SCIENTIA

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The University of New South Wales

Sciences

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

1976
Faculty Handbook

The University of New South Wales

PO Box 1 Kensington NSW Australia 2033 Phone 6630351

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Contents

Sciences

General Information

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

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

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

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

Some people who can help you

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

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

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

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

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

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

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

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

The Student Counselling and Research Unit is located at the foot of Basser Steps. The Head is Mr G. Gray. For assistance with educational or vocational problems ring 2600-2605 for an appointment.

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

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

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

Calendar of Dates

1976

Session 1	March 1 to May 9.
(14 weeks)	*May Recess:* May 10 to May 16
	May 17 to June 13
	Midyear Recess: June 14 to July 18
Session 2	July 19 to August 22
(14 weeks)	*August Recess:* August 23 to August 29
	August 30 to October 31
	Study Recess: November 1 to November 7

January

Thursday 1	New Year's Day—Public Holiday
Friday 9	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 12	Timetables for *deferred* examinations available
Friday 16	Last day for acceptance of applications by Admissions Office for transfer to another course within the University
Monday 26	Australia Day—Public Holiday
Tuesday 27	*Deferred* examinations begin

February

Saturday 7	*Deferred* examinations end
Monday 16	Enrolment period begins for new students and students repeating first year
Tuesday 17	Last day for appeal against exclusion by students who infringed re-enrolment rules at *annual* examinations
Friday 20	*Deferred* examination results available
Monday 23	Enrolment period begins for second and later year students
Tuesday 24	Last day for application for review of *deferred* examination results
Friday 27	Last day for application for permission to re-enrol by students who infringed re-enrolment rules at *deferred* examinations

March

Monday 1	**Session 1 commences**
Friday 12	Last day for acceptance of enrolments by new students (late fee payable)
Thursday 18	Last day for appeal against exclusion by students who infringed re-enrolment rules at *deferred* examinations
Thursday 25	Last day for acceptance of enrolments by students re-enrolling in second and later years (late fee payable)
Friday 26	Last day for students other than those attending the University for the first time to discontinue without failure subjects which extend over Session 1 only
Monday 29	Last day to enrol in additional subjects

April

Friday 16 to Monday 19	Easter
Friday 23	Last day for students attending the University for the first time to discontinue without failure subjects which extend over Session 1 only
Sunday 25	Anzac Day
Monday 26	Public Holiday

May

Tuesday 4	Publication of provisional timetable for June/July examinations
Monday 10	**May Recess begins**
Wednesday 12	Last day for acceptance of corrected enrolment details forms
Friday 14	Last day for students other than those attending the University for the first time to discontinue without failure subjects which extend over the whole academic year
Sunday 16	**May Recess ends**

Monday 17	Last day for students to advise of examination timetable clashes

June

Tuesday 1	Publication of timetable for June/July examinations
Sunday 13	**Session 1 ends**
Monday 14	Queen's Birthday—Public Holiday **Midyear Recess begins**
Tuesday 15	Midyear examinations begin
Tuesday 29	Midyear examinations end

July

Sunday 18	**Midyear Recess ends**
Monday 19	**Session 2 begins**
Friday 30	Foundation Day Last day for students attending the University for the first time to discontinue without failure subjects which extend over the whole academic year

August

Friday 13	Last day for students other than those attending the University for the first time to discontinue without failure subjects which extend over Session 2 only
Monday 23	**August Recess begins** Holiday for non-academic staff
Sunday 29	**August Recess ends**
Tuesday 31	Last day for acceptance of applications for re-admission in 1977 after exclusion under the re-enrolment rules

September

Friday 10	Last day for students attending the University for the first time to discontinue without failure subjects which extend over Session 2 only
Sunday 12	Last day for applications from students graduating in 1977 for admission to University degrees and diplomas
Tuesday 14	Last day for return of corrected enrolment details forms
Tuesday 21	Publication of provisional timetable for annual examinations

October

Friday 1	Last day to apply to MUAC for transfer to another university in Sydney metropolitan area and Wollongong Last day for students to advise of examination timetable clashes
Monday 4	Eight Hour Day—Public Holiday
Tuesday 19	Publication of timetable for annual examinations

November

Monday 1	**Study Recess begins**
Sunday 7	**Session 2 ends**
Monday 8	Annual examinations begin
Tuesday 30	Annual examinations end

December

Saturday 25	Christmas Day—Public Holiday
Monday 27	Boxing Day—Public Holiday

1977

Session 1	March 7 to May 14 *May Recess:* May 16 to May 21 May 23 to June 18 *Midyear Recess:* June 20 to July 23
Session 2	July 25 to August 27 *August Recess:* August 29 to September 3 September 5 to November 5 *Study Recess:* November 7 to November 12

January

Monday 3	Public Holiday
Friday 7	Last date for application for review of results of *annual* examinations
Monday 10	Publication of timetable for *deferred* examinations
Friday 14	Last day for acceptance of applications by Admissions Office for transfer to another course within the University
Tuesday 25	*Deferred* examinations begin
Monday 31	Australia Day—Public Holiday

February

Saturday 5	*Deferred* examinations end
Monday 14	Enrolment period begins for new students and students repeating first year
Friday 18	Results of *deferred* examinations available
Monday 21	Enrolment period begins for second and later year students
Tuesday 22	Last day for applications for review of *deferred* examination results

The Academic Year

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

Session 1 commences on the first Monday of March.

Organization of the University

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

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

The Council

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

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

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

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

The Professorial Board

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

The Faculties

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

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

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

The Schools

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

Executive Officers

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

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

General Administration

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

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

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

Student Representation on Council and Faculties

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

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

Open Faculty Meetings

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

Identification of Subjects by Numbers

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

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

General Studies Program

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

Student Services and Activities

The University Library

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

There are services at other centres:

Broken Hill Division: W. S. and L. B. Robinson University College Buildings, Broken Hill. Phone: 6022/3/4.

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

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

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

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

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

Accommodation

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

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

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

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

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

Warrane College   An affiliated Roman Catholic residential college, Warrane provides accommodation for 200 men students, both graduate and undergraduate. Non-resident membership is available to male students who wish to participate in College activities and make use of its facilities. Fees are payable on a session basis. Apply in writing to the Master, Warrane College, PO Box 123, Kensington, NSW 2033.

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

Student Employment

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

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

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

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

Student Health

The Student Health Unit, staffed by qualified medical personnel, offers free medical and first-aid services to male and female students. The service is not intended to replace private or community health services and thus if chronic or continuing conditions are revealed or suspected you will be advised and referred to your own doctor or an appropriate hospital. The health service is not responsible for fees incurred in these instances. Confidential appointments can be made at Hut E at the foot of Basser Steps between 9 am and 5 pm Monday to Friday. Phone extension 2679 or 3275.

Student Counselling and Research

The Student Counselling and Research Unit provides individual and group counselling for all students—prospective, undergraduate and graduate. If you have any personal needs, worries or confusion use this free, informal, personal service to help you sort out the basic issues. If the counsellor can't help you himself he usually knows someone who can.

Counselling appointments are available during sessions and recesses between 9 am and 7 pm. Phone 663 0351 extensions 2696 and 2600 to 2605, or call during Unit office hours, 8.30 am to 5.30 pm. Urgent interviews are possible on a walk-in basis between 9 am and 5 pm. Group counselling programs are offered both day and evening between 9 am and 9 pm by special arrangement.

Student Amenities and Recreation

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

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

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

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

Physical Education and Recreation Centre

The Physical Education and Recreation Centre consists of eight squash courts and a main building. The latter has a large gymnasium and ancillary practice rooms for fencing, table tennis, judo, weight-lifting and a physical fitness testing room. The Supervisor of Physical Recreation is responsible for the Centre and provides a recreational program for both students and staff. If you would like to take part in any of the programs contact the Supervisor on extension 3271.

The University Union

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

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

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

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

The Students' Union

The Students' Union is run by students and represents them on and off campus. Presidential elections are by

popular vote and all students who have completed two years at the University are eligible for election.

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".

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

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

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

Chaplaincy Centre

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

Student Clubs and Societies

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

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

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

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

Other Services and Activities

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

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

Australian Armed Forces Enquiries should be directed to:

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

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

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

Financial Assistance to Students

Tertiary Education Assistance Scheme

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

● for full-time study in approved courses

● subject to a means test

● on a non-competitive basis

● to students who are not bonded

● to students who are permanent residents of Australia.

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

● Undergraduate and graduate degree courses

● Graduate diplomas

● Approved combined Bachelor degree courses

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

Benefits

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

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

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

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

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

Scholarships, Cadetships, Prizes

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

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

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

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

Details of graduate awards are contained in the University Calendar.

Other Financial Assistance

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

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

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

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

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

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

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

Financial Assistance to Aboriginal Students

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

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

Rules and Procedures

The University, in common with other large organizations, has some agreed ways of doing things in order

to operate efficiently and equitably for the benefit of all members. The rules and procedures listed below will affect you at some time or another. In some cases there are penalties (e.g. fines or exclusion from examinations) for failure to observe these procedures and therefore they should be read with care.

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

Admission and Enrolment

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

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

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

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

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

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

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

First Year Repeat Students First year students who failed more than half the programme at the 1975 Annual

Examinations and who were not granted any deferred examinations should NOT follow the above procedure. They are required to *show cause* why they should be allowed to continue in the course, and should await instructions in writing from the Registrar as to the procedure.

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

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

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

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

Miscellaneous Subject Enrolments Students may be permitted to enrol for miscellaneous subjects (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 to the student and there is accommodation available. Only in exceptional cases will subjects taken in this way count towards a degree or diploma. A student who is under exclusion may not be enrolled in miscellaneous subjects which may be counted towards any course from which he has been excluded.

Final Dates for Completion of Enrolments No enrolments for courses 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 (12 March 1976) except with the express approval of the Deputy Registrar (Student Services) and the Head of the School 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 (26 March 1976) without the express approval of the Deputy Registrar (Student Services). No enrolments for courses occupying Session 2 only will be accepted after the end of the second week of Session 2 (30 July 1976) without express approval of the Deputy Registrar (Student Services).

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

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

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

What happens if I fail to pay the prescribed fees or charges? If you fail to pay prescribed fees or charges or become otherwise indebted to the University and you fail to make a satisfactory settlement of your indebtedness upon receipt of due notice then you cease to be entitled to the use of University facilities. You will not be permitted to register for a further session, to attend classes or examinations, or be granted any official credentials. In the case of a student enrolled for Session 1 only or for Sessions 1 and 2 this disbarment applies if any portion of fees is outstanding after the end of the eighth week of Session 1 (23 April 1976). In the case of a student enrolled for Session 2 only this disbarment applies if any portion of fees is outstanding after the end of the sixth week of Session 2 (27 August 1976).

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

Can I transfer from one course to another? To transfer from one course to another you must apply on an application form obtainable from the Admissions Office by 16 January. If your application is successful you are required to comply with the enrolment procedures for the 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 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.

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

* For details of Schedule A see University Calendar.

Registrar by the dates published annually by the Registrar. A late application may be accepted at the discretion of the University.

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

Appeal

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

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

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

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

The decision of the Committee shall be final.

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

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

Exclusion

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

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

B A student who is required to *show cause* under the provisions of Rule 2 and either does not attempt to *show cause* or does not receive special permission to re-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.

Re-admission after Exclusion

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

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

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

Restrictions and Definitions

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

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

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

Fees*

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

What other fees and charges are payable? These include those charges raised to finance the expenses incurred in operating student activities such as the University 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.

University Union entrance fee—$20 payable on first enrolment

Students Activities Fees:

University Union—$45 annual subscription

Sports Association—$6 annual subscription

Students' Union:

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

Students enrolling in part-time courses—$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.)

Depending on the subject being taken, students may also be required to pay:

Pathology Instrument Kit—$10
(Refundable on return in satisfactory condition)

Who is exempt from payment of fees?

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

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

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

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

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

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

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

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

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

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

Examinations conducted under special circumstances—for each subject $11

Review of examination result—for each subject $11

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

Failure to lodge enrolment form according to enrolment procedure $20

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

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

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

Yes. The following rules apply:

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

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

Examinations

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

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

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

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

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

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

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

Can examination results be reviewed? Examination results may be reviewed for a fee of $11 a subject, which is refundable in the event of an error being discovered.

This review consists mainly of ensuring that all questions attempted have been marked and checking the total of the marks awarded. Applications for review must be submitted on the appropriate form to the Examinations and Student Records Section together with the necessary fee by the following dates:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Student Conduct on Campus

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

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

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

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

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

If you fail a subject at the annual examinations in any year and re-enrol in the same course in the following year, you must include in your program of studies for that year the subject in which you failed. This requirement will not be applicable if the subject is not offered the following year; is not a compulsory component of a particular course; or if there is some other cause which is acceptable to the Professorial Board, for not immediately 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 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 26 April and 30 August. It is not necessary to return these forms unless any information recorded thereon is incorrect. Amended forms must be returned to the Examinations and Student Records Section within fourteen days. Amendments notified after the closing date will not be accepted unless exceptional circumstances exist and approval is obtained from the Registrar. Amended forms returned to the Registrar will be acknowledged in writing. within fourteen days.

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

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

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

Further Information

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

General

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

Admissions Office

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

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

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

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

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

Notices

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

Appeals

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

The Calendar

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

Introduction

The Science Course is offered in a unit system in all three years of the pass degree. In this system major studies in a discipline may usually be achieved by taking two units in a first year of studies, three units in a second year and four units in a third year.

First year subjects in a number of Schools must be taken as a whole and count as two units. In all cases the pattern of units studied must conform to co-requisites and prerequisites as shown elsewhere.

All students in the Science 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.

Students proceeding to a degree in Science will be associated principally with schools within the Faculties of Biological Sciences and Science. However, in accordance with the regulations, students may elect to take subjects from schools in other faculties.

Some schools do not offer a full range of Level III units in the evening. Students in the part-time course are urged to take note of these Schools, since a science major involving any of them will only be possible for day-time attendances. The Schools concerned are marked below with ‡.

Students seeking advice should contact the representative of the relevant School. A list appears below:

‡School of Applied Geology	Mr G. J. Baldwin	**Faculty of Applied Science**
School of Geography*	Mr N. Lonergan	**Faculty of Arts**
School of Philosophy* *....	Professor C. L. Hamblyn	
‡School of History and Philosophy of Science	Dr J. Saunders	
First Year Biology Units (prerequisite for all other units in this Faculty excepting Psychology)	Dr A. E. Wood	**Faculty of Biological Sciences**
School of Psychology	Dr P. J. Cleary	
	Dr A. Faust-Adams	
‡School of Biochemistry†	Professor E. O. P. Thompson	
‡School of Biological Technology	Professor B. J. Ralph	

‡School of Botany† .... Dr M. M. Hindmarsh
‡School of Microbiology† .... Dr Y. M. Barnet
‡School of Zoology† .... Mrs Patricia Dixon

Faculty of Engineering

School of Mechanical and Industrial Engineering (Engineering I*) .... Associate Professor R. G. Robertson
School of Electrical Engineering (Computer Science†) Mr K. A. Robinson

Faculty of Medicine

‡School of Anatomy† .... Associate Professor B. R. A. O'Brien
‡School of Human Genetics. .... Mr A. E. Stark
‡School of Phsyiology† .... Dr P. H. Barry

Faculty of Science

School of Applied Physics and Optometry. . ... Professor C. J. Milner (Applied Physics)
Associate Professor J. Lederer (Optometry)
School of Chemistry .... Mr W. J. Dunstan
***School of Mathematics .... Associate Professor W. E. Smith
School of Physics .... Mr K. Mann

In addition to the Science subjects, all undergraduates in Science are required to pass in three subjects in General Studies. A wide choice is available and students should consult the Department of General Studies handbook which is provided free of charge.

