Economic Behaviour* Duxbury*

27.811
Physical Geography   S2 L2T2½

Prerequisites: 27.801, 27.802, 27.813.

Emphasising inter-dependence of climate, hydrology, landforms, soils and vegetation in major zones. Classification of climates and world climatic patterns. Soil zonality and world soil patterns. World vegetation types and distribution, and their controls. Studies of selected zones with particular reference to the Australasian region.

Laboratory classes: climatic analysis and mapping, and analysis of natural landscapes, including airphoto interpretation, together with appropriate statistical exercises.

Textbooks

Bridges E. M. *World Soils* CUP*

Riley D. & Young A. *World Vegetation* CUP*

Van Riper J. E. *Man's Physical World* McGraw-Hill

27.812
Human Geography   S2 L2T2½

Prerequisites: 27.801, 27.802, 27.813.

Spatial structure and social organisation in human geography with some emphasis on Australasia and South-East Asia. Pre-urban societies; urbanisation in underdeveloped and industrialized societies; the urban growth process; location, size and spacing of settlements; the economic and social structure of urban areas; geographical perspectives on urban problems.

Includes laboratory classes on relevant methodology applied to local examples and a compulsory field tutorial.

27.813
Geographic Methods   S1 L1T3

Prerequisites: 27.801, 27.802.

An introductory course in statistical procedures as used in both human and physical geography, including: measures of dispersion; measures of spatial distribution; time series; probability distributions; samples and estimates; hypothesis testing; correlation and regression; tests for distribution in space.

Textbook

Hammond R. & McCullagh P. S. *Quantitative Techniques in Geography* OUP

27.103
Climatology   S2 L2T3½

Prerequisites: 27.801 and 27.813 or 25.011, 1.001.

Components of the radiation and heat balance of the earth surface as affected by differing atmospheric, soil and surface cover conditions. Factors controlling evaporation and transpiration under freely-available and restricted water supply conditions, and methods for the measurement and estimation of evapotranspiration. Characteristic patterns of energy and water exchange for differing types of natural or man-modified land surface. Man's modification of factors affecting the local climate in rural and urban settings. Climatic change.

Laboratory work is directed toward developing an appreciation of the operational principles and limitations of instruments commonly used in radiation and water balance studies. An introduction is given to the practical application of energy and water balance models for evaluation of the climatic environment as related to catchment hydrology, agricultural productivity and land resource management problems.

Textbook

Sellers W. D. *Physical Climatology* Chicago UP

27.203
Biogeography   S1 L2T3

Prerequisites: 27.801 and 27.813 or 17.011 and 17.021.

Ecosystems, their structure and dynamics. Energy flow and biogeochemical cycles. Comparative photosynthetic capacity of plants. Productivity, exploitation, pollution, management and conservation of ecosystems. Man as an ecological agent.

Quantitative sampling, measurement and description of vegetation. Spatial distribution (pattern) of individual species. Association between species.

Ecology of tropical and sub-tropical regions with special reference to Australia. Floristic composition, structure and physiognomy of the principle vegetation formations of Australia (rain forest, woodland, shrubland, heath and grasslands). Geographical affinities of component species. Environmental and biotic controls. Adaptations of plants to humid and arid conditions. Vegetation management under humid and arid conditions.

Fieldwork forms an integral part of the course.

Textbooks

Kershaw K. A. *Quantitative and Dynamic Plant Ecology* 2nd ed Arnold

Odum E. P. *Fundamentals of Ecology* 3rd ed Saunders

27.413
Geomorphology   S1 L2T3

Prerequisites: 27.813 and 25.011 or 27.801 and 27.802.

Advanced work in selected areas of coastal and fluvial geomorphology. The characteristics of waves in deep and shallow water. Beaches and coastal barrier systems; lagoons and estuaries. Rock platforms. Quaternary sea-level changes. Drainage basin morphometry, hill-slope geometry and hydrology. Runoff and sediment yields and their controlling factors. Variations in geomorphic processes between regions; the impact of human activity. Field projects are undertaken in both coastal and fluvial components. Laboratory time is devoted to statistical exercises using data collected from maps, airphotos and in the field.

* Paperback.

Textbooks

Bird E. F. C. *Coasts* ANUP*

Gregory K. J. & Walling D. E. *Drainage Basin Form and Process* Arnold

27.423
Pedology   S2 L2T3

Prerequisites: any two of 2.111, 2.121, 2.131 and 27.813, either 27.811 or 27.801, and 25.012 or 25.022. Excluded: 27.863.

History of Pedology. Morphological, physical and chemical properties of soil. Soil forming processes; rock weathering. silicate formation. Great Soil Groups; soil classification; soil-landscape relations and periodicity. Physical and chemical aspects of soil fertility; nutrient cycles; soil microbiology. Laboratory classes upon the measurement of soil properties; soil profile description; soil survey and mapping; analysis of soil maps. Up to five days field tutorials are an essential part of the course.

27.823
Urban Geography   S1 L2T3

Prerequisites: 27.812, 27.813.

The geography of cities in the context of economic and cultural systems, social and political processes, and historical perspectives. Topics: foundations of urban geography; the city in underdeveloped countries and planned economies; the city as an ecosystem; distributions, problems and policies of urban size; growth centres and urban planning; interurban and intraurban movement and linkages; urban residential preferences and spatial differentiation; urban environmental quality and the perceived urban environment. Weekly seminars, and laboratory and fieldwork of a practical nature to include urban survey techniques.

27.840
Agricultural Geography   S2 L2T3

Prerequisites: 27.812 and 27.813 or 15.603 or 53.204 or 51.542.

Physical, economic, political, and other cultural factors involved in origin and change of agricultural landscapes. Spatial patterns of agriculture as the result of individual and group decisions. Innovation diffusion as the process of farming change. Problems of agricultural modernization in South East Asia. Planning in rural areas, especially the impact on agriculture of competing land uses. Examples mainly drawn from Australasia.

Workshop/seminar classes include treatment of methods of inquiry into agricultural geographical problems and discussion of selected topics.

27.841
Population Geography   S1 L2T3

Prerequisites: 27.812 and 27.813 or 53.204.

Population growth and contrasts in growth patterns between underdeveloped, modernizing and developed countries. Growth dynamics and their relation to physical and human resources. The demographic transition as a unifying theme. Population densities in urban and rural areas: case studies are drawn mainly from Western Europe, Southeast Asia and Australia. Social and economic factors in international and internal migration. Spatial interaction between the populations of rural areas and cities, and between cities. Fertility and mortality variations within and between regions, countries and cities. Urbanization of population. Stable and stationary population theory. World population problems. Workshop tutorials are concerned with session projects.

Textbooks

Demko E. J., Rose H. M. & Schnell G. A. *Population Geography: A Reader* McGraw-Hill*

Wilson M. G. A. *Population Geography* Nelson*

Zelinsky W., Kosinski L. A. & Mansell Prothero R. *Geography and a Crowding World* OUP

27.860
Landform Studies   S1 L2T3

Prerequisites: 27.811, 27.813.

The study of landforms, with particular reference to Australian examples. Geomorphic regions. Planation surfaces and processes and associated weathering features. The evolutionary and dynamic approaches to landforms, with particular reference to fluvial landforms. Coastal processes and forms. Desert landforms. Landforms as evidence of climatic change.

Textbooks

Bird E. F. C. *Coasts* ANUP*

Branagan D. F. & Packham G. H. *Field Geology of New South Wales* Science Press

Mabbutt J. A. *Desert Landforms* ANUP*

Morisawa M. *Streams, their Dynamics and Morphology* McGraw-Hill*

27.862
Australian Environment and
Land Resources   S2 L2T3

Prerequisites: 27.811 and 27.813 or 25.011.

Regional patterns of natural land and water resources of Australia. Climatic, geomorphic, soil and biotic factors affecting past, present and potential modes of land use and stability of primary production. Conditions of the physical environment which favour or impede productive utilization and further development of land, marine, freshwater and energy resources under a changing technology. Problems of avoiding degradation of land quality and natural ecosystems. Case studies from distinctive environmental settings in Australia.

Laboratory/workshop sessions include the study of maps and air photographs of typical environments: local environmental problems are investigated in the field.

Textbook

CSIRO *The Australian Environment* MUP

* Paperback.

27.863
Soils, the Ecosystem and Man   S1 L2T3

Prerequisites: 27.811, 27.813. Excluded: 27.423.

Soils as an expression of endogenic and external factors and of physical and biological controls, and as a bridge between the physical environment and man's use of the land. Materials and properties of soils. Soils in the ecosystem; interrelationships between soil and climatic, biotic and geomorphic features of the environment. Constraints imposed by soil properties on land use, in both rural and urban settings. Man's effect on the soil, and its consequences, eg. soil pollution, disturbance of soil-moisture and nutrient cycles, soil depletion and erosion.

These themes will be co-ordinated in the study of regional examples in Australia and South-East Asia. There are laboratory workshops, field excursions and group projects.

Textbooks

Fitzpatrick E. A. *An Introduction to Soil Science* Oliver & Boyd

Holmes J. *Man and the Environment: Regional Perspectives* Longman

Miller G. T. *Living in the Environment: Concepts, Problems and Alternatives* Wadsworth

27.833
Urban Geography (Advanced)   S1 L3T3

Prerequisites: Graded passes in 27.812, 27.813 plus one other Upper Level unit in Geography.

As for 27.823 Urban Geography with additional and more advanced work.

27.850
Agricultural Geography (Advanced) S2 L3T3

Prerequisites: Graded passes in 27.812, 27.813.

As for 27.840 Agricultural Geography with additional lecture/tutorials, especially relating to agricultural change in Australia.

27.851
Population Geography (Advanced)   S1 L3T3

Prerequisites: Graded passes in 27.812, 27.813.

As for 27.841 Population Geography with additional and more advanced work on techniques of spatial population analysis.

27.870
Landform Studies (Advanced)   S1 L3T3

Prerequisites: Graded passes in 27.811, 27.813.

As for 27.860 Landform Studies, with additional and more advanced work, including selected studies of geomorphic processes and of man's influence on those processes.

27.872
Australian Environment and
Land Resources (Advanced)   S2 L3T3

Prerequisites: Graded Passes in 27.811, 27.813.

As for 27.862 Australian Environment and Land Resources plus further study based on additional seminars and reading. Additional topics include **1.** environmental bases for reserving land and water resources for forestry, water supply, wildlife protection, and recreation; **2.** conflicting demands in regional resource development.

27.880
Advanced Geographic Methods   F L1T1½

Prerequisites: Graded Passes in 27.811 or 27.812 and 27.813.

Additional quantitative research techniques normally taken by Honours students in their third year. Research organization; computing including Fortran; collection and organization of data; statistical description; hypothesis testing and sampling; simple and multiple association analysis; nonparametric methods.

Textbooks

Blatt J. M. *Introduction to Fortran IV Programming* Goodyear

King L. J. *Statistical Analysis in Geography* Prentice-Hall

Optometry

Undergraduate Study

31.811
Optometry I   F L4T4

Prerequisites: 1.001, 10.001 or 10.021 or 10.011.
Co-requisite: 31.821.

Geometrical and Physical Optics — Extension of Physics I content on the nature of light, reflection, refraction, thin lenses, optical instruments, dispersion and colour.

Lens systems and thick lenses, Interference, Diffraction, Polarisation, Photometry.

Mechanical Optics and Optical Dispensing — The manufacture and properties of spectacle lens materials. The 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.

Physiological Optics — Optical system of the eye: the retinal image, visual acuity. Refraction of the eye: hyperopia, myopia, astigmatism, aphakia. Presbyopia. Anisometropia. The schematic eye. Theory of subjective refraction. Aberrations of the eye. Entopic phenomena. Accommodation and convergence. Binocular vision, stereoscopy.

Textbooks

Emsley H. H. *Visual Optics* Vols I & II Butterworths

Fincham W. H. A. & Freeman M. H. *Optics* 8th ed Butterworths

Jalie M. *The Principles of Ophthalmic Lenses* Assoc of Dispensing Opticians, London

31.812
Optometry II   F L8T7

Prerequisites: 31.811, 31.821. Co-requisite: 31.831.

External and Internal Examination of the Eye: Case history and symptoms. Signs of local and/or general disease. Examination methods and instruments. Optometrical photography. Facial measurements and frame fitting. *Examination of Visual Functions:* Theory and practice of perimetry. Criteria of norms. Interpretation of field defects. Evaluation of light and colour sense. *Refraction:* Theory and practice of keratometry, objective and subjective refraction, prescribing special visual aids. Theory of design and construction of apparatus. *Orthoptics and Pleoptics:* Assessment of binocular sensory and motor functions. Diagnosis and treatment of anomalies. Instrumentation. *Reading Deficiency:* The reading process and its anomalies. Remedial training. Instrumentation. *Lighting:* Elements of illumination engineering. Assessment of visibility. Sight conservation.

Textbooks

Aust W. *The Conservative Management of Squint* Karger

Bier N. *Correction of Sub-Normal Vision* 2nd ed Butterworths

Clayton G. H. *Spectacle Frame Dispensing* Assoc of Dispensing Opticians, London

Harrington D. O. *The Visual Fields* Mosby

31.813
Optometry III   F L6T0

Prerequisite: 31.812.

Industrial Optometry: Job analysis and standardization of visual requirements. Occupational visual aids. Vision screening. Industrial hazards and industrial eye protection. *Contact Lenses:* Theory and practice of prescribing haptic and corneal lenses. Instruments. *Theory of Spectacle Lenses and Optical Instruments:* Advanced geometrical optics and spectacle lens design. Aberrations and their control. The elements of macroscopic and microscopic systems. *Advanced Visual Physiology and Physiological Optics:* Recent advances in anatomy and physiology. An introduction to electrophysiology. Aetiology of refractive errors. Theories of colour perception and its anomalies. Evaluation of diagnostic tests. Theories of space perception. Distortion of stereoscopic space. Stereoptics. *Comparative Ophthalmology and Ocular Evolution:* The anatomy and physiology of invertebrate and vertebrate visual organs. Evolution of binocular vision. *History of Optics:* Discussion of the development of optics, ophthalmology and optometry against the background of a short history of science. Optometrical and interprofessional ethics.

Textbooks

Bennett A. G. *Optics of Contact Lenses* Assoc of Dispensing Opticians

Burnham R. W., Hanes R. M. & Bartleson C. J. *Colour: A Guide to Basic Facts and Concepts* Wiley

Mandel R. B. *Contact Lenses Practice: Basic and Advanced* Thomas

31.821
Special Anatomy and Physiology   F L3T3

Prerequisites: 17.011, 17.021. Co-requisite: 73.011A.

Histology, Anatomy, and Embryology of the Eye and Associated Structures: Anatomy and histology of the eyeball, ocular adnexae, bony orbit, visual nervous pathways and visual cortex. The blood vessels, muscles, and nerves of the orbit and associated structures. The motor and sensory pathways associated with the visual apparatus. Elementary embryology and the detailed development of the eye and adnexae. Developmental defects of the eye and adnexae. *Physiology of the Eye and Vision:* Physiology of the eyelids and lacrimal apparatus, cornea, aqueous humour and intra-ocular pressure, iris and pupil, lens and accommodation, retina and photo-chemistry of vision. Sensory responses to ocular stimulation, luminosity curve, flicker, after-images, and contrast phenomena. Visual acuity. Light- and dark-adaptation, photopic and scotopic vision. Colour vision and colour blindness. Eye movements, binocular vision, and stereopsis. Theories of vision, visual perception.

Textbooks

Moses R. A. *Adler's Physiology of the Eye* Mosby

Wolff E. *The Anatomy of the Eye and Orbit* Lewis

31.831
Diseases of the Eye   F L2T1

Prerequisites: 31.811, 31.821; 73.011A. Co-requisite: 31.812.

Introductory Bacteriology and Pathology: Pathogenic organisms, infection, immunity, allergic manifestations. Antiseptics and germicides, antibiotics. Pathological tissue changes; cysts, neoplasms. Diseases of the blood, arteries, veins, heart, lungs, and kidneys. Venereal diseases. Diseases of the nervous system. *The Aetiology, Pathology, Diagnosis and Prognosis of Diseases of the Eye and Adnexae:* Diseases of the eyelids, lacrimal apparatus, orbit, conjunctiva, cornea, sclera, uveal tract, lens vitreous, retina, and optic nerve. Glaucoma. Ocular injuries. Sympathetic ophthalmia. Disease resulting from blood-borne infection. Disturbances of vision of central origin. Disturbances of ocular motility. Developmental abnormalities. *The Ocular Manifestation of Systemic Diseases:* Ocular manifestations of: tuberculosis, syphilis, disorders of metabolism, dental sepsis, diseases of the kidneys, cardiovascular system, blood, endocrine system, central nervous system, phakomatoses and hereditary syndromes.

Textbooks

Lyle T. K. & Cross A. G. *May and Worth's Manual of Diseases of the Eye* Bailliere

Passmore R. & Robson J. S. eds *A Composition to Medical Studies* Vol. 2 Blackwell

Perkins E. S. & Hansell P. *An Atlas of Diseases of the Eye* Churchill

31.841
Clinical Optometry   S1 L1T14
                                         S2 T14

Prerequisite: 31.831.

Each student examines and prescribes for about fifteen patients per week. Special emphasis is placed on perimetry, aniseikonia studies, orthoptic diagnosis and treatment, reading deficiency diagnosis and treatment, and other advanced optometrical techniques. Each student keeps a detailed case book of all patients examined and treated, and conducts a number of visual surveys and visual job analyses; experience is also gained in the fitting of contact and corneal lenses on selected patients.

Graduate Study

31.701G
Advanced Clinical Optometry   F T4

Clinical work on selected patients, with special emphasis on advanced techniques and new developments. All areas of optometric examination procedures are covered, including: external and internal examination of the eyes; visual functions; tonometry; objective optometry; evaluation of binocular functions; aniseikonia; sub-normal vision; geriatric and pediatric optometry; the clinical application of electrophysiological techniques. The assessment of new instruments, methods and treatment.

31.702G
Advanced Physiological Optics   F L2T2

Advanced studies in a number of areas of physiological optics. *Refractive State of the Eye:* Physiological basis of ocular refraction, advanced study of the schematic eye, modern concepts of ocular image formation, resolution of the ocular image. Scatter, absorption and reflection of light within the eye, illumination of the retina, receptor density and the retina image, image-forming properties of the rods and cones. Ultrasonic, X-ray and optical techniques for defining the parameters of the refractive state. Aetiology of the refractive state. *Perceptual Organization of the Retinal Image:* Neural networks in the retina and their mathematical analogs, visual transfer functions. Mach bands, retinal inhibition, spatial and temporal resolution of the retina, static and dynamic visual acuity. Stabilization of the retinal image. Periodic stimulation processes. *Electrophysiology of Vision:* Electrical fields of the eye, monitoring the ocular potential. Electro-oculography, electroretinogram, electromyogram, electro-encephalogram. Electropathology of vision. *Autonomic Servo-mechanisms of the Eyes:* Pupillometry. Accomodation. *Colour Vision:* Basic mechanisms 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. Para-foveal 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 response to lenses.

31.705G
Advanced Contact Lens Practice   F L1T3

The examination, evaluation and aftercare of contact lens patients.

31.706G
Occupational Optometry   F L2T2

Visual job analysis, human aspects of man-machine systems. Information theory, channel capacity. Visual aspects of man-machine relationships. Visual presentation of information, visual detection, identification and estimations, visual coding. Layout of workplaces, illumination, effects of environment on human performance. Relevant aspects of anthropometry. Visual screening techniques. Industrial eye protection and elements of Safety Engineering. Research techniques in Human Engineering. Visual factors in driving and road safety. Visual factors in aviation.

31.707G
Clinical Photography   F L2T2

Introduction to clinical photography, cameras and lens systems, colour films, black-and-white films and filters, apparatus and accessories. Patient preparation and positioning, backgrounds and foregrounds, lighting, the "safe-set" method. Copying, slide making, macrophotography, micro-photography. "Invisible light" photography (ultraviolet and infra-red), photofluorography, speedlight techniques, fundus photography. Dark-room techniques, portable dark-rooms. Quantitative photographic data analysis.

31.799G
Project

Biochemistry

Undergraduate Study

41.101
Introductory Biochemistry   S1 L4T8

Prerequisites: 17.021, and 2.121, 2.131. Excluded: 2.003J.

The chemical properties of amino acids, peptides and proteins, carbohydrates, nucleic acids and lipids and the biological roles of these compounds. The nature and function of enzymes. The intermediary

metabolism of carbohydrates, lipids and nitrogenous compounds. The molecular mechanism of gene expression and protein synthesis. Photosynthesis. Practical work to amplify the lecture course.

Textbook

Stryer L. *Biochemistry* Freeman

41.111
Biochemical Control   S2 L2T4

Prerequisite: 41.101.

The relationship between structure and function of enzymes, hormones, vitamins and membranes. Metabolic networks and control mechanisms. Practical work to amplify the lecture course.

Textbooks

As for 41.101, plus

White A., Handler R. & Smith E. L. *Principles of Biochemistry* 5th ed McGraw-Hill

41.102A
Biochemistry of Macromolecules   S1 L3T9

Prerequisites; 41.101, 2.002B.

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

Textbooks

Scientific American *The Chemical Basis of Life. An Introduction to Molecular and Cell Biology* Freeman
White A., Handler R. & Smith E. L. *Principles of Biochemistry* 5th ed McGraw-Hill

41.102B
Physiological Biochemistry   S2 L3T9

Prerequisites: 41.101, 2.002B.