Students who wish to be admitted with advanced standing should obtain the necessary forms from the Admissions Office. Copies of recommended courses may be obtained from the Science Course Office (Room 57, Main Building).

* First year level only
** First and Second year levels only
***Mathematics as a major study is usually taken in the Science course, but it may also be taken in the Arts course. Students in the Science course who take Mathematics as their major study are offered a wide choice of supporting subjects not only in the Sciences but from other faculties.
† Second and Third year levels only
‡ Schools which do not offer a full range of Level III units in the evening.

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* In the field of inorganic chemistry.
† In the field of organic chemisty

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Hans Gerald Leonard Coster, MSc PhD *Syd.*, MInstP, MAIP
John Ian Dunlop, BSc PhD *N.S.W.*, MAIP MAAS ATI
John Eric Giutronich, BSc *Syd.*, PhD *N.S.W.*, MAIP
John Robert Hanscomb, BSc *Qld.*, MSc PhD *N.S.W.*, MAIP GradInstP
Norman Reginald Hansen, BSc DipEd *Syd.*, MSc *N.S.W.*, MInstP, MAIP
Leslie Bevan Harris, BSc *Lond.*, BA DipEd *Durh,* PhD *N.S.W.*, AIM AInstP
Eric Harting, BSc PhD *N.S.W.*, ASTC
Brian Ronald Lawn, BSc PhD *W.Aust.*, GradInstP
Jaan Oitmaa, BSc PhD *N.S.W.*, MAIP
Graeme John Russell, BSc PhD *N.S.W.*, GradInstP, GradAIP
Raymond Garry Simons, BSc *Syd.*, MSc *Tel.Aviv,* PhD *N.S.W.*

Lecturers
Graham James Bowden, BSc DipAdvStudSc PhD *Manc.*
Peter Russel Elliston, BSc *Melb.*, PhD *Monash*
Colin Trevor Grainger, BSc DipEd *Syd.*, MSc *N.E.*, PhD *N.S.W.*, MInstP, MAIP
Veronica Jean James, BA BSc *Qld.*, PhD *N.S.W.*, MAIP
Kenneth Mann, BSc *Qld.*, MSc *N.S.W.*
Kenneth Hulme Marsden, BSc *Lond.*, MSc *N.S.W.*, MInstP, ARCS, MAIP
Peter Mitchell, BSc PhD *Adel.*, MAIP
George Lange Paul, MSc *Syd.*, PhD *Edin.*, MAIP
James Martin Pope, MSc *Brist.*, DPhil *Sus.*, AinstP
John Richard Shepanski, MSc *Syd.*, MAIP
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.*
Zoltan Lewis Kerestes, BSc *Syd.*
Paul Michael O'Halloran, BA *Macq.*, GradAIP
John Dorsett Smith, BSc *Indiana S.U.*
John Robert Smith, BSc *Syd.*
Frank Hubert Stootman, BSc *Syd.*, GradAIP
Citrad Uher, BSc *N.S.W.*, GradAIP
Miklos Varady, BSc *Syd.*
Warwick Hamilton Williams, BSc BE *N.S.W.*

Teaching Fellows
Robert Leendert Calvert, BSc *S'ton,* MSc *Qu.*
Kevin Charles Fitzsimmons, BSc *Syd.*
Ting Hun Ho, BSc *H.K.*
Janis Lee Kamprod, BSc *Adel.*
Jorge Luis Menendez-Cortinas, LicSci(Phys.) *Barcelona*
Prem Darkash Narang, MSc *Delhi*
Ahmed Abdul Rahman, BSc *Qld,* MSc *N.S.W.*

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

Honorary Associates
John Stuart Dryden, MSc *Melb.*, PhD *Lond.*, DIC, 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
Leo James Lynch, BSc PhD *N.S.W.*, GradAIP

Faculty Information

Faculty of Biological Sciences Enrolment Procedures

Preliminary Enrolment
BSc in Psychology Course

Each student must obtain his or her personal enrolment form and Personal Program Form P/RE from the School of Psychology. The forms will be available from 14 October 1975. After notification of the annual examination results the student should indicate the subjects already completed and the proposed program for 1976 on Form P/RE and forward this, together with the enrolment form (completed except for the entry of subjects) to reach the Enrolment Officer, School of Psychology, not later than Friday 16 January 1976.

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:

Full-time Students
Year 2 and Year 1 repeats	Tuesday 24 February 10.00 am to 12 noon
Year 3 and 4	Tuesday 24 February 2.00 pm to 4.00 pm

Part-time Students
All Stages	As for full-time students; (outside these hours by *prior* arrangement only)

Enrolment Centre
School of Psychology
Level 10
The Sciences Building

Faculty of Science Enrolment Procedures

Preliminary Enrolment
Pure and Applied Chemistry Course and Optometry 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 23 February 2.00 pm to 4.30 pm
Year 3	Wednesday 25 February 9.30 am to 12.30 pm
Year 4	Friday 27 February 9.30 am to 11.00 am

2. Part-time Course

Stage 1 repeats & Stages 2, 3 and 4	Tuesday 24 February 2.00 pm to 4.00 pm 6.00 pm to 8.00 pm
Stages 5, 6 & later	Wednesday 25 February 2.00 pm to 5.00 pm

3. New Students with Advanced Standing

	Wednesday 25 February 3.30 pm to 5.00 pm

Optometry Course

Students enrolling in Year 2 of the BOptom 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 23 February 2.00 pm to 4.30 pm
Year 3 & Year 4	Tuesday 24 February 2.00 pm to 4.30 pm

Science Course

See Board of Studies in Science.

General Studies

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

Enrolment Centre

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

Board of Studies in Science Enrolment Procedures

Preliminary Enrolment

Science Course

Before the end of Session 2, each student must obtain a 1976 Program Form (Form SC76), 1976 timetables and instruction sheets from the Science Course Office, Room 57, Main Building.

After notification of the annual examination results, the student should complete Form SC76 and lodge it at the Science Faculty Office not later than 16 January 1976. Students whose Program Forms are not received by 16 January 1976 must re-enrol at a late re-enrolment session.

Enrolment Timetable

Science Course

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

Full-time Course
Year 2 & Year 1 Repeats

	Wednesday 25 February
Surnames A to G	9.30 am to 12.30 pm
Surnames H to M	2.00 pm to 4.30 pm
	Thursday 26 February
Surnames N to R	9.30 am to 12.30 pm
Surnames S to Z	2.00 pm to 4.30 pm

Year 3

Surnames A to J	Monday 23 February 2.00 pm to 4.30 pm
	Tuesday 24 February
Surnames K to R	9.30 am to 12.30 pm
Surnames S to Z	2.00 pm to 4.30 pm

Year 4

All students	Friday 27 February 9.30 am to 12.30 pm 2.00 pm to 4.30 pm

New Students with Advanced Standing	Friday 27 February 9.30 am to 12.30 pm

Part-time Course

Stage 2 & Stage 1 Repeats	Monday 23 February 6.00 pm to 8.00 pm
Stage 3 & Stage 4 Students	Tuesday 24 February 6.00 pm to 8.00 pm
Stage 5 & Later Stages	Wednesday 25 February 6.00 pm to 8.00 pm

New Students with Advanced Standing	Thursday 26 February 6.00 pm to 8.00 pm

General Studies

See previous column.

Enrolment Centre

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

Statistical Society of Australia: New South Wales Branch

The Branch offers student membership to undergraduates who are following a recognized course of study which includes Statistics. The subscription for a student member is $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 A. J. Miller, Alpha House, 60 King St., Newtown 2042.

Course Outlines

There are two types of courses available within the Faculties of Science and Biological Sciences. The first is the Science Course (controlled by the Board of Studies in Science), which allows a student to select sequences from a variety of the sciences. The second type of course is of a more specialized nature. Such courses are offered in Pure and Applied Chemistry, Optometry and Psychology. Details of each of these courses are given below.

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Science Course

The Science Course is administered by the Dean nominated by the Vice-Chancellor on behalf of the Schools within the Faculty of Biological Sciences and the Faculty of Science, as well as the Schools of Applied Geology, Anatomy, Physiology and Pharmacology, History and Philosophy of Science, and the Department of Electronic Computation (School of Electrical Engineering).

The pass degree (Bachelor of Science) is based on a unit structure. A unit in experimental subjects comprises 84 hours of lectures, tutorials and laboratory work, and in theoretical subjects comprises an equivalent loading of lectures and tutorials. A unit may be of 14 or 28 weeks' duration.

The unit structure has been chosen to allow flexibility in the choice of a course of study and the regulations have been framed so that a student may choose a pattern suitable for:

1. a general scientific education.
2. the training of science teachers.
3. professional training in a specific discipline.
4. professional training in multidisciplinary areas.

Units are grouped according to levels. Level II units normally follow after Level I prerequisites. Level III units in most cases follow after Level II prerequisites.

The requirements of a pass degree may be met by completing units in accordance with the regulations set out below and which constitute a major in one of the disciplines of the Schools of the Faculties of Science and Biological Sciences, or the Schools of Applied Geology (Faculty of Applied Science), History and Philosophy of Science (Faculty of Arts), Electrical Engineering (Faculty of Engineering), Physiology or Anatomy (Faculty of Medicine). Some units, not constituting a major study may also be included from the School of Philosophy (Faculty of Arts), the School of Mechanical Engineering (Faculty of Engineering), and the School of Geography (Faculty of Applied Science). A major normally includes four Level III units chosen from those offered by a particular School. The four Level III units, however, which comprise a major in Oceanography are each offered by a different school.

All students are required to complete three General Studies subjects. Patterns and outlines of these subjects are listed in the Department of General Studies Handbook, which is available free of cost.

The minimum time required to complete a pass degree is three years' full-time study or an equivalent period part-time. Some subject groupings cannot, however, be completed in the minimum time due to timetable difficulties.

A student may be admitted, subject to meeting conditions defined in the regulations, to an honours course which involves an extra year of full-time study or two years of part-time study. Those intending to seek admission to an honours year should consult the Head of the appropriate school on completion of the first year subjects.

Any arrangement of units to be studied must be approved by the Dean. Advice on recommended course patterns may be obtained from the Education Officer of the school in which a student intends to major.

Regulations governing the Science Course

1. Definitions

The Science Course is administered by the Dean nominated by the Vice-Chancellor.

The pass degree is based on a unit structure. A unit may be of 14 or 28 weeks' duration, and units are grouped according to levels. Level II units normally follow after Level I prerequisites and Level III units, in most cases, follow after Level II prerequisites. A major sequence normally includes four Level III units chosen from those offered by a particular school, although a number of schools offer more than four such units.

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 together with the unit which excludes it towards the degree qualification. 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.

CARE SHOULD BE TAKEN IN THE CHOICE OF UNITS TO ENSURE THAT THE PATTERN COMPLIES WITH THE REGULATIONS SET OUT IN SECTION **3A**. CERTAIN COMBINATIONS OF UNITS CANNOT BE COMPLETED IN THE MINIMUM TIME DUE TO THE RESTRICTIONS OF TIMETABLES. COPIES OF TYPICAL COURSE PATTERNS ARE AVAILABLE FROM THE SCIENCE COURSE OFFICE.

2. Regulations governing the Science Course

A *Requirements for a pass degree*

In order to qualify for admission to the degree of Bachelor of Science under these regulations a candidate shall attend classes and satisfy the examiners in Science units and General Studies subjects chosen as follows:

1. At least 23 Science units shall be included from the list set out in Section **3A** and three General Studies subjects from the list in Section **3B**.

2. The 23 Science units shall comply with the prerequisites, co-requisites and exclusion conditions set out in Section **3A** and also shall conform to the following restrictions:

not less than 8 units, nor more than 10 units may be from Level I;

not less than 4 units may be from Level III, and these four shall be chosen from related disciplines.

3. One of 10.001 Mathematics I, *or*
    10.011 Higher Mathematics I, *or*
    10.021 Mathematics IT
shall be included.

4. In addition to the specific prerequisites listed in Section **3A**, additional general prerequisites are required by some schools as a preliminary to certain Advanced Level units. These units, which are scheduled below, should be taken in the first year of enrolment together with compulsory mathematics. Eight units are normally taken in first year.

School of Chemistry	1.001 or 1.011
School of Applied Geology	1.001 or 1.011 and 2.001 Chemistry.
School of Biochemistry	2.001 Chemistry.
School of Botany	17.011 Biology of Mankind and 17.021 Comparative Functional Biology; plus one other subject.
School of Microbiology	*Note:* In making their choice students should consider carefully, in their first year, the requirements of Level II and Level III units.
School of Zoology	
School of Anatomy	17.011 Biology of Mankind and 17.021 Comparative Functional Biology.
School of Physiology	2.001 Chemistry and 17.011 Biology of Mankind and 17.021 Comparative Functional Biology.

5. Only one from each of the following subjects/units may be included:

(a) Students who include Psychology and/or Philosophy units chosen from Schedule of units **3A** may not include subjects from **3B** in the same discipline without the approval of the Department of General Studies.

(b) Any unit listed in Section **3A** or the equivalent unit offered at Wollongong University College which contains similar syllabus material.

6. A student enrolled for the first time in the Science Course must include the appropriate level of Mathematics I (unless the Dean gives approval to defer this subject) and shall be required to show cause to the satisfaction of the Professorial Board why he/she should be allowed to continue the course if that student fails more than half the units in which he/she is enrolled. See also restrictions on re-enrolment. The remaining units of the course may be completed in any order consistent with the requirements concerning prerequisite and co-requisite units as set out in Section **3A**.

7. *The proposed course must be approved by the Dean or his representative at enrolment.* In special circumstances, the Dean may grant a student permission to defer enrolment in certain Level I units until later in the course. Where any alteration in the course approved at enrolment is desired, the student must obtain the approval of the Dean or his representative for the new course.

B *Requirements for an honours degree*

1. In order to qualify for admission to the honours degree of Bachelor of Science a candidate shall:

(a) Satisfy the requirements for a pass degree but without proceeding to graduation;

(b) Undertake an extra year of full-time or two extra years of part-time study.

2. Admission to an honours course is granted by the Head of School. Students wishin to proceed to an honours degree must apply to the Head of the appropriate school on completion of pass degree requirements.