Haemoproteins, electron transport, oxidative phosphorylation. Nature and function of co-enzymes. Interrelationships in mammalian intermediary metabolisms. Biochemical control mechanisms including hormomes and allosteric interactions. Enzyme kinetics. Selected aspects of differentiation and development in higher organisms. Practical work to illustrate the lecture course and to provide experience in modern biochemical techniques.

Textbooks

As for 41.102A above.

41.102C
Plant Biochemistry   S2 L2T4

Prerequisites: 41.101, 2.002B.

The biochemistry of the major pathways characteristic of plants will be studied; topics include the energetics and carbon path of photosynthesis, glyoxalate cycle, growth hormones and regulatory phenomena, nitrogen fixation and assimilation.

Experimental work to illustrate and amplify the course utilizes radioactive isotopes and a number of newer techniques.

Textbooks

No set texts. A reference booklist is provided by the School.

41.102D
Biosynthesis of Plant Metabolites   S2 L2T4

Prerequisites: 41.101, 2.002B. Corequisite: 41.102C.

This unit complements 41.102C and is taken with it.

Topics: cell wall formation and the synthesis of mobilization of reserve materials; biosynthesis of amino acids, its regulation, and their conversion into non-protein materials, eg alkaloids and cyanogenetic glycosides; aromatic ring formation and the isoprene pathway as a source of rubber, steroids, carotenes and essential oils. Flower pigments and phytoalexins.

A combined practical with unit 41.102C illustrates and amplifies the course and includes a wide range of the latest techniques.

Textbooks

No set texts. A reference booklist is provided by the School.

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.

Graduate Study

41.999G
Masters Qualifying Program

For students without an Honours degree or ineligible for the award of the BSc degree with honours. Full-time students follow a one year program similar to 41.103. Part-time students follow a two-year program selected according to educational background and experience.

Biological Technology

Undergraduate Study

42.101
Introduction to Biotechnology   S2 L2T4

Prerequisites*: 2.121, 2.131, 17.021, 10.011 or 10.001 or 10.021.

An introduction to biotechnology as a multidisciplinary subject, dealing with the application of biological systems in industry, agriculture and medicine. The application of the techniques and methodologies of mathematics, the physical sciences and engineering to the understanding and optimization of biological processes. An outline of the field and scope of biotechnology in relation to the development of microbial processes for the production of special chemicals such as antibiotics and enzymes and the production of single cell protein as an alternate protein source. The role of biotechnology in relation to pollution control and waste disposal. Biotechnological aspects of alternate energy sources. Likely contributions of biotechnology to the problems of developing countries.

The laboratory component emphasizes identification and manipulation of different classes of microorganisms (bacteria, fungi, algae) involved in traditional fermentations, industrial processes and waste treatment.

Textbooks
No set texts.

42.102A
Biotechnology A   S1 L2T4

Prerequisites*: 41.101 and 42.101 or 44.101.

The basic principles involved in the operation of microbial processes on an industrial scale. 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 microorganisms, laboratory-scale fermenter operation, microbial enzyme isolation, visits to industrial fermentation plants and industrial seminars.

Textbooks
Aiba S., Humphrey A. E. & Millis N. *Biochemical Engineering* 2nd ed Academic
Pirt S. J. *Principles of Microbe and Cell Cultivation* Blackwells

42.102B
Biotechnology B   S2 L2T4

Prerequisite*: 42.101.

Application of principles of biotechnology to the analysis and design of microbial processes of industrial relevance (antibiotics, microbial enzymes, single cell protein from carbohydrates and hydrocarbons, fermented foods and beverages, amino acids and vitamins, microbial polysaccharides, activated sludge and photosynthetic processes for waste treatment, microbial leaching of low-grade minerals). Emphasis on quantitative approach: mass and heat balance calculations, kinetic and thermodynamic analysis, detailed equipment design and specification, process design and layout, process simulation, plant location, application of optimization techniques. The economics of microbial processes 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.

Textbook
Aiba S., Humphrey A. E. & Millis N. *Biochemical Engineering* 2nd ed Academic

42.103
Biological Technology (Honours)

Advanced formal training in selected areas of biotechnology and participation in one of the school's research projects.

42.104
Graduate Seminars

42.114
Fermentation Processes

(Component topic of 22.114 Processes.) Factors governing the use of micro-organisms in industrial processes, including the selection, maintenance and improvement of micro-organisms, the control of environmental factors, batch and continuous flow operational patterns, product recovery, process optimization and waste disposal. Demonstrations of the operation and control of fermenter systems and of microbial process simulation.

Graduate Study

42.111G
Reading List in Biological Technology (Microbiology)

* In exceptional circumstances a student may apply to the Head of School for variation of prerequisite.

42.112G
Reading List in Biological Technology
(Biochemistry)

42.211G
Principles of Biology   SS L3

A study of the characteristics of living systems, including a functional treatment of cytology, metabolism, bioenergetics; structure, function and characteristics of single and multicellular systems; growth; cell division; reproduction; heredity and evolution.

42.212G
Principles of Biochemistry   SS L3

A condensed treatment of biochemistry comprising the following aspects: the elemental and molecular composition of living organisms; the chemistry and roles of the biological elements and molecules; the thermodynamics and enzymatic catalysis of metabolism; catabolic, anabolic, amphibolic and anaplerotic processes, with emphasis on hydrolysis and synthesis of polymers, glycolysis and gluconeogenesis of glucose, β-oxidation and synthesis of fatty acids, deamination and decarboxylation of amino acids, the tricarboxylic acid cycle, electron transport and oxidative phosphorylation; metabolic regulation and integration.

42.213G
Biochemical Methods   SS T3

A laboratory program in practical biochemistry. The basic instrumentation and methodology of the biochemist will be introduced by practical exercises and demonstrations. A comprehensive treatment of the relevance and applicability of biochemical techniques is covered in tutorials.

42.214G
Biotechnology   SS L2T1

The selection, maintenance and genetics of industrial organisms; metabolic control of microbial synthesis; fermentation kinetics and models of growth; batch and continuous culture; problems of scale-up and fermentor design; control of the microbial environment involving computer/fermentor interactions. Industrial examples will be selected from: antibiotic and enzyme production, alcoholic beverages, single cell protein (SCP), microbial waste disposal and bacterial leaching.

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

42.301G
Microorganism Productivity   SS L2T3

Mechanisms of metabolic control — induction, repression and forms of activation and inhibition; microbial genetics — mutation, selection, genetic transfer and manipulation; environmental parameters — oxygen, tension, pH, temperature, energy source etc. as are relevant to productivity in industrially important microorganisms.

Detailed studies — choice of substrate, screening and isolation of microorganisms, systematic application of techniques of genetic and physiological manipulation required to optimize product formation (products include for example, amino acids, nucleotides, enzymes and other macromolecules, antibiotics and other physiologically active compounds), potential strain improvement of microorganisms involved in other industrial processes (for example, mineral leaching, single cell protein production, detoxification and waste disposal).

Laboratory component will include 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
Microbial Process Control   SS L2T3

Fundamentals of process control, instrumentation and automatic control for microbial systems, an evaluation of mathematical modelling as a basis for microbial product optimization, analog computer modelling techniques, highly-instrumented fermentation equipment and on-line computer control.

Detailed models of microbial processes: organic acid production, antibiotics, enzymes, hydrocarbon fermentations, biological waste treatment, microbial leaching, mixed culture interactions, single and multistage continuous culture, simulation of enzyme reactors.

The practical component involves the collection of accurate kinetic data for a microbial system, the development of a model and the use of a model for on-line computer control.

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; bio-deterioration of fuels, petrochemical products, synthetic materials, timber and cellulosic products, building materials etc.; degradation of rocks and minerals; biological leaching of ores and mineral processing residues.

The laboratory component includes assessment of biodegradability of common industrial materials (detergents, surface coatings, fuels, biocides etc.); evaluation of protective methods; determination of biological leachability of minerals and mineral processing residues.

42.305G
Case Studies   SS L0T2

Critical evaluation of industrial processes and research and development procedures. Includes: study of isolated and selected areas of biotechnology, detailed study and evaluation of all aspects of an industrial process from the isolation of the appropriate organism or other biological starting material to the production and use of the final products, critical evaluation of techniques arising from current research and development programs.

42.306G
Project   F L0T7

An experimental or technical investigation or design project in the general field of biotechnology with supporting seminars.

42.401G
Chemical Transformations in the
Environment   SS L2T0

The environment may be regarded as an array of dynamic chemical and physical systems which can be influenced by a wide variety of factors. Select topics illustrate some important aspects of environment systems: **1.** microbial transformations of mineral and geochemical systems including the recovery of useful materials, control of metal pollution, recycling of inorganic wastes; **2.** the chemistry of river and underground water systems; **3.** the influence of new materials on the environment, including the effects of fungicides and other biocides.

Textbooks
No set texts.

42.999G
Alternative Higher Degree
Qualifying Program

Training similar in content and standard to 42.103 Biological Technology (Honours), but designed specifically for students who cannot regularly attend the University.

Botany

Undergraduate Study

43.101
Genetics   S2 L2T4

Prerequisites: 17.001 or 17.011 and 17.021.

Various aspects of molecular, organismal and population genetics, including: meiotic and non-meiotic recombination, genome variations, mutagens and mutation rates. cytoplasmic inheritance, gene function, genetic code, gene structure. collinearity of polynucleotide and polypeptide, control of gene action, genes and development, population genetics, genetics and improvement of plants and animals.

Textbook
Patt D. I. & Patt G. R. An Introduction to Modern Genetics Addison-Wesley

43.111
Flowering Plants   S1 L2T4

Prerequisites: 17.001 or 17.011 and 17.021.

The vegetative and floral morphology of Angiosperms with special reference to variations in morphology. elements of biological classification, nomenclature and identification of native plants. Weekend field work is part of the course.

Textbooks
Bell C. R. Plant Variation and Classification Wadsworth
Esau K. The Anatomy of Seed Plants Wiley

43.121
Plant Physiology   S2 L2T4

Prerequisites: 17.001 or 17.011 and 17.021. 2.001 or any two (2) units of: 2.111; 2.121; 2.131. Students may apply to the School for variations of the prerequisites.

The physiology of the whole plant including a consideration of photosynthesis, the role of phytochrome in plant morphogenesis and flowering, inorganic nutrition transport, translocation. physiology of growth and development, seed physiology and plant growth substances and their application in agriculture.

Textbooks
Galston A. W. & Davies P. J. Control Mechanisms in Plant Development Prentice-Hall
Richardson M. Translocation in Plants Arnold
Sutcliffe J. Plants and Water Arnold
Whittingham C. P. Photosynthesis OUP

43.131
Fungi and Man   S1 L2T4

Prerequisites: 17.001 or 17.011 and 17.021.

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.

Textbook

Talbot P. H. B. *Principles of Fungal Taxonomy* Macmillan

43.102
Advanced Genetics‡   S2 L2T4

Prerequisite: 43.101.