3. A suitably qualified candidate may be admitted to an honours course in one of the following:

Anatomy	History and Philosophy of
Applied Mathematics	Science
Applied Physics	Microbiology
Biochemistry	Physics
Biological Technology	Physiology
Botany	Psychology†
Chemistry	Pure Mathematics
Computer Science	Theoretical Mechanics
Entomology	Theory of Statistics
Geology	Zoology

4. To qualify for admission to an honours course, a student must have completed successfully 8 Level III units in the pass degree course* except that in special cases the Head of the appropriate school may approve entry without such a qualification.

*For the honours course in Applied Physics the corresponding normal requirement is both (a) at least six Level III units to be completed and (b) at least eight units at Levels II and III to be completed at Credit grade or better or in the respective Higher version.

†The Honours subject is 12.014 Psychology IV.

5. Further to requirements listed in paragraph **2.B4.**, to qualify for entry into an honours year a student must have completed any special units at required grades as determined by the Head of the School, prior to admission to the Honours year.

In order to ascertain any such special conditions, a student contemplating honours is advised to consult the Head of School at the end of the first year of study.

6. Upon admission to the honours course a student must attend lectures, read and engage in laboratory work as required by the Head of School.

3. Schedule of Units

A *Science units*

These are listed under the Schools which provide the instruction and are divided into levels. Students must observe the prerequisites and co-requisites. Some Schools offer higher units to which special prerequisites apply and which are designed to lead to honours. Students contemplating honours studies must ensure that they have selected appropriate units. Some units are terminating so that students taking these may not qualify to continue studies in that School. When selecting terminating units students must ensure that a choice of a major sequence is still available. Note that many units are of half year duration so that it is necessary to choose units which give a balanced program of study over the year.

The Dean has the power to vary in exceptional cases the prerequisites and/or co-requisites set down below on the recommendation of the Head of the appropriate school.

See following pages.

B *General Studies*

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).

Faculty of Science

School of Physics

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites‡	Co-requisites‡	Excluded
1.001	Physics I	I	2	F	6	Sc. Faculty Ent.		
1.011	Higher Physics I	IH	2	F	6	Sc. Faculty Ent.		
Physics Level II		II						
1.112A	Electromagnetism	II	1	S2	6	1.001, 10.001	10.211A	1.122A
1.112B	Modern Physics	II	1	S1	6	1.001, 10.001	10.211A	1.122B, 1.212C
1.112C	Thermodynamics and Mechanics	II	1	F	2	1.001, 10.001	10.211A	1.122C

School of Physics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites‡	Co-requisites‡	Excluded
1.212	Physics IIT (any two of 1.212A, 1.212B, 1.212C)	II	1	F	3	1.001 or 1.011; 10.001 or 10.011 or 10.021		1.112B (excluded by 1.212C only)

Higher Physics Level II

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites‡	Co-requisites‡	Excluded
1.122A	Electromagnetism	IIH	1	S2	6	1.011, 10.001	10.211A	1.112A
1.122B	Quantum Physics	IIH	1	S1	6	1.011, 10.001	10.211A	1.112B
1.122C	Thermodynamics and Mechanics	IIH	1	F	2	1.011, 10.001	10.211A	1.112C

Physics Level III

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites‡	Co-requisites‡	Excluded
1.113A	Wave Mechanics	III	1	S1	6	1.112B, 1.112C 10.211A		1.123A and 1.123D 2.023A and 10.222F
1.113B	Electromagnetic Fields and Physical Optics	III	1	S2	6	1.112A, 10.211A		
1.113C	Statistical Mechanics and Solid State	III	1	S1	6	1.112B and 1.112C	1.113A§	1.123B and 1.123C
1.113D	Astrophysics and Nuclear Physics	III	1	S2	6	1.112B	1.113A§ or 10.222F	1.123C

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, 10.222F
1.123B	Electromagnetic Theory and Statistical Mechanics	IIIH	1	S1	6	1.122C, 1.122A 10.211A		1.113C, 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 and 1.113D
1.123D	Atomic Physics and Spectroscopy	IIIH	1	S2	6	1.122B, 1.122A 10.211A	1.123A or 10.222F	1.113A

Physics Level III Supplementary Units

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites‡	Co-requisites‡	Excluded
1.143A	Biophysics	III	1	S1	5	1.112C		
1.143B	Solid State Devices and Electronics	III	1	S2	6	1.133A or 1.112A if taken in 1975		
1.143D	Conceptual Framework of Physics	III	1	S2	5	1.112C† 1.112A, 1.112B		
1.143F	Marine Acoustic and Seismic Methods (Oceanography Unit)	III	1	S1/S2	4/2	10.211A or 10.221A or 10.031		

† This unit may be a co-requisite in special cases
‡ Students should note the additional prerequisite to units of Higher Physics III. Where a unit is specified at Level II as a prerequisite or co-requisite the Level IIH unit may be substituted.
   Students must apply to the Head of School for Admission to Physics honours and they should have completed at least Physics units 1.123A, 1.123B, 1.123C and 1.123D.
§ This co-requisite may be waived under certain circumstances subject to the approval of the School of Physics.

School of Chemistry

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
2.001	Chemistry I	I	2	F	6			
2.002A	Physical Chemistry	II	1	*	6	1.001 or 1.011 and 2.001 and 10.001 or 10.011 or 10.021		
2.002B	Organic Chemistry	II	1	*	6	2.001		
2.002D	Analytical Chemistry	II	1	*	6	2.001 and 10.001 or 10.011 or 10.021		
2.042C	Inorganic Chemistry	II	1	*	6	2.001		
2.003E	Nuclear and Radiation Chemistry	II/III	1	*	6	2.001 and 10.001 or 10.011 or 10.021		
2.003H	Molecular Spectroscopy and Structure	II/III	1	*	6	2.001		
2.003J	Fundamentals of Biological Chemistry	II/III	1	*	6	2.001		41.101A
2.003K	Solid State Chemistry	II/III	1	*	6	2.001 and 10.001 or 10.011		
2.013A	Introductory Quantum Chemistry	II/III	1	*	6	1.001 or 1.011 and 2.001 and 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 and 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		2.043L
2.013M	Thermochemistry	III	1	*	6	2.003A		
2.023A	Chemical Physics	III	1	*	6	2.002A and 10.211A		
2.023B	Natural Product Chemistry	III	1	*	6	2.003B		
2.023L	Biological and Agricultural Chemistry	III	1	*	6	2.002B		2.053L
2.033A	Physical Chemistry of Macromolecules	III	1	*	6	2.003J or 2.002B and 1.112C or 2.002A		
2.033L	Applied Organic Chemistry†	III	2	F	12	2.002B		2.003L, 2.053L, 2.043L
2.043A	Environmental Chemistry	III	1	*	6	2.002A		
2.043L	Chemistry and Enzymology of Foods†	III	2	F	12	2.002B		2.053L, 2.013L, 2.033L
2.053A	Chemical Kinetics and Reaction Mechanisms	III	1	*	6	2.002A		
2.053L	Biological and Agricultural Chemistry†	III	2	F	12	2.002B		2.023L, 2.033L, 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.

School of Mathematics

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded*
Mathematics								
10.001	Mathematics I	I	2	F	6			
10.011	Higher Mathematics I	IH	2	F	6			
10.021	Mathematics IT	IT	2	F	6			
10.041	Introduction to Applied Mathematics	I	1	S2	6		10.001 or 10.011	
10.031‡	Mathematics	II	1	F	2	10.001 or 10.011 or 10.021 Credit		‡
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 or 10.011		10.121A
10.111B	Analysis	II	1	F	2	10.001 or 10.011		10.121B
10.1111	Group Theory	II/III	½	S1	2	10.001 or 10.011	10.111A, 10.111B 10.211A	10.121A, 10.111C
10.1112	Geometry	II/III	½	S2	2	10.001 or 10.011	10.111A, 10.111B, 10.1111, 10.211A	10.121C 10.111C
Higher Pure Mathematics Level II†								
10.121A	Algebra	IIH	1	F	2½	10.011		10.111A, 10.1111
10.121B	Real and Complex Analysis	IIH	1	F	2½	10.011		10.111B
10.121C	Number Theory and Geometry	IIH/IIIH	1	F	2½	10.121A, 10.121B, 10.011	10.121A, 10.121B, 10.221A or 10.211A	10.111C, 10.112A, 10.1112, 10.1121
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 and/ or S2	2	***	10.111A, 10.111B, 10.211A	10.121C, 10.112A
10.1122	Algebra	III	½	S2	2	10.111A	10.111B, 10.1111, 10.211A	10.122A, 10.112A
10.1123	Set Theory	III	½	S1 and/ or S2	2	***	10.111A, 10.111B, 10.211A	10.112D
10.1124	Combinatorial Topology	III	½	S1 and/ or S2	2	10.111B	10.111A, 10.211A	10.112D
10.1125	Ordinary Differential Equations	III	½	S1	2	***	10.112B	10.122E, 10.112E
10.1126	Partial Differential Equations	III	½	S2	2	***	10.112B, 10.1125	
10.1127	History of Mathematics	III	½	S1	2	10.111A, 10.111B, 10.211A		
Higher Pure Mathematics Level III**								
10.122A	Algebra	IIIH	1	F	2½	10.121A		10.1122
10.122B	Integration and Functional Analysis	IIIH	1	F	2½	10.121B		10.112B
10.122C	Topology and Differential Geometry	IIIH	1	F	2½	10.121A, 10.121B		10.1124, 10.112C
10.122E	Complex Analysis and Differential Equations	IIIH	1	F	2½	10.121B		10.1125

For footnotes, see overleaf

School of Mathematics (continued)

* 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 Level IIIH 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.

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
10.211B	Analytical Dynamics	II	1	S1*	4	10.001, 1.001	10.211A	10.221B
10.211C	Hydrodynamics	II/III	1	S2	4	10.001, 1.001 or 10.041 or 5.010	10.211A, 10.111B	10.221C
Higher Applied Mathematics Level II								
10.221A	Mathematical Methods	IIH	1	F	2½	10.011†		10.211A
10.221B	Analytical Dynamics	IIH	1	S1	4	10.011†, 1.011†	10.221A or 10.211A	10.211B
10.221C	Hydrodynamics	IIH/IIIH	1	S2	4	10.011 or 10.001 Dist., 1.001 or 10.041 or 5.010	10.221A or 10.211A, 10.121B or 10.111B	10.211C
Applied Mathematics Level III								
10.212A	Numerical Analysis	III	1	F	2	10.111A, 10.211A		10.222A
10.212D	Mathematical Methods	III	1	F	2	10.211A, 10.111A, 10.111B		10.032, 10.222D, 10.222E
10.212L	Optimization Techniques	III	1	F	2	10.111A, 10.111B, 10.211A		10.222L
Higher Applied Mathematics Level III								
10.222A	Numerical Analysis	IIIH	1	F	2	10.221A, 10.121A‡		10.212A
10.222C	Maxwell's Equations and Special Relativity	IIIH	1	F	2	10.221A, 10.121B‡, 1.001		1.113B, 1.123B, 1.153B
10.222D	Mathematical Methods	IIIH	1	F	2	10.221A, 10.121A, 10.121B‡		10.212D
10.222F	Quantum Mechanics	IIIH	1	F	2	10.221A, 10.121A, 10.121B‡	10.222D	1.113A, 1.123A
10.222L	Optimization Techniques	IIIH	1	F	2	10.221A, 10.121A, 10.121B‡		10.212L

* The evening course for 10.211 B runs at 2 hours per week throughout the year.

† A student who gains a superior pass in 10.001 Mathematics I and/or 1.001 Physics I may apply to proceed to Higher Applied Mathematics units.

‡ 10.111A, B and 10.211A with a sufficiently good pass may be substituted as a prerequisite in place of 10.121A, B and 10.221A.

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

School of Mathematics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites (all units except as governed by *or*)	Co-requisites	Excluded*
Statistics								
Theory of Statistics Level II								
10.311A	Probability and Random Variables	II	1½	S1	7	10.001 *or* 10.011 *or* 10.021 Cr		10.321A, 10.331
10.311B	Statistical Inference	II/III	1½	S2	7	10.001 *or* 10.011 *or* 10.021 Cr; 10.311 *or* 10.321A		10.321B, 10.331
Higher Theory of Statistics Level II								
10.321A	Probability and Random Variables	IIH	1½	S1	8	10.001 *or* 10.011		10.311A, 10.331
10.321B	Statistical Inference	IIH/ IIIH	1½	S2	8	10.001 *or* 10.011; 10.321A		10.311B, 10.331
10.331	Statistics SS	II	1	F	2	10.001 *or* 10.011 *or* 10.021 Cr		10.311A, 10.311B, 10.321A, 10.321B
Theory of Statistics Level III**								
10.312A	Probability and Stochastic Processes	III	1	SS	4	10.311A *or* 10.321A; 10.111A *or* 10.121A; 10.111B *or* 10.121B; 10.211A *or* 10.221A		10.322A
10.312B	Experimental Design (Applications) and Sampling	III	1	SS	4	10.311B *or* 10.321B *or* 10.331 (Nor. Cr)	10.211A *or* 10.221A	10.322B
10.312C	Experimental Design (Theory)	III	1	SS	4	10.311B *or* 10.321B; 10.111A *or* 10.121A; 10.111B *or* 10.121B; 10.211A *or* 10.221A	10.312B† *or* 10.322B†	10.322C
10.312D	Probability Theory	III	1	SS	4	10.311A *or* 10.321A; 10.111A *or* 10.121A; 10.111B *or* 10.121B; 10.211A *or* 10.221A		10.322D
10.312E	Statistical Inference	III	1	SS		10.311B *or* 10.321B; 10.111A *or* 10.121A; 10.111B *or* 10.121B; 10.211A *or* 10.221A	†	10.322E
Higher Theory of Statistics Level III**								
10.322A	Probability and Stochastic Processes	IIIH	1	SS	4½	10.321A; 10.111A *or* 10.121A; 10.111B *or* 10.121B; 10.211A *or* 10.221A		10.312A
10.322B	Experimental Design (Applications) and Sampling	IIIH	1	SS	4½	10.321B; 10.111A *or* 10.121A; 10.111B *or* 10.121B; 10.211A *or* 10.221A		10.312B
10.322C	Experimental Design (Theory)	IIIH	1	SS	4½	10.321B; 10.111A *or* 10.121A; 10.111B *or* 10.121B; 10.211A *or* 10.221A	10.322B†	10.312C
10.322D	Probability Theory	IIIH	1	SS	4½	10.321A; 10.111A *or* 10.121A; 10.111B *or* 10.121B; 10.211A *or* 10.221A		10.312D

* 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 units.

** 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).

School of Mathematics (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded*
10.322E	Statistical Inference	IIIH	1	SS		10.321B; 10.111A *or* 10.121A; 10.111B *or* 10.121B; 10.211A *or* 10.221A	†	10.312E

Theoretical and Applied Mechanics

Theoretical Mechanics Level III

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded*
10.412A	Dynamical and Physical Oceanography	III	1	F	2	1.001 *or* 1.011, 10.211A *or* 10.221A *or* 10.031§		
10.412B	Continuum Mechanics	III	1	F	2	10.111A, 10.111B and 10.211A	10.211C *or* 1.143F *or* 1.112C	10.422B

Higher Theoretical Mechanics Level III

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded*
10.422A	Fluid Dynamics	IIIH	1	S2	4	10.221C *or* 10.211C Dist.	10.422B	
10.422B	Mechanics of Solids	IIIH	1	S1	4	10.111A, 10.111B, 10.211A, 10.221B *or* 10.211B Dist *or* 1.122C *or* 1.112C Dist.		10.412B

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

§ It is recommended that *one* of the following be taken concurrently: 10.211C or 10.221C or 1.112C or 1.143F.

School of Applied Physics and Optometry

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
31.182	Optics and Optical Instruments	II	1	F	3	1.001 *or* 1.011		1.212
31.113A	Physics of Materials I	III	1	S1 *and* F	6 3	1.112B *or* 1.122B *and* 2.001		
31.113B	Physics of Measurement	III	1	F	3	1.112B *or* 1.122B		
31.113C	Applications of Radiation	III	1	S2	6	1.112B *or* 1.122B	31.182	

Faculty of Biological Sciences

School of Psychology

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Exclusions
12.001	Psychology I	I	2	F	5	Science Faculty entrance		
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	12.052 and/or 12.062	
12.153	Research Methods IIIA	III	1	S1	4	12.052, 12.062 and 12.152 are prerequisites for any Level III unit + 12.153		
12.163	Research Methods IIIB	III	1	S2	4			
12.173	Psychological Issues III	III	1	Not offered 1976	4			

School of Psychology (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Exclusions
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 1976	4			12.623
12.323	Motivation IIIA	III	1	Not offered 1976	4			
12.373	Psychological Assessment IIIA (Testing)	III	1	Not offered 1976	4			12.042 (Psych BSc)
12.383	Psychological Assessment IIIB (Psychometric Theory)	III	1	Not offered 1976	4			
12.413	Physiological Psychology IIIA	III	1	S1	4			12.402 (Psych BSc)
12.423	Physiological Psychology IIIB	III	1	S2	4	+ 12.413		12.402 (Psych BSc)
12.453	Human Information Processing IIIA	III	1	S2	4			
12.463	Human Information Processing IIIB	III	1	Not offered 1976	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	Not offered 1976	4	+ 12.553		
12.603	Abnormal Psychology IIIA	III	1	S1	4			
12.613	Abnormal Psychology IIIB*	III	1	S2	4	+ 12.603		
12.623	Guidance and Counselling III*	III	1	S2	4			12.313
12.653	Industrial Psychology III*	III	1	S1	4	+ 12.503 (may be Co-requisite)		
12.663	Ergonomics III*	III	1	S2	4			
12.703	Psychological Techniques III*	III	1	Not offered 1976	4	+ 12.373		
12.713	Behaviour Control and Modification III	III	1	S2	4			
12.733	Laboratory Instrumentation III*	III	1	S2	4			12.042 (Psych BSc)

(Vertical note spanning the Prerequisites column: "unit III Level for any prerequisites are 12.152 and 12.062, 12.052")

* Reserved for approved potential Psychology IV candidates. Applicants must have completed 12.001, 12.152, 12.052 and 12.062 at an average level of Credit or higher.

Notes:

1. A major in Psychology 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 adds an additional four Level III units to the four required for single major. The double major is available to Pass students as well as to potential Psychology IV students. Intending Honours students are advised to complete a double major in Psychology and to include 12.153 and 12.163 among their Level III units.

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	Sc. Faculty Entrance	2.001, 10.001 or 10.011 or 10.021; if Level II or Level III Biology Units in the Faculty of Biological Sciences are to be taken subsequently.	
17.021	Comparative Functional Biology	I	1	S2	6	17.011†	2.001, 10.001, or 10.011 or 10.021; if Level II or Level III Biology Units in the Faculty of Biological Sciences are to be taken subsequently.	
17.012	General Ecology	II	1	S1	6	17.001 or 17.011 and 17.021		

† Terminating pass acceptable.

School of Biochemistry‡

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites**	Co-reqiosotes	Excluded
41.101A	Chemistry of Biologically Important Molecules	II	1	S1	6	**For any Level II unit:** 17.001† or 17.011† and 17.021† and 2.001†	41.101B*	2.003J
41.101B	Matabolism	II	1	S1	6		41.101A	
41.101C	Control Mechanisms	II	1	S2	6	both 41.101A and 41.101B		
41.102A	Biochemistry of Macromolecules and Cell Biochemistry	III	2	S1	12	**For any Level III unit:** 41.101A, 41.101B and 41.101C and two Level II Chemistry units, including 2.002B		
41.102B	Metabolic Pathways and Control Mechanisms	III	2	S2	12			

‡ Level III units available only during the daytime.

* 41.101A may be taken as a single unit under special circumstances and at the discretion of the Head of School.

** 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
42.102	Fermentation Technology	III	1	S2	6	44.102		

* 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 1.001**		
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 pre- or co-requisite		
43.122	Advanced Plant Physiology	III*	1	S1	6	41.101A; 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 and either 1.001 or 2.001		
43.182	Cellular and Developmental Physiology	III*	1	S2	6	43.121		

NOTE: 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.

‡ 43.112 Plant Taxonomy and 43.172 Phycology and Marine Botany are the only Level III units which may be available to part-time students in 1976.

* These units may be taken in either second or third year of the Science course provided that prerequisites have been completed.

** 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; 43.112 Plant Taxonomy will commence in 1976 and 43.162 The Plant Kingdom will commence in 1977.

School of Microbiology†

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites*	Co-requisites	Excluded
44.101	Introductory Microbiology	II	1	S2	6	17.001 or 17.011 and 17.021		
44.111	Microbiology**	II	1	F	3			
44.102	General Microbiology	III	2	S1	12	44.101, 41.101A and 41.101B		
44.112	Applied Microbiology	III	2	S2	12	44.102		
44.122	Immunology	III	1	S2	6	17.001 or 17.011 and 17.021; 41.101A, 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 and 17.021		
45.201	Invertebrate Zoology	II	1	S2	6	17.011 and 17.021		
45.301	Vertebrate Zoology	II	1	S2	6	17.011 and 17.021		
45.112	Marine Ecology	III	1	S1	6	17.011 and 17.021 plus 45.201 or 25.022 or 2.002D		
45.121	Evolutionary Theory	III	1	S1	6	17.011 and 17.021		
45.122	Animal Behaviour	III	1	S2	6	45.101, 45.201, 45.301		
45.132	Comparative and Environmental Physiology	III	1	S2	6	41.101A and B; 45.301		
45.142	Developmental and Reproductive Biology	III	1	S1	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	III	1	S1	6	45.101, 45.201		
45.412	Insect Physiology	III	1	S1	6		45.402	
45.422	Applied Entomology	III	1	S2	6	45.412		
45.432	Project	III	1	S2	6	45.412		

NOTE: 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.

Faculty of Applied Science

School of Applied Geology

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
25.011*	Geology I	I	2	F	6	Sc. Faculty Ent.	2.001	25.151
25.151*	Geoscience IA	I	2	F	6	Sc. Faculty Ent.	2.001	25.011
25.012**	Geology IIA	II	2	F	6	25.011, 2.001		
25.022**	Geology IIB	II	1	F	3	25.011, 2.001		
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	
25.603A†	Geological Oceanography	III	1	S2	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 compulstory part of this course.

*** A geological survey camp of 10 days' duration is a compulsory part of this course.

****Field turorials 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	Sc. Faculty Ent.		
27.802*	Introduction to Human Geography	I	1	S2	4½	Sc. Faculty Ent.		
27.103*	Climatology	II	1	S2	5½	1.001 *and* 27.801 *and* 27.802		
27.203*	Biogeography	II	1	S1	5½	27.801 *and* 27.802		
27.413*	Geomorphology	II	1	S1	5½	27.801 *and* 27.802 *or* 25.011 *or* 25.151		
27.423*	Pedology	II	1	S2	5½	2.001 *and* 27.801 *and* 27.802 *or* 25.011 *or* 25.151		

* Field work (to be arranged by the School of Geography) is a compulsory component of each unit.

Faculty of Arts

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		
52.172	Early Greek Philosophy	I	½	S2	2	Nil		
52.182	Political Philosophy	I	½	S2	2	Nil		
52.153	Predicate Logic	II	½	S1	2	Level II status in Philosophy** and 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**		
52.203	Introduction to Political Philosophy	II	½	S1	2	Level II status in Philosophy**		52.182
52.213	Sartre	II	½	S1	2	52.163		
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			
52.283	Philosophical Study of Woman	II	½	S2	2	52.203 *or* 52.493		

School of Philosophy (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
52.293	Plato's Later Dialogues	II	½	S2	2	52.483*		
52.303	Spinoza and Leibniz	II	½	S2	2	52.163		
52.313	Ethics of Politics	II	½	S2	2	52.203*		
52.323	Set Theory	II	½	S1	2	52.153		
52.333	Philosophy of Perception†	II	½	S1	2	52.163 or 52.173		
52.343	Privacy and Other Minds	II	½	S2	2	52.163 and 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	52.203*		
52.383	Twentieth Century Marxist Philosophy	II	½	S2	2	52.203*		
52.393	History of Traditional Logic	II	½	S2	2	52.153		
52.403	Model Theory	II	½	S2	2	52.323		
52.413	Reading Option	II	½	S1 or 2		Satisfactory performance in Level II units		52.453
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	S2	2	Level II status in Philosophy**		
52.493	Existentialism	II	½	S1 or 2 (to be notified)	2	Level II status in Philosophy**		
52.503	Utopias	II	½	S1 and 2	1½	Level II status in Philosophy** and 52.182 or 52.203		
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 & 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.

† Not offered in 1976.

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, 2.001, 10.001, 25.011 or 25.151, 1.011, 10.011, 10.021, 27.801 and 27.802, 12.001		

School of History and Philosophy of Science (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
62.022	The Social History of Science—From the French Revolution to the Second World War	II	1	S2	6	A pass in *two* of: 1.001, 17.011 *and* 17.021, 2.001, 10.001, 25.011 *or* 25.151, 1.011, 10.011, 10.021,		
62.032	The Scientific Theory	II	1	S2	6	27.801 and 27.802, 12.001		
62.013	History of the Philosophy of Science	III	1	F	3	62.012 *or* 62.022 *or* 62.032		
62.023	The Scientific Community	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	Permission of Head of School of H.P.S.		

Faculty of Engineering

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	Sc. Faculty Ent.		
5.020	Engineering B	I	1	S1 or 2	6		5.010	
5.030	Engineering C	I	1	S1 or 2	6			

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		

School of Electrical Engineering (continued)

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded
6.601B	Assembler Programming and Non-numeric Computing	II	1	S2	5	10.001	6.601A	
6.601B*	Assembler Programming and Non-numeric Computing	II	1	F	2½	10.001	6.601A	
6.602A	Computer Systems I	III	1	S1	5	6.601B		
6.602B	Computer Systems II	III	1	S2	5		6.602A	
6.602C	Computer Applications	III	1	S1	5	6.601A		
6.602D	Programming Languages	III	1	S2	5	6.601A		

* Offered only in the evening.

Faculty of Medicine

School of Anatomy

No.	Name	Level	Unit Value	When Offered	Hpw	Prerequisites	Co-requisites	Excluded*
70.011A	Mammalian Histology	II	1	S1	6	17.011 and 17.021		
70.011B	Mammalian Embryology	II	1	S2	6	17.011 and 17.021		
70.011C	Systematic Anatomy I	II	1	S1	6	17.011 and 17.021		
70.012A	Systematic Anatomy II	III	1	S1	6	70.011A, 70.011C		
70.012B	Systematic Anatomy III	III	1	S1	6	70.011A, 70.011C		
70.012C	Systematic Anatomy IV	III	1	S2	6	70.011A, 70.011C		
70.012D	Comparative Histology	III	1	S1	6	70.011A		
70.303	Kinesiology	III	1	S2	6	70.011C, 70.012A		

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	2.001 10.001 or 10.011 or 10.021 17.011 and 17.021		
73.012	Physiology II	III	4	F	12	73.011A; 41.101A, B, C		

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	S2	5	45.101 or 10.311A and 10.311B or 10.321A and 10.321B or 10.331		
79.302	Biochemical Genetics of Man	III	1	S2	6	43.101, 41.101A and 41.101B		

B *General Studies*

Students should select *three* general studies subjects (see General Studies Handbook). In addition, honours students are required to complete one more general studies subject.

4. Pattern of Studies

In general, a student should select a course which is adequately distributed over the six half years of study. Typical course pattern are available from the Faculty Office.

A suggested pattern of study is:

First year: The appropriate two units of Level I Mathematics and six other Level I units including those essential to the intended major sequence of units.

Second year: One general studies elective and eight units from Level II and two from Level I.

Third year: Two general studies electives and at least four Level III units. The other units could be Level II or III.

Fourth year: For an honours degree, one general studies elective and such requirements as specified by the Head of the appropriate School.

5. Part-time Study

A student must select the units and general studies electives in accordanced with these regulations but must enrol in an appropriate level of Mathematics I in the first or second year of attendance unless the Dean gives approval to defer this subject.

Rules governing admission to the Science Degree 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 lest the first two years of a degree course extending over four or more years and approved by the Board of Studies in Science for the purpose of double degrees, may be admitted to the Science

*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.

degree course 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 Course units shall be given advanced standing in such General Studies subjects and no more than 14 such Science course units.

3. Students so admitted may be granted exemption from two other Level II Science 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 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 course regulations. One of Mathematics 10.021 or 10.001 or 10.011 must be included in the course.

Rules governing admission to the Science Degree Course with advanced standing

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

2. Undergraduates of the University of New South Wales who transfer from another course to the Science degree course, may be admitted to the Science degree course with exemption in all General Studies subjects completed by them and in all Science course units completed by them. Further, where an undergraduate has completed a subject which contains the syllabus material of a Science course unit (or units) the Dean, with the agreement of the Head of the School offering the Science 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 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 degree 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 course subjects in this University may, subject to the approval of the appropriate Heads of School, be granted exemption in no more than eleven Science course units but not including Level III Science course units.

5. Notwithstanding the provisions of Rules **1.**, **2.**, **3.** and **4.**, the Board of Studies in Science 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 this University.

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 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.

There is no limit to the number of chemistry units which may be studied in the Science course, provided the course pattern is approved, but students wishing to study more than eleven units should transfer to the Pure and Applied Chemistry course in order to ensure that a balanced course of study is undertaken.

2. *Pure and Applied Chemistry Course.* This course which allows intensive specialization in chemistry according to a prescribed pattern, leads to 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 programme 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 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 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 course.