Students wishing to take this subject should request details from the School.

43.112
Plant Taxonomy†‡   S2 L2T4

Prerequisite: 43.111. Co-requisite: 43.101.

The assessment, analysis and presentation of data for classifying plants both at the specific and supra-specific level; the emphasis is on vascular plants. Field work is part of the course.

Textbooks*

Beadle N. C. W., Evans O. D. & Carolin R. C. *Flora of the Sydney Region* Reed

Heywood V. H. *Plant Taxonomy* The Institute of Biology's Studies in Botany No. 5 Arnold

Jeffrey C. *An Introduction to Plant Taxonomy* Churchill

Jeffrey C. *Biological Nomenclature* Arnold

43.122
Advanced Plant Physiology‡   S1 L2T4

Prerequisites: 41.101 or 41.101A and 41.101B, 43.121.

The physiology and biochemistry of plant lipids, with special reference to developing and germinating seeds, and of developing and ripening fruits. Project work is an important part of the course and some attendance is required outside the hours set down in the time-table. Reading and interpreting original scientific papers are an important part of these projects, which relate to current work in the fields covered.

43.132
Mycology and Plant Pathology‡   S2 L2T4

Prerequisite: 43.131. Students may apply to the School for variation of the prerequisite.

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 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.

Textbook

Alexopoulos C. J. *Introductory Mycology* 2nd ed Wiley 1962

43.142
Environmental Botany‡   S1 L2T4

Prerequisites: 17.001 or 17.011 and 17.021; 1.001. Students may apply to the school for variation of the prerequisite.

The soil and atmospheric environments in which plants live and a study of the interaction of plants with their environment. Emphasis is placed on the role of environmental sciences in food production. Students are required to attend three week-day field excursions as part of the practical course.

43.152
Palaeoecology‡   S2 L2T4

Prerequisite: 43.111.

The evolution of the Australian flora from the Tertiary to the present, and the relationships between the present flora and those of neighbouring land masses. Includes an introduction to methods of palynology and palaeoclimatology, as well as numerical methods in phytogeography. A field camp is an integral part of this course.

Textbooks

No set texts.

43.162
The Plant Kingdom§‡   S2 L2T4

Prerequisite: 43.111.

The major taxa of the Plant Kingdom with emphasis on the green plants. The evolution of basic vegetative structures, reproductive structures and genetic systems are studied. Field work will be part of the course.

Textbooks

Beadle N. C. W., Evans O. D. & Carolin R. C. *Flora of the Sydney Region* Reed

Morris I. *An Introduction to the Algae* Hutchinson

Sporne K. R. *The Morphology of Angiosperms* Hutchinson

Sporne K. R. *The Morphology of Gymnosperms* Hutchinson

Sporne K. R. *The Morphology of Pteridophytes* Hutchinson

Watson E. V. *The Structure and Life of Bryophytes* Hutchinson

* Students should consult lecturers in the course before purchasing textbooks.

† This unit alternates each year with 43.162 The Plant Kingdom. 43.162 The Plant Kingdom commences in 1977. If both units are to be included in three-year pass degree program, one should be completed in second year.

‡ These units may be taken in either second or third year of the Science course provided that prerequisites have been completed.

§ This unit alternates each year with 43.112 Taxonomy. This unit commences in 1977.

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 S.E. Australia.

Textbooks
Prescott G. W. *How to Know the Freshwater Algae* 3rd ed Brown, Iowa
Chapman V. J. & D. J. *The Algae* 2nd ed Macmillan

43.182   **S2 L2T4**
Cellular and Developmental Physiology‡

Prerequisite: 43.121. This unit may be taken as a co-requisite in some circumstances.

The physiology, organization and interrelations of higher plant cells. Emphasis is placed on the interactions between plant cells and cellular events which control such processes as the regulation of growth and division, the perception of gravity by plants, secretion, seed germination and senescence.

Microbiology

Undergraduate Study

Level II Units

44.101
Introductory Microbiology   **S2 L2T4**

Prerequisites: 17.011, 17.021.

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 algae, "higher" bacteria, typical unicellular bacteria and small bacteria-like forms); plant, animal and bacterial viruses. The relationship between microorganisms and their environment; ecological considerations. Interactions between microorganisms and higher organisms.

Textbook
Brock T. D. *Biology of Microorganisms* 2nd ed Prentice-Hall

44.111
Microbiology   **F L1T2**

This unit is not acceptable as a prerequisite for Level III Microbiology units except on the recommendation of the Head of School.

A short introduction to microbiology which is designed to familiarize students, without previous biological training, with microorganisms and with the methods used in their isolation and identification. The contents of the course is similar to that of 44.101.

Textbooks
Mitchell R. *Introduction to Environmental Microbiology* Prentice-Hall
or
Brock T. D. *Biology of Microorganisms* 2nd ed Prentice-Hall
or
Brock T. D. & K. M. *Basic Microbiology with Applications* Prentice-Hall

Level III Units

44.102
General Microbiology   **S1 L4T8**

Prerequisites: 44.101, 41.101 or 41.101A and 41.101B.

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; genotypic and phenotypic control systems.

Textbooks
As for 44.101 if not taking other Microbiology units. Otherwise:
Hawker L. E. & Linton A. H. eds *Microorganisms: Function, Form and Environment* Arnold
Davis B. D., Dulbeco R., Eisen H. N., Ginsberg H. S. & Wood W. B. *Microbiology* Complete 2nd ed Harper & Row

44.112
Applied Microbiology   **S2 L4T8**

Prerequisite: 44.102.

Endeavours to relate the basic facts about microorganisms to a variety of practical conditions. The occurrence, importance, activity and control of microorganisms in soil, air, water and in their relationship with higher organisms (other than man); their industrial applications including manufacture, preservation and spoilage of food and dairy products. The nature of bacterial and fungal diseases of man, their cultural and serological diagnosis, epidemiology, treatment and prevention will be discussed in some detail.

Textbooks
As for 44.102.

44.122
Immunology   **S2 L2T4**

Prerequisites: 17.011, 17.021, 41.101 or 41.101A and 41.101B.

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

‡ These units may be taken in either second or third year of the Science course provided that prerequisites have been completed.

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.

Textbook

Roitt I. *Essential Immunology* Blackwell Scientific Publications

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.

Textbooks
As for 44.102.

Level IV (Honours) Units

44.513
General Microbiology

Microbial taxonomy, structure and function, physiology, ecology and genetics.

44.523
Applied Microbiology

Selected aspects of industrial microbiology including fermentation processes, food production and food spoilage, soil microbiology; pathogenesis of microorganisms and host resistance; diagnostic medical microbiology; chemotherapy, disinfection and sterilization.

44.533
Immunology

Phylogeny and ontogeny of the immune response, non-specific and specific immune mechanisms; hypersensitivity reactions; immunochemistry; diagnostic serology, immunoprophylaxis and therapy.

44.543
Virology

A detailed study of virus-host interactions based on examples of bacterial and animal viruses; virus genetics; epidemiology of virus diseases; diagnostic virology.

44.553
Electron Microscopy

The principles and practice of electron microscopic techniques.

44.563
Microbiology Project I

A supervised laboratory project of 150 hours duration designed to provide experience in a wide range of microbiological and immunological techniques and to introduce students to the general principles of research methodology, particularly at an applied level.

44.573
Microbiology Project II

A supervised laboratory project of 300 hours duration. While considerable emphasis will be given to acquiring technical competence in many microbiological or immunological techniques, the projects in this unit will provide greater scope for training in research methodology.

44.583
Microbiology Project III

A supervised laboratory project of 500 hours minimum duration. These projects provide training in research in fundamental aspects of microbiology or immunology, with special emphasis on the development and use of specialized techniques relevant to the particular field of study.

Zoology†

Undergraduate Study

45.101
Biometry   S1 L2T4

Prerequisites: 17.011, 17.021. Excluded: 10.311A, 10.321A, 10.331.

Statistical methods and their application to biological data, including: introduction to probability; the binomial, poisson, negative binomial, 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.

45.201
Invertebrate Zoology   S2 L2T4

Prerequisites: 17.011, 17.021.

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.

† 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 has been completed.

Textbooks

Meglitsch P. A. *Invertebrate Zoology* 2nd ed OUP

Sherman I. W. & Sherman V. G. *The Invertebrates: Function and Form. A Laboratory Guide* Collier-Macmillan

45.301
Vertebrate Zoology   S2 L2T4

Prerequisites: 17.011, 17.021.

A comparative study of the Chordata, 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.

Textbooks

Hildebrand M. *Analysis of Vertebrate Structure* Wiley

Alexander R. McN. *The Chordates* CUP

45.112
Marine Ecology   S1 L2T4

Prerequisites: 17.011, 17.021, 45.201 or 25.022·or 2.002D.

A study of the metabolic, regulatory and reproductive activities 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, for the February field trip by 7 January.

Textbook

Tait R. V. *Elements of Marine Ecology. An Introductory Course* 2nd ed Butterworths

45.121
Evolutionary Theory   S1 L3T1

Prerequisites: 17.011, 17.021.

Current evolutionary theory, emphasizing the population level. Ecological genetics, evolutionary aspects of ecological niche theory, speciation, coevolution, and general evolutionary genetics. Some background in genetics is desirable.

Textbook

No set texts. Use is made of the original literature and the principal references.

45.122
Animal Behaviour   S1 L2T4

Prerequisites: 45.101, 45.201, 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.

Textbook

Brown J. L. *The Evolution of Behaviour* Norton

45.132
Comparative and
Environmental Physiology   S2 L2T4

Prerequisites: 41.101, 45.201, 45.301.

A study of the physiology of various groups of animals with particular emphasis on the adaptation of the animal to its environment. Includes: osmotic and ionic regulation, respiration and circulation, temperature regulation, nerve and muscle function, digestion and metabolism.

Textbooks

Gordon M. S. *Animal Function: Principles and Adaptations* 2nd ed Macmillan

Schmidt-Nielsen K. *Animal Physiology: Adaptation and Environment* CUP

Wessells N. K. *Vertebrate Structure and Functions* Readings from Scientific American, Freeman

45.142
Developmental and
Reproductive Biology   S2 L2T4

Prerequisites: 45.201, 45.301.

Reproductive mechanisms, reproductive histology, reproductive endocrinology, and embryology, with particular reference to the comparative aspects in vertebrate species. Marsupial and monotreme reproduction.

Textbooks

Gilchrist F. G. *A Survey of Embryology* McGraw-Hill

Nalbandov A. V. *Reproductive Physiology of Birds and Mammals* 3rd ed Freeman

45.202
Advanced Invertebrate Zoology   S1 L2T4

Prerequisite: 45.201.

A comparative study of the environmental and sensory physiology of invertebrates.

Textbooks

Schmidt-Nielsen K. *Animal Physiology: Adaptation and Environment* CUP

Wells M. *Lower Animals* Weidenfeld & Nicolson

45.302
Vertebrate Zoogeography   S2 L2T4

Prerequisite: 45.301. Co-requisites: 45.122 or 45.132 or 45.142.