Electives offered by the School of Chemistry

Level	No.	Title	Prerequi-sites	Co-requi-sites	Excluded
II/III	2.003E	Nuclear and Radiation Chemistry	2.001 *and* 10.001 or 10.011 or 10.021		
II/III	2.003H	Molecular Spectroscopy and Structure	2.001		
II/III	2.003J	Fundamentals of Biological Chemistry	2.001		41.101A
II/III	2.003K	Solid State Chemistry	2.001 *and* 10.001 or 10.011		
II/III	2.013A	Introductory Quantum Chemistry	1.001 or 1.011 *and* 2.001 *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	

Level	No.	Title	Prerequi-sites	Co-requi-sites	Excluded
III	2.013L	Chemistry and Enzymology of Foods	2.002B		2.043L
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
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, 2.043L, 2.053L
III	2.043A	Environmental Chemistry	2.002A		
III	2.043L	Chemistry and Enzymology of Foods† (double unit)	2.002B		2.013L, 2.033L, 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, 2.033L, 2.043L
III	2.063A	Advanced Molecular Spectroscopy	2.013A		

† Only *one* of these double units may be chosen.

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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		
2.001	Chemistry I		6
10.011	Higher Mathematics I *or*	}	6
10.001	Mathematics I	*or*	
10.021	Mathematics IT		

Plus one of **Hpw**

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 *or*	}	6
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	}	

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

*Three field excursions, up to five days in all, are an essential part of the course.
**To be chosen from units in the Science 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

| 1.212 | Physics IIT | 3 |

Biological Sciences

17.011	Biology of Mankind	6
17.021	Comparative Functional Biology	
41.101A	Chemistry of Biologically Important Molecules	6*
41.101B	Metabolism	6*
44.101	Introductory Microbiology	3
73.011A	Principles of Physiology	6

*One session only.

Geology

25.011	Geology I	6
25.012	Geology IIA	6
25.022	Geology IIB	6
25.112B	Geoscience IIB	3

Year 3 (1977) **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 course and in accordance with Science course regulations.

Year 4 Honours

As prescribed by the School.

Part-time Course

The part-time course in Pure and Applied Chemistry is equivalen to the full-time course and extends over six part-time years, leading to 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.

This course allows a student to choose electives from other faculties such as Commerce or Applied Science. Areas such as industrial chemistry, management and technical services can thus be covered by those students who feel that their vocational interests lie in one particular region.

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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	
1.001	Physics I	6
2.001	Chemistry	6
10.001	Mathematics I or	
10.021	Mathematics IT	6

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

		Hpw
Stage 4		
2.002B	Organic Chemistry	3
2.002D	Analytical Chemistry	3
2.003H	Molecular Spectroscopy and Structure	3
	General Studies Electives	3
		12

*See footnote ** under Year 2 full-time course.

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.

Optometry Course

The Department of Optometry provides a four year full-time course in Optometry leading to the degree of Bachelor of Optometry, which may be awarded at 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.

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Optometry—Full-time course
Bachelor of Optometry
BOptom

Year 1		Hours per week
1.001	Physics I	6
2.001	Chemistry I	6
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 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 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.

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Bachelor of Science in Psychology Course

The four year course in Psychology, which leads to 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 programme 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, e.g. clinical, social, industrial, human factors, and educational. In addition, each student must complete a research thesis or project.

Details of the qualifications required for admission to the Psychology BSc Course, 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 BSc Course

1. Applicants for admission to the Course must be matriculated to this University; and also have either satisfied the entrance requirements for the Faculty of Science or, alternatively, have passed Mathematics I or Biology of Mankind and Comparative Functional Biology.

2. A. In order to qualify for admission to the 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

and

A total value of 8 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.

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:

53.101 Sociology IA and 53.102 Sociology IB *or*
15.001 Economics IA and 15.011 Economics IB *or*
Two of 54.901 Australian Politics A, 54.901 Australian Politics B, 54.902 Comparative Politics and 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, 52.172 Early Greek Philosophy 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:
41.101A Chemistry of Biologically Important Molecules
41.101B Metabolism
(*41.101A and 41.101B must be taken together, and count as two units*)

41.101C Control of Mechanisms
43.101 Genetics
45.101 Biometry
45.301 Vertebrate Zoology
73.011A Principles of Physiology (equivalent to 2 units)

(c) Sociology IA and Sociology IB 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 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 BSc Course with advanced standing

1. Graduates of the University of New South Wales may be admitted to the Psychology BSc degree course 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 BSc course may be admitted to the Psychology BSc course with exemption in no more than seven Psychology BSc course subjects or their unit equivalents.

3. Graduates or undergraduates of other universities may be admitted to the Psychology BSc 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 BSc 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 BSc 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, with the equivalent of 6 compulsory psychology subjects [although the student may choose from a number of Level II, III and IV units];

2. Some supporting studies in mathematics and/or biology, of which a minimum of one course is compulsory;

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 I	Year II	Year III	Year IV
Compulsory Psychology Subjects for all Courses		12.001	12.052, 12.062, 12.152 and 12.042	8 Psychology Level III units	12.004
Main Supporting Subject:					
Pure Mathematics	(2 Yrs)	10.001 Social Science Subject I* Any approved Level I Subject*	10.111A, 10.111B and 10.211A	An approved Level I or II Subject*	
	(3 Yrs)	10.001 A Social Science Subject I* Any approved Level I Subject*	10.111A unit 10.111B unit 10.211A unit	4 Pure Mathematics Level III unit value	
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 2.001 10.001 or 10.021	41.101A 41.101B 41.101C	A Social Science Subject I*	
Zoology	(2 Yrs)	17.011 and 17.021 2.001 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 2.001 10.001 or 10.011 or 10.021	73.011A 10.331 or A Pure Maths II unit	A Social Science Subject I*	

		Year I	Year II	Year III	Year IV
Social Science Subject	(2 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* 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 (I)* or Any approved Level I or II Subject*	

* or equivalent units.

Schedule: Main Psychology BSc 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	6	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
	12.004	Psychology IV	IV	15	F	All other Course requirements	
	12.402	Physiological Psychology	II	4	F	12.001, 17.011 and 17.021	
		8 Psychology units**	III				

Schedule: Main Psychology BSc 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 10.211A	Mathematics II	II	6	F	10.001 or 10.011	
	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§	41.101A	Chemistry of Biologically Important Molecules	II	6	S1	17.011 and 17.021 2.001	41.101B
	41.101B	Metabolism	II	6	S1	10.001 or 10.011	41.101A
	41.101C	Control Mechanisms	II	6	S2	or 10.021	41.101A 41.101B
Zoology Units§	43.101	Genetics	II	6	S2	17.011 and 17.012	
	45.101	Biometry	II	6	S1	2.001	
	45.301	Vertebrate Zoology	II	6	S2	10.001 or 10.011 or 10.021	
Physiology Units§	73.011A	Principles of Physiology (Equiv. Unit Value = 2)	II	6	F	17.011 and 17.021 2.001 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 units, including pre- and co-requisites, refer to Science 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.

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 1976. Each candidate must complete a re-enrolment form and submit it to the Cashier. (See Enrolment Procedures earlier in this handbook).

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

Masters and Graduate Diploma Courses

Note: All formal masters courses and graduate diploma students must lodge an authorised enrolment form with the Cashier on the day the enrolling office signs the form. (See the 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 (see the relevant Faculty Handbook). 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 110, Biological Sciences

Building	Friday 27 February
	2.00 pm to 5.00 pm
	6.00 pm to 8.00 pm

*Candidates re-enrolling in Schools in the Faculties of Arts, Commerce, and Law should obtain forms from the appropriate Faculty Office.

PhD and ME candidates re-enrolling in the School of Electrical Engineering should attend on Friday 20 February, 2.00 pm to 5.00 pm in Room G3 at the School.

PhD and ME candidates re-enrolling in the School of Mechanical and Industrial Engineering should attend on Friday 27 February, 2.00 pm to 5.00 pm in Room 106 at the School.

Candidates re-enrolling in the Schools of Medicine and Surgery should obtain forms from the Department Head in the hospital with which they are associated.

Master of Psychology (MPsychol)

School of Psychology	Friday 27 February 2.00 pm to 5.00 pm 6.00 pm to 7.30 pm

Faculty of Science
Master of Chemistry (MChem)

Unisearch House	Friday 27 February 2.00 pm to 5.00 pm

Food and Drug Analysis (DipFDA)

Room 422, Robert Heffron Building (Chemistry)	Friday 27 February 2.00 pm to 5.00 pm 6.00 pm to 8.00 pm or by arrangement with the School

Master of Optometry (MOptom)

Unisearch House	Monday 23 February 2.00 pm to 5.00 pm

Master of Physics (MPhysics)

Graduate Office Room 61 Main Building	Friday 27 February 2.00 pm to 5.00 pm 6.00 pm to 7.30 pm

Master of Statistics (MStats)

Room 1205 Sciences Building	Tuesday 24 February 4.00 pm

Schools in the Faculties of Biological Sciences and Science except *School of Chemistry*	Friday 27 February 2.00 pm to 5.00 pm 6.00 pm to 8.00 pm Office of the appropriate School
School of Chemistry	Friday 27 February 2.00 pm to 6.00 pm Unisearch House

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.)

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 or 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

12.104	Psychology Honours
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 attent 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

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 earlier in this section.

532
Biochemical Engineering Graduate Diploma
GradDip

		Hours per week	
		S1	S2
3.481G	Mass Heat and Momentum Transfer	4	0
3.482G	Thermodynamics	4	0
3.483G	Process Dynamics and Biochemical 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

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 earlier in this section.

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 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 earlier in this section.

The course consists of lectures, seminars, demonstrations and 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	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

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

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

Sections I

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

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 Applied Physics and Optometry	Master of Optometry
School of Chemistry	(Master of Chemistry) Graduate Diploma in Food and Drug Analysis

School 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 earlier in this section.

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 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 (hereinafter referred to as the Committee) 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.

*The School of Mathematics also offers the pass degree of MA (see below).

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 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
1.585G	Basic Solid-State Physics	1
1.586G	Solid-State Device Physics	1
1.288G	Physical and Applied Acoustics	1
1.535G	Biophysics	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
10.372G	Statistics and Experimental Design	1
10.373G	The Interpretation of Experimental Data	1
10.401G	Seiches and Tides	1
31.301G	Measurement and Data-Handling	1
31.123G	The Physics of Strong Materials	1
97.010G	Basic FORTRAN IV Programming I & II	1
5.075G	Computational Methods—Part I	1
5.076G	Computational Methods—Part II	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.

Applied Physics and Optometry

The Department of Optometry offers a formal graduate course leading to the degree of Master of Optometry (MOptom). This course comprises the study of three elective graduate subjects and of advanced Clinical Optometry, together with the preparation of a thesis on an assigned project. It may be completed in one year of full-time study, or (to meet the needs of practising optometrists) in two or three years of part-time study. The course provides advanced training in clinical and theoretical aspects of Optometry, with opportunities for specialization in fields such as contact lenses, occupational optometry, and orthoptics.

Conditions for admission and for the award of the degree of Master of Optometry are set out in the Calendar.

876
Master of Optometry
MOptom

		Hours per week
31.701G	Advanced Clinical Optometry	4
	Three elective graduate subjects chosen from the list below (each 4 hours)	12
31.799G	Project	8
		24

Elective Graduate Subjects

		Hours per week
31.702G	Advanced Physiological Optics	4
31.703G	Binocular Vision and Space Perception	4
31.704G	Advanced Orthoptic Theory and Practice	4
31.705G	Advanced Contact Lens Theory and Practice	4
31.706G	Occupational Optometry	4
31.707G	Clinical Photography	4

The six elective graduate subjects offered are quite independent, and any three of them are suitable for a student seeking advanced professional training of a general nature. If clinical specialization is aimed at, the student would be advised to elect the graduate subjects shown below:

Specialization	*Graduate Subjects*
Contact Lenses	**1.** Advanced Contact Lens Theory and Practice
	2. Clinical Photography
	3. Advanced Physiological Optics
Occupational Optometry	**1.** Occupational Optometry
	2. Binocular Vision and Space Perception
	3. Advanced Physiological Optics
Orthoptics	**1.** Advanced Orthoptic Theory and Practice
	2. Binocular Vision and Space Perception
	3. Clinical Photography

Chemistry

877
Master of Chemistry
MChem

The MChem 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 six core courses of lectures:

A Analytical flame spectroscopy;
B Advanced electrochemical analysis;
C Chromatography;
D Complexes and ionic equilibria in analytical chemistry;
E Emission, I.R., mass and XRF spectroscopy;
F Calculations and statistics in analytical chemistry.

In addition they will take *two* of the following elective courses:

G Solvent extraction in analytical chemistry;
H Chemical analysis of organic and biological materials;
I Analytical chemistry applied to mineral chemistry and geochemistry;
J Chemical instrumentation and control including data processing and automation;
K Chemical microscopy;
L Sampling—procedures and errors.

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 experience, 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 in the Calendar.

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.

Mathematics

The School of Mathematics offers a graduate course which covers a wide range of statistical theory and practice. It leads to the award of the degree of Master of Statistics, and is available on a two-year full-time basis or on a four-year part-time basis.

The course provides advanced training for practising statisticians, and is available to graduates with a pass degree in statistics or an honours degree in a related field (commonly mathematics) with supporting study in·statistics. Honours graduates in statistics may be exempted from a maximum of half the course. The conditions for the award of the degree are set out in the Calendar.

The academic requirement for the degree is 24 credits.
Each candidate's program of study must be approved by the Head of the School.

875
Master of Statistics
MStats
Compulsory Subjects		Credits
10.381G	Experimental Design I	2
10.383G	Stochastic Processes	2
10.385G	Multivariate Analysis I	2
10.388G	Sequential Analysis	2
10.390G	Statistical Inference	2
10.392G	Project	2

Elective Subjects

10.382G	Experimental Design II	2
10.384G	Time Series	2
10.386G	Multivariate Analysis II	2
10.387G	Non-Experimental Statistics	2
10.389G	Non-Parametric Methods	2
10.391G	Special Topic* A	2
10.393G	Special Topic* B	2

Up to 6 credits may be taken in graduate subjects offered by other Departments or Schools within the University, subject to the approval of the Head of School. Such subjects include:

10.212L	Optimization Techniques	3
15.423	Econometrics B	2
18.771G	Simulation in Operations Research	2
19.111G	Theory of Traffic Behaviour	4
19.131G	Transport Planning	4

*To be arranged eg, biological statistics, further work on order statistics, population statistics, non-linear programming, discrete distribution theory.

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 in the Calendar.

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 will be 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.

Subject Descriptions and Textbooks

Reference booklists 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); S1 + S2 (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).

Identification of Subjects by Numbers

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

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

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

Identifying Number	School, Faculty or Department
1	School of Physics
2	School of Chemistry
6	School of Electrical Engineering
10	School of Mathematics
12	School of Psychology
17	Biological Sciences
25	School of Applied Geology
27	School of Geography

Identifying Number	School, Faculty or Department
31	School of Applied Physics and Optometry
41	School of Biochemistry
42	School of Biological Technology
43	School of Botany
44	School of Microbiology
45	School of Zoology
52	School of Philosophy
62	School of History and Philosophy of Science
70	School of Anatomy
73	School of Physiology and Pharmacology
79	School of Community Medicine

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

Anatomy

Undergraduate Study

The School of Anatomy offers three Level II units and five Level III units for Science students. Level II units comprise Mammalian Histology, Mammalian Embryology and Systematic Anatomy I (musculo-skeletal). The Level III units are Systematic Anatomy II (locomotion), Systematic Anatomy III (alimentary and urogenital), Systematic Anatomy IV (neuro-endocrine), Comparative Histology and Kinesiology. Students who major in Anatomy and who attain an adequate standard may proceed to a BSc Honours degree.