A geographic approach to the current distribution, abundance and types of vertebrate species in the Australian region. Particular emphasis is placed on the basic principles of speciation, the history of the Australian continent, vertebrate adaptations and changes in the distribution and abundance of the Australian vertebrate fauna under the influence of man.

Textbook

No set texts. Use is made of the original literature and the principal references.

45.402
Insect Structure and
Classification   S1 L2T4

Prerequisites: 17.011, 17.021.

A comparative study of the internal anatomy and external morphology of insects. Classification and bionomics of major groups and families. A collection of insects is to be made. Practical work to include dissections, a study of mouthparts, wing venations, segmentation. Field excursions as arranged.

Textbook

CSIRO *The Insects of Australia* MUP

45.412
Insect Physiology   S1 L2T4

Prerequisite: 45.101. With special permission of the Head of School one of: 10.321A, 10.311A, 10.331 may be substituted for 45.101. Co-requisite: 45.402.

The functions of the various organ systems and of the whole insect. Various aspects of reproduction, growth and metabolism. Experimental work to illustrate the lecture course.

Textbook

Chapman P. F. *The Insects, Structure and Function* EUP

45.422
Applied Entomology   S2 L2T4

Prerequisite: 45.412.

Fundamentals of insect control. Pest species and types of damage caused. Control by insecticides, physical and biological means. Insect toxicology. Insecticide resistance. Practical work to illustrate the above and also various aspects of bioassay in Entomology. Field excursions as arranged.

Textbook

Woods A. *Pest Control: A Survey* McGraw-Hill

45.432
Project   S2 L2T4

Prerequisite: 45.412.

Selected aspects of insect physiology; ecology and toxicology. Treatment of topics in depth rather than breadth. Practical work illustrates the lectures and places emphasis on design and planning of experiments.

Philosophy

First Enrolment in Philosophy

In Session 1, students normally take:
52.151 Plato
52.161 Informal Logic
which each have half-unit value.

In Session 2 they normally take two half-units chosen from:
52.152 Hume
52.162 Formal Logic
52.182 Political Philosophy
52.171 Philosophy of Religion

Students are required to indicate their Session 2 choice on their initial enrolment forms, but may make alterations later if they wish.

Students who do not take Philosophy in Session 1 may, however, still qualify for admission to Upper Level work by passing two or more Philosophy half-units in Session 2.

Level II
Students may not proceed to Level II work in Philosophy in their first year of study. Students in later years may proceed to Level II work after passing two Level I half-units in either session.

At Level II a wide range of *half-units* is offered, some dealing with particular philosophical topics and others capable of being taken in sequence to give more sustained treatments of larger areas. Students may select freely among these, subject to stipulations regarding prerequisites.

In certain circumstances the prerequisites specified for units or half-units may be waived; for example, in the case of students who have already studied similar material, or who wish to take isolated units or half-units relevant to another discipline. Students who feel they have a case for a concession of this kind should consult the School.

A maximum of three units (six half-units) at Level II may be taken as part of the Science course, exclusive of General Studies. Additional units may, with permission, be substituted for a part of the General Studies requirement, in accordance with the provisions laid down in the General Studies Handbook.

Admission to the half-unit 52.423 Seminar A and 52.433 Seminar B, which are designed primarily for students intending to take Philosophy Honours in the Faculty of Arts, is by permission of the School normally based on a Credit Level performance in two or more Level II half-units already taken.

Selection of Units

The following details should assist students with their initial choice of half-units at Level II.

The half-units available in Session I having no prerequisite apart from Level I studies are:

Predicate Logic
Descartes
British Empiricism
Greek Philosophy: Thales to Plato
Scientific Method
Social and Political Philosophy

Of these, Predicate Logic is prerequisite to a range of advanced logic half-units, and Social and Political Philosophy caters in particular for those who wish to progress to other half-units in this area. Greek Philosophy: Thales to Plato is prerequisite to a later course on Plato. Descartes and British Empiricism are also prerequisites, alone or as

alternatives, to certain other half-units. Students who plan to take a full Philosophy major sequence will consequently need to consider what half-units they may wish to take later. Intending Honours students should expect to include Predicate Logic at some stage.

Provision is made for a full sequence of half-units in logic, namely, Predicate Logic, Set Theory, Model Theory and Foundations of Mathematics. The half-unit Argument caters for those with a less mathematically oriented interest in the subject.

Historical studies are catered for by the half-units: Greek Philosophy, Plato, Descartes, British Empiricism, Spinoza and Leibniz, History of Modern Logic, History of Traditional Logic, Logical Atomism, Wittgenstein, and Sartre, which can be arranged in sequences in various ways.

There are two half-units in the field of Ethics, namely Classical Ethical Theories, and Contemporary Ethics.

The half-units not so far mentioned deal with particular issues or philosophical views. They are: Philosophy of Psychology, Philosophy of Biology, Aesthetics, Philosophy of Perception, Privacy and Other Minds, and Oppression and Liberation. The half-units at Advanced Level consist of seminar courses on topics which vary from year to year based on recent articles in philosophical journals.

Undergraduate Study

52.151
Plato   S1 L1½T½

Prerequisite: None.

Some dialogues of Plato with special reference to conceptions of the soul, and their implications for views on morals, politics, education and theory of knowledge.

Textbook
Plato The Last Days of Socrates Tredennick H. trans Penguin

52.161
Informal Logic   S1 L1½T½

Prerequisite: None.

An approach to logic by way of language, treating such topics as the uses of utterances, the truth and significance of conditions of statements, the non-formal analysis of arguments, and the logical relations of propositions. Illustrations and examples are drawn from Freud's The Interpretation of Dreams.

Textbook
Freud S. The Interpretation of Dreams Strachey J. trans Basic, or Avon paperback

52.171
Philosophy of Religion   S2 L1½T½

Prerequisite: None.

The philosophy of religion consists in the attempt to answer certain questions. Among these questions are the following: Can it be proved that God exists or proved that he does not? Are "God is benevolent" and "There is evil" incompatible in the sense that everyone who holds that both statements are true contradicts himself? Can we make sense of the notion of the survival of our own death? Are such statements as "God loves us" meaningful? and do they also express something either true or false as opposed to being merely an expression of our own feelings? These are just a selection from the questions that will be examined in this course. The course is conducted by seminars, lectures and tutorials and is assessed on the basis of essays.

Textbook
Weinberg J. R. & Yandell K. E. eds Philosophy of Religion Holt Rinehart Winston

52.152
Hume   S2

Prerequisite: None.

Some sections of Hume's Enquiry. Topics to be discussed may include: the miraculous and the existence of God, the mind-body problem and personal identity, the freedom of the will.

Textbook
Hume D. On Human Nature and the Understanding Flew A. ed Collier

52.162
Formal Logic   S2

Prerequisite: None.

An introduction to a system of natural deduction sufficient for the symbolization of such ordinary language arguments and the construction of such proofs as lie within the field of propositional logic and simple predicate logic.

Textbook
Kalish D. & Montague R. Logic: Techniques of Formal Reasoning Harcourt, Brace & World

52.182
Introduction to
Political Philosophy   S2 L1½T½

Prerequisite: None.

Individuals live in social, or political, societies. These societies promote, protect and even create some rights and freedoms, limit others, and, perhaps, prohibit still others; and similarly for duties and obligations. Through the works of a number of historically central political philosophers — mainly Plato, Hobbes, Locke, Rousseau and Mill — this subject investigates the basis for the origin of political society, its various functions and its relation to the individuals within it.

Textbooks
To be advised.

52.153
Predicate Logic   S1 L2T0

Prerequisite: 56.162.

A system of natural deduction is presented for the first-order predicate calculus, including identity and definite descriptions. Emphasis is upon construction of formal derivations, methods of showing the invalidity of formal arguments, and the evaluation of informal arguments by symbolization.

Textbook

Kalish D. & Montague R. *Logic: Techniques of Formal Reasoning* Harcourt, Brace & World

52.163
Descartes   S1 L2T0

Prerequisite: Level II status in Philosophy.**

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 and his account of freedom.

Textbook

Anscombe G. E. M. & Geach P. T. eds *Descartes's Philosophical Writings* Nelson

52.173
British Empiricism   S1 L2T0

Prerequisite: Level II status in Philosophy.**

The empiricist tradition with special concentration on Locke and Berkeley.

Textbooks

Armstrong D. M. *Berkeley's Philosophical Writings* Collier*
Locke J. *An Essay Concerning Human Understanding* Fontana

52.193
Scientific Method   S1 L2T0

Prerequisite: Level II status in Philosophy.**

The nature of empirical knowledge as exemplified in the physical and social sciences and in history, with emphasis on the concept of explanation, the nature of induction and scientific laws, counterfactual statements, and the paradoxes of confirmation.

Textbooks

Hempel C. G. *Philosophy of Natural Science* Prentice-Hall
Ryan A. ed *Philosophy of Social Explanation* OUP

52.213
Sartre   S1 L2T0

Prerequisite: 52.492.

Sartre's account of freedom, relations between persons and his social theory.

Textbooks

Sartre J. P. *Being & Nothingness* Methuen or Pocket Books
Sartre J. P. *St. Genet: Actor and Martyr*
Laing R. D. & Cooper D. *Reason and Violence* Tavistock

52.223
Foundations of Mathematics   S2 L2T0

Prerequisite: 52.153.

A selection of problems concerning the foundations of Mathematics including the following topics: Non-Euclidean geometry and consistency proofs, Axiomatics, Antinomies of naive set theory, Logicism, Intuitionism, Formalism, Godel's incompleteness result.

Textbook

Wilder R. S. *An Introduction to the Foundations of Mathematics* Wiley

52.233
Argument   S2 L2T0

Prerequisite: Level II status in Philosophy.**

A theoretical study of practical argumentation in the courtroom, politics and everyday life as compared with argument in logic, mathematics and theoretical science. Confirmation and probability, authority, testimony, precedent; rules of debate; criteria of validity; problem of mechanization of practical arguments: logical rationalism and scepticism.

52.243
Logical Atomism   S2 L2T0

Prerequisite: Level II status in Philosophy.**

The logical atomism of Russell and Wittgenstein and the logical positivist movement.

Textbooks

Pears D. ed *Russell's Logical Atomism* Fontana
Wittgenstein L. *Tractatus Logico-Philosophicus* Pears D. F. & McGuiness B. F. trans Routledge

52.253
Philosophy of Biology   S2 L2T0

Prerequisites: Level II status in Philosophy.**

Some of the problems associated with the philosophy of biology. Main consideration is the autonomy of biology; ie, whether biology is in principle reducible to the physical sciences and, ultimately, to physics, or whether the biologist necessarily employs types of description and explanation that have no application in the explanation and

---

* Paperback.