Each Anatomy unit is offered once during the year as a day course only.

For details of level, unit value, when offered, hours per week, pre-requisites and co-requisites, see tabular material earlier in this handbook.

70.011A
Mammalian Histology   L2T4

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, Philadelphia & Toronto
or
Bloom W. & Fawcett D. W. *A Textbook of Histology* 10th ed Saunders

70.011B
Mammalian Embryology   L2T4

History of embryology and its development as a science. The mammalian reproductive system. Gametogenesis. Fertilisation 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
Systematic Anatomy I   L2T4

Introduction to terms and concepts in systematic anatomy. General introduction to cardiovascular, respiratory, gastrointestinal, genito-urinary and nervous systems. Detailed study of the musculo-skeletal system. Parts 1 and 2. Part 1, The Upper Limb; Part 2, The Lower Limb. Distribution of vessels and nerves, living and radiological anatomy. Biomechanics of movement, posture and locomotion.

Textbook

Basmajian J. V. *Primary Anatomy* 6th ed Williams & Wilkins Co., Baltimore

70.012A
Systematic Anatomy II   L2T4

Detailed study of the musculo-skeletal system. Parts 3 and 4. Part 3, Head and Neck; Part 4, Trunk (vertebral column , thoracic, abdominal and pelvic walls). Distribution of vessels and nerves; living and radiological anatomy.

Textbook

Basmajian J. V. *Primary Anatomy* 6th ed Williams & Wilkins Co., Baltimore

70.012B
Systematic Anatomy III   L2T4

Detailed study of the visceral systems—cardio-pulmonary, gastro-intestinal and genito-urinary.

Textbook

Basmajian J. V. *Primary Anatomy* 6th ed Williams & Wilkins Co., Baltimore

70.012C
Systematic Anatomy IV   L2T4

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

70.012D
Comparative Histology   L2T4

Comparative cellular and intracellular structure and function. Comparative tissue structure and function. Detailed comparative study of skin and derivatives. Bone and skeletal structure. Haemopoietic tissues. Cells of circulating blood and tissue fluids. Blood vascular system. Muscle. Nervous tissue and sense organs. Alimentary system and associated glands. Excretory system. Genital and reproductive tissue.

Textbook

Ham A. W. *Histology* 7th ed Lippincott, Philadelphia & Toronto
or
Bloom W. & Fawcett D. W. *A Textbook of Histology* 10th ed Saunders

70.303
Kinesiology   L2T4

Study of movement in vertebrates, kinesiological recording, anatomical factors affecting movement, mechanics of posture and loco-motion, comparative vertebrate locomotion, development and organization of movement in the human, the facilitation of movement.

Applied Physics and Optometry

Department of Applied Physics

Applied Physics is concerned with the use of physical principles and techniques in the solution of technological problems. An applied physicist frequently acts as an interface between the discipline of physics and some other speciality such as engineering, polymer science or medicine. He or she may be involved, for example, in development of new or improved materials or manufacturing processes, in application or development of new instrumentation, control techniques or test methods.

At present there are relatively few applied physicists employed by industry in Australia as compared to other industrialized countries. Significant opportunities for employment exist in research, develop-ment, and applications laboratories as well as other departments of Australian companies. The Department of Applied Physics promotes the applications of physics in Australian industry and serves to bring together industrial and academic scientists and students so as to provide an education suited to the practical applications of physics rather than to the pursuit of more fundamental knowledge.

The Department currently offers one Level II and three Level III units in the Science Course (31.182 and 31.113A, B and C). While these are intended as part of preparation for applied physics honours study, they are equally suitable for science students, whether majoring in physics or not, who have an interest in the application of physics in technology and have completed the prerequisite units (1.112B or 1.122B; and 2.001 for 31.113A; 31.182 [prerequisite 1.001] for 31.113C).

Undergraduates who are majoring in Physics in the Science Course and whose interest is in applying their subject are offered the opportunity to achieve a BSc with Honours in Applied Physics on the basis of the fourth-year course which the Department conducts.

In accordance with Science Course regulations, suitably-qualified students may apply to the Head of the School for admission to the Honours year on completing pass degree requirements. Suitable qualifications include, besides the major in Physics, completion of the majority of a range of Science Course subjects and units which give appropriate support to applied physics study. A recommended pass degree program is:

Year 1	1.001 (or 1.011)	Physics I	
	2.001	Chemistry I	
	5.010 and 5.020 or 5.030	Engineering I	(2 units each)
	10.001 (or 10.011)	Mathematics I	
Year 2	1.112 (or 1.122)	Physics II (units A, B & C)	
	10.111 (or 10.121)	Pure Mathematics II (units A & B)	
	10.211 (or 10.221)	Applied Mathematics II (unit A)	
	31.182	Optics and Optical Instruments	
	1 further unit from the "Preferred List" below		
Year 3	1.113	Physics III (units A, B and C)	
	(or 1.123 Higher Physics III (units A, B, C and D))		
	31.113	Applied Physics III (units A, B & C)	

Two (or one) further units from the "Preferred List" below to comprise a total of 8 units for the year.

"Preferred List" of Science Course units

Level I*	17.011	Biology of Mankind	
	17.021	Comparative Functional Biology	(1 unit each)
	12.001	Psychology I	
	25.011	Geology I	(2 units each)
Level II	2.002A	Physical Chemistry	
	2.042A	Inorganic Chemistry	
	2.002D	Analytical Chemistry	
	2.002B	Organic Chemistry	(1 unit each)
	10.331	Statistics SS	
Level III	1.143B	Electronics	
	1.143	Physics (units A, B and F)	
	One only of 6.601B, 6.602C and 6.602D		
	6.601A	Introduction to Computing	(1 unit each)

The honours course comprises lectures, laboratory studies and project work in areas of the application of physics to practical objectives. Some of the areas may be chosen by the student from a number of electives. All Honours students take a "core" of studies comprising 31.114A Advanced Physics of Materials, 31.114B Advanced Physical

*The Science Course Regulations (see 2(a)(ii)) require that not less than 8 nore more than 10 units be from Level I.

Completion of a 24-unit pass degree program (as indicated), and a majority of graded passes in the Level II and Level III units, is normally required for admission to the Honours year.

Instruments, and 31.114C Introduction to Industrial Practice. In the last-named, aspects of the work of scientists in industry will be critically studied in depth. In this course, and in other parts of the honours year work, the Department has the support of a staff of visiting lecturers who are senior industrial scientists.

Graduates with honours in applied physics, or in physics, may register as research students in the Department working for the MSc or the PhD degree. Research work in the Department is directed towards practical objectives. Students working part-time or externally in appropriate fields for the MSc are welcome and given full encouragement.

Graduates not holding an appropriate honours degree either must present evidence of research ability, or must complete a qualifying course prescribed by the Department, before being accepted as higher-degree research students.

Students coming from outside the Science Course should note the "Rules governing Admission to the Science Degree Course with Advanced Standing" and in particular Rule 5, which relates to admission for the purpose of obtaining an honours degree. The "special program" which the Board of Studies in Science would be recommended to prescribe in the case of a pass graduate or graduand with a major in physics, would normally comprise one year of preparatory studies followed by the normal Applied Physics Honours year. Depending on circumstances, the preparatory work might be accomplished by one year's full-time study, or might involve more than one year if part-time.

Undergraduate Study

31.182   S1 L2½T1½
Optics and Optical Instruments   S2 L1T1½

The nature and propagation of light. Reflection and refraction at plane, circular-cylindrical, and spherical surfaces. Images produced by lenses, thin, thick and compound. Aberrations of lenses and mirrors, and methods of correcting them. Optical instruments; the eye, magnifiers, microscopes, telescopes, cameras, etc. Photometry. The limitation of beams in optical systems. Principles of design of some modern optical instruments; oil immersion lenses, zoom lenses, interference filters, light-guides and fibre-optics. Some uses of laser light. Polarization, interference, diffraction, limit of resolution in optical instruments.
Laboratory work features an introduction to the use of microscopes.

Textbook
Fincham W. H. A. & Freeman M. H. *Optics* 8th ed Butterworths

31.113A   S1 L3T3 *or*
Physics of Materials I   S1 + S2 L1½T1½

Properties of technologically-important materials related to their structure.

Inter-atomic bonding in and structure of single- and multi-component materials. Departure from ideal structures in real materials. Mechanical properties: elasticity, plasticity, viscosity, viscoelasticity, fracture phenomena, surface properties: surface energy, friction, adhesion, lubrication; diffusion; thermal, electrical, dielectric and magnetic properties.

Textbook
Van Vlack L. H. *Materials Science for Engineers* Addison-Wesley

31.113B
Physics of Measurement   S1 + S2 L1½T1½

Errors of observation and their treatment. Digital instruments, data recording, computer input, data handling by desk calculator.

Mass, force, acceleration, displacement, length, velocity, time, thermal, optical measurements. Measurements on fluids. Vacuum production and measurement. Electrical measurements and measuring instruments, including use of transducers for various physical quantities. Microwave and UHF measurements.

Noise in circuits: Nyquist's theorem, shot and flicker noise. Dynamic analysis of measuring systems. Problems of measurement under adverse and extreme conditions.

Textbook
Cook N. H. & Rabinowicz E. *Physical Measurement and Analysis* Addison-Wesley

31.113C
Applications of Radiation   S2 L3T3
Long-wave to short-wave electromagnetic radiations; some uses of electron beams and other radiations. Microwave radio and radar systems, use of beams of optical radiations, radiometry, colorimetry, radiation pyrometry, spectroscopic analytical techniques, radiation sources and detectors, stimulated emission and holography, X-ray analytical techniques, radiography. Applications of electron beams, mass spectrometers, nuclear radiations, acoustic radiation.

Textbooks
No set texts.

Part of each unit 31.113A, B & C, comprises relevant laboratory work and other exercises. In these, students will be to a significant extent associated with the current program of research work of the Department.

31.114A
Advanced Physics of Materials   S2 L3T3
An advanced course on the relation of structure of materials to their physical properties. Solid surfaces: adhesion, static, dynamic and rolling friction; oxidation; corrosion; electroplating, polishing and machining; case hardening, isolation and inhibition. Liquids: structure; strength and viscosity of simple liquids and polymers; capillary, couette and Stokes flow. Disperse systems: sols; colloids; emulsions; gels; viscosity and elasticity; network formation; foams, stability and structure. Electrical properties of plastics: dielectric properties; conductivity; breakdown. Metals: thermal strengthening and damage; radiation hardening and damage. Particle and fibre composites: structure, properties and manufacture. Polymers: visco-elasticity, dynamic properties, rubber/textile composites, rheological properties in manufacturing.

Textbooks
No set texts.

31.114B
Advanced Physical Instruments   S1 L2T4
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.

31.114C   S1 + S2
Introduction to Industrial Practice   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.

Department of Optometry

The Department of Optometry offers:

1. A four-year full-time course leading to the degree of Bachelor of Optometry at either pass or honours level. This degree (BOptom) fulfils the requirements defined in the NSW Optometrists (Amendment Act, 1963), and is the only course of professional training for Optometrists given in this State. Full details of the course appear earlier in this handbook.

2. An extended undergraduate course leading to the double degree BSc/BOptom.

3. A formal graduate course for the degree of Master of Optometry (MOptom). This course involves the study of three elective graduate subjects and advanced clinical optometry, together with the preparation of a thesis on an assigned project. It may be completed in one year of full-time study, or in the case of practising optometrists, in two or three years of part-time study.

4. Facilities for individual research are available and students who are considered as eligible may enrol with the university as candidates for the degrees of Master of Science or Doctor of Philosophy.

Further information on the foregoing may be obtained from the brochures issued by the Department of Optometry.

Undergraduate Study
31.811
Optometry I   L4T4
Geometrical and Physical Optics—Extension of Physics I content on the nature of light, reflection, refraction, thin lenses, optical instrument, 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 Opthalmic Lenses* Assoc. of Dispensing Opticians, London

31.812
Optometry II   L8T7

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   L6T0

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* Association 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 Lens Practice: Basic and Advanced* Thomas

31.821
Special Anatomy and Physiology   L3T3

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. *Phsyiology 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 occular 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   L2T1

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.

Textbook

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

Graduate Study

31.701G
Advanced Clinical Optometry   S1 + S2 T4

Clinical work on selected patients with special emphasis on advanced examination techniques, including: Multiple-pattern-stimulation scotometry, angio-scotometry, paediatric perimetry, ultra-violet and elctro-luminescent scotometry. Biomicroscopy, exophthalmometry, applanation and electronic tonometry, gonioscopy, binocular stereoscopic opthalmoscopy. Coincident optometry, binocular balancing techniques, near-point refraction, graphical analysis. Optometrical treatment of subnormal vision and aniseikonia. Geriotric and paediatric optometry. Evaluation of colour vision and colour aptitude. The clinical assessment of new instruments, methods of diagnosis and treatment.

31.702G
Advanced Physiological Optics   S1 + S2 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 retinal 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 Organisation 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. Electro-pathology of vision. *Autonomic Servomechanisms of the Eyes:* Pupillometry. Accommodation. *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 S1 + S2 L3T1
Binocular Vision and Space Perception

Binocular vision and the factors which operate in the perception of space, distance and direction are studied from theoretical and clinical viewpoints.

The nature and control of eye movements, and their role in fusion and the perception of a stable visual environment. Neurological and perceptual concepts of fusion and its phenomena. Oculomotor imbalance in binocular vision. Stereopsis and stereoscopic space. The perception of space, distance and direction. Metrics of visual space. Perceptual adaptation and after-effects. Interactions and conflicts between the modalities of space perception. Human spatial orientation in normal and abnormal environments, including zero gravity. The perception of movement.

31.704G S1 + S2 L2T2
Advanced Orthoptic Theory and Practice

The theory and practice of orthoptics and pleoptics with special emphasis on the following topics: Advanced ocular kinematics, the neurology of eye movements, methods of measuring the relative positions of the eyes, the direction of regard. Entoptic phenomena and their clinical utilization in the diagnosis and treatment of eccentric fixation and anomalous correspondence, the role of high intensity, short-duration light stimulation in the diagnosis and treatment of amblyopia, eccentric fixation and anomalous correspondence. Orthoptic and pleoptic instruments.

31.705G S1 + S2 L1T3
Advanced Contact Lens Theory and Practice

Corneal physiology, fluid forces associated with contact lens systems. Optical plastics; composition, processing and methods of working. Optical theory and design of contact and corneal lenses. Contact lens adjustments and modifications. Special applications of contact lenses, bifocal contact lenses. Cosmetic contact lenses: clinical uses and construction. Ocular prostheses; corneal implants.

31.706G
Occupational Optometry S1 + S2 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 S1 + S2 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, macro-photography, micro-photography. "Invisible light" photography (ultra-violet and infra-red), photofluorography, speedlight techniques, fundus photography. Dark-room techniques, portable dark-rooms. Quantitative photographic data analysis.