** Level II status in Philosophy consists in **1.** being in second or later year of university study, and **2.** having taken and passed two Level I Philosophy half-units **in the same session**. This prerequisite may be waived in certain cases by the School.

description of merely physical phenomena. No prior knowledge of biology is assumed but candidates are expected to familiarize themselves with the attitudes of various biologists to these issues.

Textbook

Nagel E. *The Structure of Science* Routledge

52.263
Philosophy of Psychology   S2 L2T0

Prerequisite: 52.193.

Some aspects of fundamental theory of psychology, with special emphasis on classical and contemporary behaviourism and behaviourist oriented psychology, and on the general conceptions of "behaviour" and "purpose"

Textbook

Fodor J. A. *Psychological Explanation* Random House

52.273
Aesthetics   S2 L2T0

Prerequisite: Level II status in Philosophy.**

The central concepts, types of judgment and theories occurring in the fields of aesthetics, art criticism and literary criticism.

Textbook

Rader M. ed *A Modern Book of Aesthetics* Holt Saunders

52.283
Philosophical Study of Woman   S2 L2T0

Prerequisite: 52.182 or 52.203 or 52.493.

Crucial structures involved in woman's situation.

52.293
Plato's Later Dialogues   S2 L2T0

Prerequisite: 52.483 (or, by permission, a course covering similar material).

Centred round some of Plato's later dialogues, the *Theaetetus* and *Sophist* in particular.

Textbooks

Plato *Theaetetus* McDowell J. trans OUP
Plato *Parmenides and other dialogues* Warrington J. trans Everyman

52.303
Spinoza and Leibniz   S2 L2T0

Prerequisite: 52.163.

The main issues raised in the philosophy of the two great seventeenth century rationalists, with emphasis on the development of their metaphysical systems in response to unresolved problems in the philosophy of Descartes and to contemporary scientific thinking. Their ethical views.

Textbooks

Leibniz G. W. *Philosophical Writings* Parkinson G. H. R. ed Everyman
Spinoza B. *Ethics* and *On the Improvement of the Understanding* Both available in *Works of Spinoza* Elwes R. H. M. trans Dover

52.323
Set Theory   S1 L2T0

Prerequisite: 52.153 or 26.812 or 10.001 or 10.011 or 10.021.

An axiomatic development of Zermelo-Fraenkel set theory, including a construction of the natural numbers, equinumerosity, ordinal and cardinal numbers, the axiom of choice and some of its consequences.

Textbook

Suppes P. *Axiomatic Set Theory* Van Nostrand

52.343
Privacy and Other Minds   S1 L2T0

Prerequisites: 52.163, 52.173 or 52.243.

The questions: (a) whether there is anything that a person can know which it is logically impossible for anybody else to know; (b) whether it is logically possible that anybody should speak a language that cannot be understood by anybody else; and (c) how we come to understand another person's mind.

Textbooks

Ayer A. J. *The Foundations of Empirical Knowledge* Any ed
Ayer A. J. *The Problem of Knowledge* Any ed
Strawson P. F. *Individuals: An essay in Descriptive Metaphysics* Methuen*

52.353
History of Modern Logic   S1 L2T0

Prerequisite: 52.153.

A historical treatment of selected topics in logic since Boole, with particular reference to Frege, Russell, Carnap and Quine.

Textbook

Kneale W. & M. *The Development of Logic* OUP

52.363
Wittgenstein   S1 L2T0

Prerequisite: 52.243.

Some themes in the later philosophy of Wittgenstein.

Textbooks

Coope C. et al *A Wittgenstein Workbook* Blackwell
Wittgenstein L. *Philosophical Investigations* Blackwell

---

* Paperback.
** Level II status in Philosophy consists in **1.** being in second or later year of university study, and **2.** having taken and passed two Level I Philosophy half-units **in the same session.** This prerequisite may be waived in certain cases by the School.

52.373
Philosophical Foundations of Marx's Thought   S2 L2T0

Prerequisite: 52.182 or 52.203 (may be waived, with permission, for students who have already studied political philosophy).

Marx's thoughts with special reference to philosophical issues, and philosophical origins.

52.383
Twentieth Century Marxist Philosophy   S2

Prerequisites: 52.182 or 52.203 (may be waived, with permission, for students who have already studied political philosophy).

Selected twentieth century Marxist theorists with reference to philosophical problems in the fields of ethics, science, history and politics. Particular attention is paid to the debate on the nature and philosophical implications of the rediscovered Hegelian origins of Marxism from Lukacs and Korsch to Althusser. Other authors to be studied include Gramsci, Sartre and Marcuse.

52.393
History of Traditional Logic   S2 L2T0

Prerequisite: 52.153.

A historical treatment of selected topics in logic before 1850, including the traditional theory of deduction; the rhetorical tradition; topics and fallacies; the medieval theory of terms; traditional treatment of modality; logic in India and China.

Textbook

Kneale W. & M. *The Development of Logic* OUP

52.403
Model Theory   S2 L2T0

Prerequisite: 52.323 or 10.1123.

An introduction to the metamathematics of the predicate calculus from the point of view of model theory. Topics include: the deduction theorem, consistency, completeness, theories with equality, prenex normal forms, categoricity and second order theories.

Textbook

Mendelson E. *Introduction to Mathematical Logic* Van Nostrand

52.413
Reading Option   S1 or S2

Admission by permission, to suitable students with good passes in at least two half-units at Level II.

A course of individually supervised reading and assignments on an approved topic not otherwise offered.

52.423
Seminar A   S2 L0T2

Admission by permission, based on a credit record in Level II units.

A study of topics of contemporary interest mainly from selected journal articles. Students are expected to contribute papers.

52.433
Seminar B   S1 L0T2

Admission by permission, based on a credit record in Level II units.

A study of topics of contemporary interest mainly from selected journal articles. Students are expected to contribute papers.

52.463
Introduction to Transformational Grammar   S1 L2T0

Prerequisite: Any Level I unit.

Transformational grammar from the beginning: its history, goals, theory, and practice, emphasizing understanding and constructing arguments for one transformational system over another.

Textbook

Jacobs R. & Rosenbaum P. *English Transformational Grammar* Blaisdell

52.473
Semantics of Natural Language   S2 L2T0

Prerequisite: 52.153 or 52.463.

Recent developments in that area which is of common concern of linguistics, logic and the philosophy of language. Topics: the goals of linguistic theory, the relevance of formal logic to natural language, and truth, meaning, and presupposition in natural language.

52.483
Plato's Theory of Forms   S1 L2T0

Prerequisite: Level II status in Philosophy** (Not available to students who have taken a similar course at Level I).

Some dialogues of Plato, with special attention to Socratic definition and Plato's Theory of Forms.

Textbook

Plato *The Last Days of Socrates* Tredennick H. trans Penguin

52.493
Existentialism   S1 L2T0

Prerequisite: Level II status in Philosophy**

Attempts to trace the historical origins of Existentialism, firstly by studying the ethical foundations in writings of Soren Kierkegaard and Friedrich Nietzsche, and secondly the epistemological foundations

** Level II status in Philosophy consists in **1.** being in second or later year of university study, and **2.** having taken and passed two Level I Philosophy half-units in the same session. This prerequisite may be waived in certain cases by the School.

in Husserl's phenomenology. The confluence of these two streams in the writings of the French philosopher Jean-Paul Sartre is then examined and also the influence of existentialism on modern psychiatry and theology is discussed. The course is conducted by seminars and assessed by essays.

Textbook

Warnock M. *Existentialism* Oxford Opus 52

52.503
Utopias   S1 L1½T0

Prerequisite: Level II status in Philosophy**; and 52.182 or 52.203.

Traces the various developments in utopian theory by studying the acknowledged classics in the field, eg, Edward Bellamy's *Looking Backward*, William Morris's *News from Nowhere*, and examining the arguments of the critics of Utopia, eg Karl Marx, Karl Popper. Examines the practical details of utopian settlements, especially those created in the "New World", like Robert Owens' New Haven and the Rappite community's Harmony. This course is conducted through seminars and assessed by essays.

Textbook

Manuel E. ed *Utopias and Utopian Thought* Beacon

52.513
Social and Political Philosophy   S1 L2T0

Prerequisite: Level II Status in Philosophy** and 52.182.

Largely through contemporary writings, including a number of journal articles, examination of such notions as justice, liability, responsibility, coercion, rights and punishment and the issues surrounding these notions.

52.523
Classical Ethical Theories   S1 L2T0

Prerequisite: Level II Status in Philosophy**.

Some central and quite influential works in the history and development of moral philosophy. Comparison of certain aspects of these moral theories, comparison of the varying approaches taken by these philosophers, and the development of certain ideas through these philosophers. Stress on examining and understanding each theory in itself.

52.533
Contemporary Ethics   S2 L2T0

Prerequisite: 52.523*.

A survey of some central themes in contemporary ethical theory (beginning with G. E. Moore), focusing primarily on questions concerning the use, meanings, and logic of moral terms and concepts.

52.543
The Philosophy of Love   S1 L2T0

Prerequisite: 52.163 or 52.173 or 52.263.

Four main topics:
1. The distinction between *eros* and *agape*. This, together with the cognate distinctions between desire and love and between lust and love, is considered with an emphasis on Plato, St Paul, St Augustine, St Thomas Aquinas, and Luther. Orid, Lucretius and Freud are given secondary consideration in this section (Freud on genital and narcissistic love).

2. The relation between love and reason. This, together with the relation between love and will, is studied mainly in Plato, St Augustine and St Thomas. Freud is given secondary consideration.

3. Union and separation. This is studied mainly in Plato, St Augustine, Plotinus. Secondary consideration is given to St Teresa, Hegel, McTaggart and Freud.

4. Courtly and romantic love. The main interest here lies in the attachment to the unattainable and it is treated in various texts from the troubadours to the modern novel and film.

Sociology

Graduate Study
For students enrolled in the MScSoc degree course

53.306G
Science and Government I   S1 L2

The growth of government interest in science during the 20th century. Issues, institutions and policies. The nature and consequences of government support for research. The debate over the 'planning' of science. The arguments in favour of 'science policy'.

Science policy placed against the general background of the growth of government intervention in economic and social life during the last 100 years, leading to evaluation of the structure of modern government. The impacts of two world wars and the 'cold war'. Differences between countries in scientific organization and science policy.

53.307G
Science and Government II   S2 L2

Continuation of 53.306G, dealing with specific issues, rather than the general issue of science and government. Includes the military role of science and technology, policies to promote industrial innovations, the role of science and technology in international affairs, scientific manpower and policies on natural resources.

** Level II status in Philosophy consists in **1.** being in second or later year of university study, and **2.** having taken and passed two Level I Philosophy half-units **in the same session.** This prerequisite may be waived in certain cases by the School.

* May be waived with the consent of the lecturer.

History and Philosophy of Science

Undergraduate Study

62.012
The Origins of Modern Science   S1 L2T4

Prerequisites: A pass in four Level I units from Table 1 excluding Philosophy and Engineering units.

An introductory course dealing with the Scientific Revolution of the seventeenth century, the philosophical issues being discussed in their historical context. The course will survey the major achievements of science during the period, the consequences of the Copernican Revolution, the construction of dynamics from Galileo to Newton, Harvey's physiology, the development of theories of light and of concepts such as atmospheric pressure. The cultural and intellectual background of these achievements and their effects on European thought will be discussed.

Preliminary Reading

Butterfield H. *The Origins of Modern Science* Bell

Textbooks

Hall A. R. *From Galileo to Newton 1603-1720* Collins
Hall M. B. ed *Nature and Nature's Laws — Documents of the Scientific Revolution* Harper
Westfall R. S. *The Construction of Modern Science* Wiley

62.022
The Social History of Science —
From the French Revolution to
the Second World War   S2 L3T3

Prerequisites: As for 62.012.

The development of the scientific movement, in its social and cultural context, from the French Revolution to the 1930s. Includes: consideration of the different national contexts of the scientific movement; its relations with the State, with the universities and other teaching institutions, and with the professions of medicine and engineering; the communications system in science and the nature and functions of scientific societies; the effects of science on technology and of technology on science; the institutionalization and professionalization of science.

Textbooks

No suitable textbooks are available. Reading lists, selections from primary sources, and other material are issued during the course.

62.032
The Scientific Theory   S2 L2T4

Prerequisites: As for 62.012.

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. Includes:

the principles of theory construction; perception and observation; the structure of scientific revolutions; scientific apologetics; the structure of theories; 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.

Textbooks

Darwin C. *The Origins of Species* Penguin
Hempel C. G. *Philosophy of Natural Science* Prentice-Hall
Kuhn T. S. *The Structure of Scientific Revolutions* 2nd ed Chicago UP
Popper K. R. *The Logic of Scientific Discovery* Harper Torchbook

62.013
History of the Philosophy of Science   F L2T1

Prerequisites: 62.012 or 62.022 or 62.032.

The development of ideas concerning the nature and methods of the sciences from 1700 to the present day. Descartes, Leibniz and continental rationalism; Bacon, Locke, Berkeley, Hume and British empiricism; Kant and Kantians; Herschel, Whewell, Mill and the revival of inductivism; Comte, Mach and nineteenth-century positivism; Peirce, James and pragmatism; Poincaré and conventionalism; Duhem and instrumentalism; Meyerson and realism; Einstein and the relativists; Eddington's selective subjectivism; Bridgman and operationalism; the Vienna Circle and logical positivism; Carnap and positivist reductionism; the philosophical ancestry of some leading contemporary philosophers of science.

Preliminary reading

Losee J. A. *A Historical Introduction to the Philosophy of Science* OUP

Textbooks

No suitable textbooks are available. Students should buy some primary sources and will be advised in class re selection.

62.023
The Rise of
Environmentalism   S1 L3T3

Prerequisites: 62.012 or 62.022 or 62.032.

Environmentalism is a very scientific issue and also a very political one. The course aims to put it in historical perspective as a major element in the contemporary social history of science. The concept of the Environmental Revolution of 1968-1972 (a revolution in consciousness and perception on the part of society generally) is used as an organizing concept and the course begins with various developments in the period before 1968 that can be regarded as leading towards it (notably the conservation movement, the development of ecology and other environmental sciences, the fallout episode of 1954-1963, the beginnings of the pesticides issue, and the growing awareness of environmental deterioration). After a discussion of the Environmental Revolution — including the institutional aspects, national and international — the course concludes with an examination of developments since 1972.

Textbooks

No set texts. Reading lists and other materials are issued during the year.

62.033
The Development of
Theories of Matter   S1 L3T3

Prerequisites: 62.012 or 62.022 or 62.032.

Review of early theories; the development of man's ideas about the nature of matter up to the mid-twentieth century. Stress on the development of the atomic and quantum theories, ideas concerning chemical bonding and structure, the evolution of the cell theory, and the application of chemical ideas to biological problems. Emphasis is laid on the relationships between work in the chemical, physical and biological sciences.

Textbooks

Crosland M. P. *The Science of Matter* Penguin

Toulmin S. E. & Goodfield J. *The Architecture of Matter* Pelican

62.043
The Historical Foundations of
Experimental Biology   S1 L2T4

Prerequisites: 62.012 or 62.022 or 62.032.

The development of experimental biology from the work of Vesalius in the mid-sixteenth century to that of Bernard in the mid-nineteenth century, with special emphasis on the development of physiology. Includes: the Vesalian tradition; the work of Harvey, with special reference to the circulation of the blood and the functioning of the heart; Descartes and the mechanization of biology; Malpighi, Hooke and early microscopy; Hales and plant physiology; theories of animal heat and respiration; the work of Haller, Bichat, Magendie and Bernard on animal physiology.

Textbooks

No set texts.

62.053
The History of Theories of
Generation and Heredity   S2 L2T4

Prerequisites: 62.012 or 62.022 or 62.032.

The development of theories relating to generation and heredity, with special reference to the interplay of scientific, social and ideological factors. Largely concerned with the period from 1830 to 1930. Includes: the cell theory; sexual and asexual reproduction; embryology; the theory of spontaneous generation and its overthrow; Mendel and his predecessors; the rise of classical genetics and the background to the Synthetic Theory of evolution; molecular biology and DNA.

Textbooks

No set texts.

62.063
History and Philosophy
of Cosmology   S2 L2T4

Prerequisites: 62.012 or 62.022 or 62.032.

The main formative influences that have shaped the science of cosmology. The work of investigators such as Wright, Kant and Herschel on the Milky Way, which followed from the work of Galileo and Newton on motion and gravitation. The implications of the researches of Olbers and Hubble for an expanding universe. The conceptual and observational framework of the present situation in cosmology and cosmogony; central physical-philosophical problems raised by various models of the universe concerning space and time, matter and radiation. Problems which have their parallels in the mathematical astronomy of the Greeks, and the beginnings of modern cosmology following upon the Copernican revolution.

62.073
Predicate Logic and the
Foundations of Mathematics   F L2T1

Prerequisite: 52.162 or prescribed reading preceding long vacation.

(Offered by the School of Philosophy.)

Predicate Logic

A system of natural deduction for the first order predicate calculus, including identity and definite descriptions. Emphasis is upon construction of formal derivations, methods of showing the invalidity of formal arguments, and the evaluation of informal arguments by symbolization.

Textbook

Kalish D. & Montague R. *Logic: Techniques of Formal Reasoning* Harcourt, Brace & World

Foundations of Mathematics

An introduction to a selection of problems concerning the foundations of Mathematics, including non-Euclidean geometry and consistency proofs, axiomatics, antinomies of naive set theory, logicism, intuitionism, formalism, Gödel's incompleteness result.

Textbook

Wilder R. S. *An Introduction to the Foundations of Mathematics* Wiley

62.083
Marxism and Science   F L0T3

Prerequisite: 62.032.

A course of weekly seminars and directed readings on Marxism and science. Includes: Marxist interpretations of scientific knowledge and its development, the claims of Marxism to be a science and the critique of non-Marxist philosophies of science, the nature and function of ideology in relation to scientific knowledge, and the requirements of a Marxist historiography of science; with the relative emphasis among these topics to be determined according to the interests of the class.

62.093
Science and the Strategy
of War and Peace   F L1T2

Prerequisites: 62.012 or 62.022 or 62.032.

Aims to give historical perspective to the impact of science and technology on the art of war from Leonardo da Vinci to contemporary problems of nuclear disarmament and the arms race. Emphasis on the intellectual challenges, social consequences and moral dilemmas posed by twentieth century developments in the mechanization of warfare, communications, surveillance and physical, chemical, nuclear

and biological weaponry; the early history of the atomic scientists and the nuclear age; Einstein and Russell and the anti-war movements; the role of the military industrial complex; the dynamics of the arms race and its limitation; the technological elaboration of armaments in the 1960s; the opportunity cost of military expenditure.

Textbooks

No set texts. Extracts from source material and journal articles are issued.

Graduate Study

62.701G
Philosophy and Methodology
of Science*   S1 L2

An introduction to some current and fundamental problems in the philosophy of science and society; the nature of scientific debates and forms of argument; the function of 'scientific' images in the exploration and conquest of man and nature; scientific understanding and explanations in terms of models, analogies and laws of nature; problems of creativity and logic in the construction, establishment, acceptance and rejection of theories; the dynamics of scientific development and change; the concept of scientific revolutions.

62.702G
Logic and Strategy of
Scientific Progress*   S2 L2

Theories of scientific rationality, ideology and knowledge and their application to the intellectual and social improvement of mankind from Francis Bacon to Marx, Popper, Kuhn, Lakatos, Ravetz and Easlea.

62.703G
Technology and Society in
the Twentieth Century*   S1 L2

A discussion on a historical ground plan, of the inter-relations between technology and society. Review of the main lines of development of technology in the twentieth century; case studies referring to such issues as: the opposed claims of technological determinism and social determinism; relations between technology and politics; the social mechanisms of the transfer of technology; the 'spin off' from military and space technology; the role of technology in the developing countries and the issue of appropriate technology; recent developments in pollution control technology and alternative energy sources.

62.704G
Science, Technology, and
Social Responsibility*   S2 L2

Concern about the social responsibility of science-based technology first appeared to a significant extent in 1945 among scientists involved in the development of nuclear weapons and was for a long time largely restricted to them. Since the late 1960s however the 'cultural

revolution' triggered by the Vietnam War and the widespread reaction against science and technology have obliged scientists generally to come to terms with the issue and in some cases to engage in social and political action.

Discussion of the historical setting of the issue, subsequently explored through examination of a number of particular cases.

62.705G
Science and the Military-
Industrial Complex I*   S1 L2

An introduction to the developing interrelations and mutual dependencies of the scientific community and its institutions, scientific research and development and innovation, and the military and industrial communities in the twentieth century. Case studies used to examine national attempts to integrate civilian and defence resources, priorities and policies, the unification of research and development activities, and the power and influence of the 'military-industrial' complex.

62.706G
Science and the Military-
Industrial Complex II*   S2 L2

Continuation of 62.705G. A critical study of the intellectual challenges, social and political consequences, opportunity costs and moral dilemmas posed by the association of the 'military-scientific' complex with technological developments in the mechanization of warfare, communications, surveillance and physical, chemical, biological and nuclear weaponry.

Board of Studies in
Science and Mathematics

Undergraduate Study

68.302
Introductory Marine Science   S1 L3T1

Ocean basins, sediments, properties of seawater, ocean circulation, coasts and coastal processes. Marine biology and ecology, primary and secondary productivity.

Textbook

Gross M. G. *Oceanography. A View of the Earth* Prentice-Hall

* For students enrolled in the MScSoc degree course.

Anatomy

Undergraduate Study

70.011A
Histology I   S1 L2T4

Prerequisites: 17.011, 17.021.