31.799G
Project

Biochemistry

Biochemistry involves a study of the chemistry of living organisms, and it is a subject where those interested in biology and those interested in chemistry work together to increase our understanding of life.

Some of the most spectacular achievements of recent times have been in the unravelling of the chemistry and function of very large molecules, macromolecules, of proteins, nucleic acids and polysaccharides which occur in living organisms. This has resulted in a better understanding of the transmission of hereditary information and the adaptation of organisms to the environment by mutations and natural selection.

Major areas of interest in Biochemistry at the present time involve a study of the chemistry of these large molecules involved in body processes such as growth, movement and reproduction. The formation and breakdown of these large molecules is known as metabolism and necessarily includes the chemical processes, involving both large and small molecules present in foodstuffs, which provide the necessary energy and the simple molecules or monomers that are then used in biosynthesis of these larger molecules which constitute the organism.

Basic to any understanding of the reactions of living organisms is the process of promoting chemical reactions under physiological conditions, that is, at low temperatures. A considerable emphasis is placed on understanding the hundreds of different types of enzymes, large protein molecules, each specifically designed for promoting one particular chemical reaction, the speed with which they function and the factors which control their operation.

The integration and control of biochemical reactions involves the study of hormones, or chemical messengers, that are synthesised in certain glands and exert their effects on cells, often situated in distant parts of the body, after being transported in the circulating blood or other vascular fluid.

A knowledge of Biochemistry is essential in maintaining the health of living organisms and is vital to the study of Medicine. There is an overlap with other biological sciences so that Biochemistry is a co-requisite or prerequisite for study in the disciplines of Biological Technology, Botany, Microbiology, Physiology and Zoology. Biochemistry on the other hand draws particularly on a background of Biology and Chemistry and some knowledge of Mathematics and Physics.

There are excellent prospects for advanced training at honours level, involving an additional year's training, mainly in research, and for graduate research work for the Master of Science degree or for the Doctorate in Philosophy.

Biochemistry plays a role in many facets of human activity and for students majoring in Biochemistry there are employment opportunities in educational institutions, in many research areas, eg, in Universities, CSIRO, Public Health and hospital organizations, and in industries concerned with food, pharmaceuticals and agriculture.

For details of level, unit value, when offered, hours per week, prerequisites and co-requisites, see tabular material earlier in this handbook.

Undergraduate Study

41.101A — L2T4
Chemistry of Biologically Important Molecules

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. Practical work to amplify the lecture course.

Textbook
Stryer L. *Biochemistry* Freeman

41.101B
Metabolism — L2T4

The intermediary metabolism of carbohydrates, lipids and nitrogenous compounds. The molecular mechanism of gene expression and protein synthesis. Practical work to amplify the lecture course. Photosynthesis.

Textbook
As for 41.101A.

41.101C
Control Mechanisms — L2T4

The relation between structure and function of enzymes, hormones, vitamins and membranes. Metabolic networks and control mechanisms. Practical work to amplify the lecture course.

Textbooks
As for 41.101A, plus
White A. Handler R. & Smith E.L. *Principles of Biochemistry* 5th ed McGraw-Hill

41.102A — L3T9
Biochemistry of Macromolecules and Cell Biochemistry

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

Textbooks
Scientific American *The Chemical Basis of Life. An Introduction to Molecular and Cell Biology.* Freeman
White A. Handler R. & Smith E. L. *Principles of Biochemistry.* 5th ed McGraw Hill

41.102B — L3T9
Metabolic Pathways and Control Mechanisms

Haemorproteins, and electron transport, photosynthesis, photophosphorylation and oxidative phosphorylation. Nature and function of co-enzymes. Interrelationships in mammalian intermediary metabolism. Biochemical control mechanisms including hormones and allosteric interactions. Enzyme kinetics. Selected aspects of differentiation and development in higher organisms. Practical work to illustrate the lecture course and to provide experience in modern biochemical techniques.

Textbooks
As for 41.102A above.

Biological Technology

Biotechnology is the interface between the biological sciences and their applications in industry, medicine and agriculture. It is an inter-disciplinary area in which considerable use is made of the techniques and methodologies of mathematics, the physical sciences and engineering.

Biotechnology is a firmly established area of study in relation to fermentation technology, enzyme technology and engineering, and the biodeterioration and biodegradation of materials, both organic and inorganic. In these areas, the principal basic biological sciences involved are biochemistry, microbiology and genetics, and considerable use is made of mathematical modelling and computer techniques, and of chemical engineering concepts. Other areas of biotechnology overlap with biomedical engineering in which various of the engineering disciplines intermesh with the medical sciences. Most of the activities of the School are collaborative with other schools and departments of the University, and in some areas with relevant industry.

The School offers one Level III subject, Fermentation Technology, as an option to students taking major sequences in Microbiology and Biochemistry in the Science course (the subject is also available to students in the Food Technology course). The School also contributes to fourth year subjects in the Industrial Chemistry course (Processes) and in Electrical Engineering (Biomedical Engineering).

An honours program in the fourth year of the Science course can be undertaken in the School by students who have reached a satisfactory standard in biochemical or microbiological subjects in the third year of the course. A graduate diploma course in Biochemical Engineering is offered in collaboration with the School of Chemical Engineering and is open to students in relevant disciplines. A Master's course (MSc(Biotech)) by formal study is offered for honours graduates in Biotechnology or other graduates who have reached the required entrance standards by appropriate routes. The course is of one year's duration full-time, but may be completed over a longer piod on a part-time basis.

Registration for the research degrees of Master of Science or Doctor of Philosophy is offered to honours graduates in relevant disciplines or to those graduates who have completed the preliminary or qualifying programs available in the School. *Financial support for higher degree studies is available.

The School is not interested in producing narrow specialists, but in the training of graduates who, by participation in formal courses and research programmes of a collaborative kind, are equipped to

*See Graduate Scholarships in the Calendar.

identify and solve a wide range of problems, and who are experienced in the multi-disciplinary approach and are appreciative of its potentialities.

Undergraduate Study

42.102
Fermentation Technology   L2T4

The basic factors involved in the operation of microbial processes on an industrial scale, including: the selection, maintenance and improvement of micro-organisms; the influence of physical and chemical factors on the microbial environment; the control of environmental factors; the effects of operational patterns in batch and continuous flow cultivation; the harvesting, purification and standardisation of products; process optimisation; disposal of waste materials; an examination of selected microbial processes for chemical, pharmaceutical and food production, against the basic characteristics of large-scale fermentation processes; practical exercises, including the operation of various types of fermenters, to illustrate the principal aspects of the lecture course.

Textbooks
Alba S. Humphrey A. E. & Millis N. *Biochemical Engineering* 2nd ed Academic
Casida L. E. Jr *Industrial Microbiology* Wiley
Kubitschek H. E. *Introduction to Research with Continuous Cultures* Prentice-Hall.

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 microbiol process simulation.

Graduate Study

42.111G
Reading List in Biological Technology (Microbiology)

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 programme in practical biochemistry. The basic instrumentation and methodology of the bichemist 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 relevent 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 L5T0

Basic mechanisms of biodeterioration and biodegradation; direct and indirect attack mechanisms; co-metabolism and mixed population phenomena; factors controlling rates of degradation and recalcitrance of materials to biological attack__ biological accelerators.

Detailed treatment of: biological corrosion of metals and alloys__ biodeterioration of fuels, petrochemical products, synthetic materials, timber and cellulosic products, building materials etc.; degradation of rocks and minerals; biological leaching of ores and mineral processing residues.

The laboratory component includes assessment of biodegradability of common industrial materials (detergents, surface coatings, fuels, biocides etc.); evaluation of protective methods; determination of biological leachability of minerals and mineral processing residues.

42.305G
Case Studies   SS L0T2

Critical evaluation of industrial processes and research and development procedures. Includes: study of isolated and selected areas of biotechnology, detailed study and evaluation of all aspects of an industrial process from the isolation of the appropriate organism or other biological starting material to the production and use of the final products, critical evaluation of techniques arising from current research and development programs.

42.306G
Project   S1 + S2 L0T7

An experimental or technical investigation or design project in the general field of biotechnology with supporting seminars.

Botany

Botany is concerned with all aspects of the structure and function of plants and the relation of plants to the environment. Knowledge gained by investigations in these fields is important in agriculture, forestry and conservation, as well as in understanding the fundamental properties of biological material.

The major aspects of the subject which are taught in undergraduate courses in the School are Plant Genetics, Plant Physiology and Biochemistry, Plant Morphology, Ecology, Environmental Botany, Mycology and Plant Pathology. Any of these courses are usually combined with appropriate subjects in Biochemistry, Microbiology and Zoology. By this means, students may complete their studies with a broad spread over a number of biological disciplines, or may concentrate more in botanical aspects, with other subsidiary supporting subjects.

Fourth year Honours courses are provided for students wishing to specialize in a particular branch of Botany.

Research facilities are available within the School for graduate study leading to a degree of Master of Science or Doctor of Philosophy.

Careers for graduates in Botany include teaching, at secondary or tertiary level, scientific and technological work in food and drug industries, and investigational, research or extension work in the science and agriculture laboratories of State or Commonwealth organizations.

For details of level, unit value, when offered, hours per week, prerequisites and co-requisites, see tabular material earlier in this handbook.

Undergraduate Study

43.101
Genetics   L2T4

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   L2T4

The vegetative and floral morphology of Angiosperms with special reference to variations in morphology, evolutionary trends, elements of biological classification, nomenclature and identification of native plants. Field work is part of the course.

Textbooks

Beadle N. C. W., Evans O. D. & Carolin R. C. Flora of the Sydney Region Reed
Esau K. The Anatomy of Seed Plants Wiley

43.121
Plant Physiology   L2T4

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   L2T4

Introductory biology and taxonomy of fungi. Fungi as pathogens of plants and animals. Use of fungi as food. Medical uses of Fungi: drugs, hallucinogens. Degradation of organic matter: soil fertility; timber wastage. Chemical control of fungi. Mycorrhizas.

Textbook

Talbot P. H. B. *Principles of Fungal Taxonomy* Macmillan

43.102
Advanced Genetics   L2T4

Cytogenetics and genetic control of chromosome pairing. Evolutionary genetics. Heritability estimates and selection. Some aspects of human genetics.

43.112
Plant Taxonomy   L2T4

Considers 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   L2T4

The physiology and biochemistry of germinating seeds and of developing fruits will be studied in depth. Laboratory projects may require attendance outside the hours set down in the timetable.

43.132
Fungi and Man   L2T4

Detailed structure and ultrastructure of hyphae, spores, vegetative fungal structures. Morphology and taxonomy of members of major taxonomic groups. Spore liberation, dispersal, deposition and germination. Morphogenesis. Cytology and genetics. Physiology and biochemistry of saprophytic species. Ecological considerations of fungi in specialised habitats. Evolution of a host-pathogen relationship. Physiology of parasitism. Survival mechanisms. Methods of control of plant pathogens.

Textbooks

Burnett J. H. *Fundamentals of Mycology* Arnold
Talbot P. H. B. *Principles of Fungal Taxonomy* Macmillan

*Students should consult lecturers in the course before purchasing textbooks.

43.142
Environmental Botany   L2T4

The marine, 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 up to three full-day Saturday field excursions as part of the practical course.

43.152
Mycology Plant Pathology   L2T4

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.

Textbooks

No set texts.

43.162
The Plant Kingdom   L2T4

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

43.172
Phycology and Marine Botany   L2T4

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 edn Brown, Iowa
Round F. E. *The Biology of the Algae* 2nd edn Arnold

43.182   L2T4
Cellular and Developmental Physiology

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.

Graduate Study

43.215G
Plant Biology   SS L1T2

Energy and material cycles and fluxes in the biosphere; green plants as primary producers; general structure and function of green plants, growth, development and reproduction; environmental adaptations; comparative structure and organization of major plant groups.

43.216G
Ecology and Systematics SS L1T2

Ecological significance of life-forms and vegetation structure in relation to regional environmental (particularly water and nutrient) gradients; case studies in applied ecology; principles of systematics; taxonomy and classification of selected vascular plant groups.

Chemistry

The parent of the chemical sciences is chemistry, but this name alone no longer describes the main areas of activity or specialization. The following are the more important areas in chemistry: Analytical Chemistry, Bio-chemistry, Geo-Chemistry, Inorganic Chemistry, Organic Chemistry, Physical Chemistry, Theoretical Chemistry, and Nuclear and Radiation-Chemistry.

The chemical sciences concern materials, their properties and their transformations. As such, they are both experimental and theoretical sciences. Chemistry provides a common language for the experimental sciences, comparable with the language of quantitative scientific thought provided by mathematics and is central among them, lying between physics on the one hand, and biology on the other. The interdependence of the chemical sciences and other sciences is exemplified in the fields of chemical engineering, chemical metallurgy and chemical technology. Additional to their intrinsic values, the chemical sciences provide the basis of modern technology through contributions to medicine, industry and agriculture.

Career opportunities in chemistry are available for graduates in chemical industry, particularly in the research and development, control and management sections. Opportunities are also available in the universities and tertiary institutes, and in secondary teaching. Further opportunities are provided within Commonwealth and State departments, and within research organizations including the CSIRO and the AAEC. Graduates with a major in chemistry are also often employed in interdisciplinary areas such as nutrition, chemistry of food and drugs, medical science (including clinical chemistry), pharmaceutical chemistry, polymer science, environmental science (including pollution studies), water and energy resources and marine science.

Chemistry forms a part of many undergraduate courses offered, for example, Chemistry in the Science course, and Pure and Applied Chemistry. Additionally, there are courses within the Faculty of Applied Science, such as Industrial Chemistry, Ceramic Engineering, Food Technology, Chemical Engineering, Textile Technology and Metallurgy, which are predominantly concerned with technological aspects of chemistry.

The School of Chemistry provides two main undergraduate courses, namely **1. Pure and Applied Chemistry,** and **2. Chemistry (as a co-major) in the Science Course.** Both courses lead to the BSc degree.

A study of **Chemistry (as a co-major) in the Science course** involves a study of two branches of science to an advanced level. For example, a combination of Level III Chemistry and Level III Mathematics will provide a useful basis for later specialization in X-ray crystallography or theoretical chemistry; a combination of Level III Chemistry with Level III Geology will be of assistance to those who later wish to specialize in geochemistry. Another possibility is to combine Level III Chemistry with Level III Bio-chemistry units. These courses are suitable for those who wish to acquire advanced

knowledge of two fields of study, or of interdisciplinary subjects. The Science course, as an alternative to the BSc(Ed) course, is also suitable for those planning to teach Chemistry at the secondary level. On a full-time basis, the Science course may be taken in three years (pass) or four years (with honours). On a part-time basis, however, the Science course may, according to the choice of subjects, require seven years (pass).

The aim of the **Pure and Applied Chemistry** course is to provide both depth and choice of subject matter at pass and honours level, to meet the needs of students who will become professional chemists. The course consists of a study of the fundamental principles of chemistry and of electives which deal with topics in contemporary fields of chemistry. It may be taken either full-time (three years for pass, four years for honours) or part-time (six years for pass, eight years for honours). No industrial training is required, though it is customary for students taking the part-time course to find employment in some branch of the chemical industry.