Cell form and tissue structure. Cell structure and function. Cell function and evolution. Epithelial cells and tissue. Connective tissues and connective cells. Muscle cells and muscle tissue. Nerve cell and nervous tissue. Cellular interrelations. Structure of organs and organ systems. Skin and derivatives. Development and structure of teeth. Circulatory system. Oral cavity. Alimentary canal and associated glands. Respiratory system. Urinary system. Eye, ear. Reproductive system.

Textbooks
Ham A. W. *Histology* 7th ed Lippincott

or

Bloom W. & Fawcett D. W. *A Textbook of Histology* 10th ed Saunders

70.011B
Mammalian Embryology   S2 L2T4

Prerequisites: 17.011, 17.021.

History of embryology and its development as a science. The mammalian reproductive system. Gametogenesis. Fertilization and cleavage. Development and implantation of blastocyst. Development of embryonic disc, embryonic membranes, placenta. Comparative mammalian placentation. Human embryogenesis. Development of human foetus. Characteristics of external form. Teratology. Human organology. Comparative mammalian development. Biochemistry and embryogenesis.

Textbook
Arey L. B. *Developmental Anatomy* 7th ed Saunders

70.011C
Introductory Anatomy   S1 L2T4

Prerequisites: 17.011, 17.021.

Introduction to gross anatomy, based on a study of prosected specimens. Musculoskeletal, cardiovascular, respiratory, gastrointestinal, genitourinary and nervous systems. General topographical and surface anatomy. Normal variations including those related to sex and age (childhood, adolescence, maturity, senescence).

Textbook
Basmajian J. V. *Primary Anatomy* 6th ed Williams & Wilkins

or

Jacob S. W. & Francone C. A. *Structure and Function in Man* 3rd ed Saunders

70.012A
Musculoskeletal Anatomy   S1 L2T4

Prerequisites: 70.011A, 70.011C.

The topographical anatomy of the limbs and the musculoskeletal framework of the trunk. Distribution of nerves and vessels. Living and radiological anatomy.

Textbook
Basmajian J. V. *Primary Anatomy* 6th ed Williams & Wilkins

or

Gardner E., Gray D. J. & O'Rahilly R. *Anatomy* Saunders

70.012B
Visceral Anatomy   S2 L2T4

Prerequisites: 70.011A, 70.011C.

The topographical anatomy of the great visceral systems — gastrointestinal, respiratory, cardiovascular, and genitourinary — and of the head and neck. Living and radiological anatomy.

Textbook
Basmajian J. V. *Primary Anatomy* 6th ed Williams & Wilkins

or

Gardner E., Gray D. J. & O'Rahilly R. *Anatomy* Saunders

70.012C
Neuroanatomy   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.

Textbook
Barr M. L. *The Human Nervous System: An Anatomical Approach* Harper & Row

70.303
Kinesiology   S2 L2T4

Prerequisites: 70.012A, 70.012C.

Study of movement in vertebrates. kinesiological recording, anatomical factors affecting movement, mechanics of posture and locomotion, comparative vertebrate locomotion, development and organization of movement in the human, the facilitation of movement.

Textbooks
No set texts. A list of reading material is provided.

70.304
Histology II   S2 L2T4

Prerequisite: 70.011A.

Mammalian histology, with particular reference to the human. Practical histological procedures: fixation, section preparation, staining. Microscopy. Theoretical, practical and applied histochemistry.

Textbooks

Disbry B. D. & Rack J. H. *Histological Laboratory Methods* Churchill Livingstone

Bancroft J. D. *An Introduction to Histochemical Techniques* 2nd ed Butterworths

and either

Bloom W. & Fawcett D. W. *A Textbook of Histology* Saunders

or

Ham A. W. *A Textbook of Histology* Lippincott

Physiology and Pharmacology

Undergraduate Study

73.011A
Principles of Physiology   F L2T4

Prerequisites: 2.121, 2.131, 10.001 or 10.011 or 10.021, 17.011, 17.021.

Generally taken in the second year of the science course by a number of groups of students, including physiotherapy and optometry students as well as those intending to major in physiology. 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.

Textbook

Vander A. J., Sherman J. H. & Luciano D. S. *Human Physiology* 2nd ed McGraw-Hill

73.012
Physiology II   F L4T8

Prerequisites: 73.011A, 41.101, 41.111.

A major subject offered in third year, providing a more advanced course of study concentrating on a number of specific areas of physiological study, eg circulation, respiration, the biophysics of cell membranes, neurophysiology and endocrinology.

Textbook

Mountcastle V. B. *Medical Physiology* 13th ed Mosby

In both subjects, Principles of Physiology and Physiology II, students spend considerable time performing laboratory experiments which illustrate various physiological principles and introduce them to the techniques used in physiological investigation.

Honours and Graduate Study

Depending on their undergraduate records students may be accepted by the Head of the School to undertake a fourth year of study towards an honours degree in Physiology. This would usually be done by students planning a career in physiology. During the honours year the student carries out a research project under the supervision of a staff member and submits a thesis based on the research project. The student can usually nominate the general research area in which he wishes to work from those being studied in the School. Within this research area the student is given a specific project by the supervisor.

Higher degree study for an MSc or PhD degree may also be undertaken by selected students.

Community Medicine

Undergraduate Study

79.201
Population Genetics Theory   S1 L2T3

Prerequisites: 45.101 or 10.311A and 10.311B or 10.321A and 10.321B or 10.331.

Models of genetic systems and growth of populations, with essential mathematical and statistical theory; illustrated by examples from human genetics. Limitations of models.

Models of population growth in discrete and continuous time with nonoverlapping and overlapping generations. An extension of the Hardy-Weinberg principle to finite populations and several loci. The concept of inbreeding, calculation of coefficients of consanguinity, effects of inbreeding, effective population number. Fisher's Fundamental Theorem of Natural Selection. Advanced treatment of factors maintaining gene frequency equilibria in populations, including balance between mutation and selection, heterozygotic advantage, and genetic loads. Effects of finite population number, including random gene frequency drift.

Textbook

Crow J. F. & Kimura M. *An Introduction to Population Genetics Theory* Harper & Row.

Sciences

79.202
Quantitative Methods in
Human Genetics   S2 L2T3

Prerequisites: 43.101, 10.311A and 10.311B, or 10.321A and 10.321B or 10.331 or 12.152 or 45.101.

Application of the principles of genetics and the theory of statistics to the study of human populations.

Estimates of population parameters, uses of measures of relatedness, discrimination between models of inheritance, design and analysis of surveys of families and twin pairs, genetic models of qualitative and quantitative variation, use of probability models in genetic counselling and determining effects of medical intervention.

Textbook
No set texts. A list of references is provided.

79.302
Biochemical Genetics of Man   S2 L2T4

Prerequisites: 43.101, 41.101.

Inherited variation of blood group antigens, serum proteins and red-cell enzymes, their possible selective roles, and their application to the study of differences between and within populations. Application of statistical techniques to analyzing population data.

Textbooks
No set texts.

The University of New South Wales   Kensington Campus 1977

Buildings

Applied Science F10
Architecture H14
Banks F22
Basser College C18
Biological Sciences D26
Biomedical Lecture Theatres E27
Central Lecture Block E19
Central Store B13
Chancellery C22
Civil Engineering H20
Classroom Block H3
Dalton (Chemistry) F12
Electrical Engineering G17
Electrical Engineering Theatre F17
Goldstein College D16
Golf House A27
Gymnasium B5
House at Pooh Corner N8
International House C6
John Goodsell (Commerce) F20
Keith Burrows Lecture Theatre H14
Kensington Colleges C17
Main Building K15
Maintenance Workshop B13
Mechanical and
Industrial Engineering J17
Medicine (Administration) B27
Menzies Library E21
Metallurgy E8
Morven Brown (Arts) C20
New College (Anglican) L6
Newton J12
Old Main Theatrette J14
Parade Theatre E3
Parking Station H25
Philip Baxter College D14
Robert Heffron (Chemistry) E12
Sam Cracknell Pavilion H8
Sciences F23
Sciences Lecture Theatre Block D23

Science Theatre F13
Shalom College (Jewish) N9
Sir John Clancy Auditorium C24
Sir Robert Webster
(Textile Technology) G14
Squash Courts B7
Unisearch House L5
University Regiment J2
University Union
(Roundhouse) — Stage I E6
University Union
(Blockhouse) — Stage II G6
University Union
(Squarehouse) — Stage III E4
Wallace Wurth School of Medicine C27
Warrane College (Roman Catholic) M7
Wool and Pastoral Sciences B8

General

Accountancy C20
Admissions Office B23
Anatomy C27
Applied Geology F10
Applied Physics H12
Applied Science (Faculty Office) F10
Appointments Office B23
Architecture
(including Faculty Office) F10
Arts (Faculty Office) D20
Australian Graduate
School of Management F23
Biochemistry D26
Biological Sciences (Faculty Office) D26
Biological Technology D26
Biomedical Library F23
Bookshop G17
Botany D26
Building H15
Cashier's Office B23

Centre for Medical Education
Research and Development F24
Chemical Engineering F10
Chemical Technology F10
Chemistry E12
Child Minding Centre N8
Civil Engineering H20
Closed Circuit Television Centre F19
Commerce (Faculty Office) F20
Community Medicine E25
Computer Services Unit F21
Drama D9
Economics F20
Education G1
Electrical Engineering G17
Engineering (Faculty Office) K17
English C19
Examinations and Student Records B22
Fees Office B23
Food Technology F10
French C20
General Studies C20
Geography K17
German C20
Health Administration C22
History C20
History and Philosophy of Science C19
Industrial Arts B1
Industrial Engineering J17
Institute of Administration G2
Institute of Languages G14
Institute of Rural Technology B8
Law (Faculty Office) F21
Law Library F21
Librarianship B10
Library E21
Marketing F19
Mathematics F23
Mechanical Engineering J17
Medicine (Faculty Office) B27
Metallurgy E8

Microbiology D26
Mining Engineering K15
Music B11
National Institute of Dramatic Art C15
Nuclear Engineering F18
Optometry H12
Pathology C27
Patrol and Cleaning Services F20
Philosophy C20
Physics K13
Physical Education and
Recreation Centre (PERC),
see Gymnasium and Squash Courts
Physiology and Pharmacology C27
Political Science C19
Postgraduate Committee
in Medical Education B27
Postgraduate Extension Studies
(Closed Circuit Television) F19
Postgraduate Extension Studies
(Radio Station and Administration) F23
Psychology F23
Public Affairs Unit C23
Regional Teacher Training Centre F24
Russian D20
Science (Faculty Office) K14
Social Work F1
Sociology C20
Spanish and Latin American Studies D19
Student Amenities and Recreation E15
Student Counselling and Research E16
Student Employment C22
Student Health E15
Students' Union E4
Surveying H20
Teachers' College Liaison Office F16
Tertiary Education Research Centre E16
Textile Technology G14
Town Planning K15
University Union G6
Wool and Pastoral Sciences B8
Zoology D26