The role of basic scientific research in the creation of modern industrial society is widely accepted. The usual introduction to research in chemistry is provided by the honours degree (in either the Science course, or the Pure and Applied Chemistry course), which may be followed by a higher research degree in Chemistry (eg, MSc, PhD). These degrees are aimed at those whose interests are in research and/or teaching. Alternatively, postgraduate training in chemistry is provided through formal Diploma or Master's courses (eg the Diploma in Food and Drug Analysis, and the MChem in Analytical Chemistry).

Requirements for Honours in Chemistry

Students desiring admission to the honours course must apply in writing to the Head of the School not later than 30 November of the year in which the third year of the full-time (or equivalent stage of the part-time) course is completed.

The requirement for admission to the honours course is a sufficiently meritorious record in the work of the pass degree.

The major part of the work for honours will consist of a research project on which a written thesis is submitted. There is also some formal course work. Attendance will be required at such lectures and seminars as the Head of the School directs. Honours will not be awarded in any particular branch of the subject, but in chemistry as a whole.

For admission to the honours chemistry course in Science, the applicant must complete at least eight Level III units, of which at least four must be in Chemistry. Students who, at the beginning of their third year are already interested in taking honours in chemistry, are advised to seek guidance from the School about the most appropriate subject to accompany the Level III Chemistry units.

Prospective Honours students in the Pure and Applied Chemistry course should seek guidance before choosing their final year elective subjects.

Undergraduate Study

2.001
Chemistry I S1 + S2 L2T4

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

Textbooks

Aylward G. H. & Findlay T. J. V. *S1 Chemical Data* Wiley
Chemistry I Laboratory Manual Univ of N.S.W.
De Puy C. H. & Rinehart K. L. *Introduction to Organic Chemistry* 2nd ed Wiley
Mahan B. H. *University Chemistry* 3rd ed Addison-Wesley

2.021
Chemistry IE   S1 or S2 L3T3

A terminating subject for students in the Aeronautical, Civil, Electrical, Industrial, Mechanical and Mining Engineering, and Naval Architecture courses.

Classification of matter and theories of the structure of matter. Atomic and molecular structure, the periodic table and chemical behaviour. Chemical bonding and the nature and properties of chemical systems. Equilibrium and energy changes in chemical systems. Introduction to colloidal systems.

Textbooks

Aylward G. H. & Findlay T. J. V. eds *SI Chemical Data* Wiley
Barrow G. M. Kenney M. E. Lassila J. D. Litle R. L. & Thompson W. E. *Understanding Chemistry* Benjamin
Chemistry IE Laboratory Manual N.S.W.U.P.

Level II units

2.002A
Physical Chemistry   S1 or S2 L3T3

Prerequisites: 1.001 or 1.011 and 2.001 and 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   S1 or S2 L3T3

Prerequisite: 2.001.

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

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   S1 or S2 L2T4

Prerequisites: 2.001 and 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

Eckschlager K. *Errors and Measurements in Chemical Analysis* Chalmers R. A. trans ed. Van Nostrand
Ewing G. W. *Instrumental Methods of Chemical Analysis* McGraw-Hill
Fischer R. B. & Peters D. G. *Quantitative Chemical Analysis* Saunders

2.042C
Inorganic Chemistry   S1 or S2 L2T4

Prerequisites: 2.001.

Chemistry of the non-metals including B, C, Si, N, P, S, Se, Te, halogens, and noble gases. Chemistry of the metals of groups IA, IIA, and 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.

Textbooks

1.
Jolly W. L. *The Chemistry of the Non-Metals* Prentice-Hall
Larsen E. M. *Transitional Elements* Benjamin

or
2.
Cotton F. A. & Wilkinson G. *Advanced Inorganic Chemistry* 2nd ed Wiley

Level II/III units

2.003E   S1 or S2 L2T4
Nuclear and Radiation Chemistry

Prerequisites: 2.001 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—gross attenuation, ionization. Detection and measurement of nuclear radiations—ionization, proportional, Geiger-Muller, scintillation, semiconductor counting for alpha, beta and gamma radiation and neutrons. Absolute and coincidence counting. Nuclear pulse spectrometry. Nuclear instrumentation, principles of radiation measuring equipment. 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. Separation of isotopes by physical and chemical means. 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   S1 or S2 L3T3
Molecular Spectroscopy and Structure

Prerequisite: 2.001.

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   S1 or S2 L2T4
Fundamentals of Biological Chemistry

Prerequisite: 2.001. Excluded: 41.101A.

Aspects of the chemical and physical properties of materials important in biological systems. Methods of separation of purification and estimation and to 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 systhesis.

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   S2 L2T4

Prerequisites: 2.001 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   S1 L3T3

Prerequisites: 1.001 or 1.011 and 2.001 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

Level III units

2.003A
Physical Chemistry   S1 or S2 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   S1 or S2 L2T4

Prerequisite: 2.002B.

Alicyclic Chemistry. Stereochemistry of acyclic systems; classical and non-classical strain in cyclic systems; stereochemistry and conformation of monocyclic and polycyclic compounds; synthesis, reactions and rearrangement of monocyclic compounds including stereochemical selectivity; transannular reactions in medium rings. Synthesis and reactions of fused and bridged polycyclic systems.

Heterocyclic Chemistry. Synthesis and reactions of the following 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* C.U.P.
Vogel A. I. *Elementary Practical Organic Chemistry* Pt II Qualitative Organic Analysis Longman
Whittaker D. *Stereochemistry and Mechanism* Clarendon

2.003C
Inorganic Chemistry   S1 or S2 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 oxidation states of transition metals. Chemistry of the groups IIIA (the lanthanides and actinides), IVA, VA, VIA and VIIA. More advanced chemistry of groups IIIB, IVB, VB, VIB, and VIIB and the noble gases.

Textbook

Cotton F. A. & Wilkinson G. *Advanced Inorganic Chemistry* 3rd ed Wiley

2.003D
Instrumental Analysis   S1 or S2 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. Automation and data processing.

Textbooks

Chalmers R. A. *Aspects of Analytical Chemistry* Contemporary Science Oliver & Boyd Paperback
Ewing G. W. *Instrumental Methods of Chemical Analysis* McGraw-Hill
Hamilton L. F., Simpson S. & Ellis D. W. *Calculations of Analytical Chemistry* 7th ed McGraw-Hill

2.003L
Applied Organic Chemistry   S1 or S2 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 addivity. Fatty acids with emphasis on unsaturation, thermal and oxidative polymerizations, alkyl resins, analysis of mixtures. Waxes and sterols; selected natural and synthetic macromolecules; polymerization processes, including treatment of initiators, chain transfer agents, retarders. Vulcanization and sulphur-olefin reactions. Photochemical processes; electro-organic chemistry. Fine chemicals, soaps and detergents. Aspects of metal catalysis in industry.

Textbook

No set text. A list of reference books is provided by the School.

2.003M
Organometallic Chemistry   S1 or S2 L2T4
Prerequisite: 2.002B.

Synthesis, structure and reactions of metal alkyls and aryls; metal carbonyls, isonitriles and acetylides; compounds of metals with unsaturated hydrocarbons; organic chemistry of boron, silicon, phosphorus and arsenic; application of organometallic compounds in organic synthesis and homogeneous catalysis.

Textbooks

Pauson P. *Organometallic Chemistry* Arnold
Swan J. M. & Black D. St. C. *Organometallics in Organic Synthesis* Chapman & Hall

2.013B
Synthetic Organic Chemistry   S2 L2T4
Prerequisite: 2.003B.

Introduction, aims, stereochemical and positional problems, recognition of sub-units. Modern functional group transformations with particular reference to positional and stereochemical control. Spectroscopic markers. Electrocyclic reactions, formation, contraction and expansion of rings, Diels-Alder and related cycloadditions, photochemistry, Woodward-Hoffman rules, protecting groups. Representative syntheses of compounds of theoretical and biological interest, e.g. cubane, Dewar benzene, caryophyllene, reserpine, corrins.

Textbook

Carruthers W. *Some Modern Methods of Organic Syntheses* C.U.P.

2.013C   S1 or S2 L2T4
Advanced Inorganic Chemistry
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, solid electrolytes, semi-conductors, and insulators. 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   S1 or S2 L2T4
Advanced Analytical Chemistry
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

Chalmers R. A. *Aspects of Analytical Chemistry* Contemporary Science Oliver & Boyd Paperback
Eckschlager K. *Errors and Measurements in Chemical Analysis.*

Chalmers R. A. trans ed Van Nostrand

Ewing G. W. *Instrumental Methods of Chemical Analysis* McGraw-Hill

Hamilton L. F. Simpson S. & Ellis D. W. *Calculations of Analytical Chemistry* 7th ed McGraw-Hill

Kolthoff I. M., Sandell E. B., Meehan E. J. & Bruckenstein S. *Quantitative Chemical Analysis* Macmillan

Schaeffer W. F. *Microscopy for Chemists* Dover .

Schwarzenbach G. & Flaschka H. *Complexometric Titrations* Irving H. M. trans 2nd ed Methuen

2.013L   S1 + S2 L1T2
Chemistry and Enzymology of Foods
Prerequisite: 2.002B. Excluded: 2.043L.

The chemistry of food constituents at an advanced level and the relationship between the chemistry and enzymology associated with the origin and handling of foodstuffs. Treatment of the stability of constituents, changes in colour and texture occurring during processing and storage. Methods of assessment, chemical and physical.

General classification of constituents, role of free and combined water. Fixed oils and fats, rancidity of enzymic and autoxidative origin, antioxidants—natural and synthetic—theories on mechanisms of action, carbohydrates reactivity, role in brewing processes, carbohydrate polymers, starch structure, enzymic susceptibility and mode of action, estimations, enzymic degradation and enzymic browning, reactions and stability of natural pigments, vitamins, preservatives.

Textbooks
No set texts. A list of reference books is provided by the School.

2.013M
Thermochemistry   S1 or S2 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   S1 or S2 L4T1
Prerequisites: 2.002A and 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   S1 or S2 L2T4
Prerequisite: 2.003B.

The isolation, structure determination, synthesis and biosynthesis, and the reactions of selected classes of organic compounds of biological significance. The chemistry of plant and animal products—terrestrial and marine. Examples from carbohydrates, terpenoids and steroids, alkaloids and other naturally-occurring heterocyclic systems. Interdisciplinary aspects of the topic.

Textbook
Tedder J. M., Nechevatal A., Murray A. W. & Carnduff J. *Basic Organic Chemistry* Part IV Wiley

2.023L   S1 + S2 L1T2
Biological and Agricultural Chemistry
Prerequisite: 2.002B. Excluded: 2.053L.

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.

Textbook
No set text. A list of reference books is provided by the School.

2.033A   S1 or S2 L2T4
Physical Chemistry of Macromolecules
Prerequisites: 1.112C 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 dichoism and optical rotary dispersion; conformation of macromolecules in solution; helixrandom 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   S1 + S2 L2T4
Prerequisite: 2.002B. Excluded: 2.003L, 2.043L, 2.053L.

As for 2.003L but in greater detail and depth.

Textbook
No set text. A list of reference books is provided by the School.

2.043A
Environmental Chemistry   S1 or S2 L2T4
Prerequisite: 2.002A.

Role of chemist in society, impact of technology. 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. Simple digital and analogue computer models of ecological systems based on chemical data and physico-chemical properties (for further details see 3.101 and 22.143).

Textbooks
Dickson T. R. *The Computer and Chemistry* Freeman
Hamilton C. H. *Chemistry in the Environment* Freeman
Schaum Outline Series *Numerical Analysis* McGraw-Hill

2.043L   S1 + S2 L2T4
Chemistry and Enzymology of Foods
Prerequisite: 2.002B. Excluded: 2.013L, 2.033L, 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   S1 or S2 L3T3
Chemical Kinetics and Reaction Mechanisms
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   S1 + S2 L2T4
Biological and Agricultural Chemistry
Prerequisite: 2.002B. Excluded: 2.023L, 2.033L, 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   S1 or S2 L2T4
Advanced Molecular Spectroscopy
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 photo-electron spectra. Kinetic spectroscopy. Lasers.

Textbook
Dixon R. N. *Spectroscopy and Structure* Methuen

Graduate Study

2.150G   S2 L2T4
The Chemistry of Natural & Synthetic High Polymers*

2.153G   S1 + S2 L2T4
Recent Advances in Chemistry*

2.154G, 2.155G, 2.156G
Advanced Analytical Chemistry and Chemical Instrumentation*   Units A, B and C

2.231G and 2.242G   S1 + S2 L1T3
Food and Drugs I and II—(Including Pharmacognosy and Microscopy of Crude Drugs)

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   S1 + S2 L1T2
Toxicology, Occupational and Public Health
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 S1 + S2 L1T3
Chemistry and Analysis of Foods

Illustrates the bases and application of analytical techniques as applied to foods. Emphasis is placed on the design of methods, on the preparation of material for instrumental analysis and on the interpretation of data.

Subject-matter includes: proteins and flesh foods, carbohydrates and saccharine foods, fats and oils, dairy and fermentation products, vitamins, food additives—preservatives and colouring matters, pesticide residues, metal contaminants—food microscopy.

2.281G S1 + S2 L1T3
Instrumental Techniques in Food and Drug Analysis

Principles involved in modern instrumental techniques; detailed application and interpretation of results. U.V., I.R., N.M.R., and E.S.R., emission and atomic adsorption spectroscopy, polarography, X-ray methods, fluorescence spectroscopy and gas chromatography. Services 2.231G, 2.242G and 2.251G but is also suitable as a single subject for those wishing to familiarize themselves with modern techniques.

2.371G
Treatment of Analytical Data S1 + S2 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 electrochemical analysis. **3.** Chromatography. **4.** Complexes and ionic equilibria in analytical chemistry. **5.** Emission, I.R., mass and XRF spectroscopy. **6.** Calculations and statistics in analytical chemistry. *Electives:* Two of: **7.** Solvent extraction in analytical chemistry. **8.** Chemical analysis of organic and biological materials. **9.** Analytical chemistry applied to mineral chemistry and geochemistry. **10.** Chemical instrumentation and control including data processing and automation. **11.** Chemical microscopy. **12.** Sampling—procedure and errors. *Laboratory:* Practice, instruction and visits. *Research Project* or *Critical Literature Survey.*

Computer Science

For Students in the Science Course

Students in the Science course may major in Computer Science. This course is provided by the Department of Computer Science within the School of Electrical Engineering; the course is available on a full-time basis only and leads to the degree of BSc (pass or honours).

*These are units available to students enrolled in the Graduate Diploma in Current Science.

Students of sufficient merit who have completed the undergraduate units in Computer Science may be admitted to the honours course in fourth year. Permission to enter the course is granted by the Head of the Department of Computer Science. The honours course consists of prescribed lectures, seminars and reading in the areas of mathematical theory of computation, computer applications, computer logic and organization.

Undergraduate Study

6.601A S1 + S2 L3T2
Introduction to Computer Science

Introduction to programming: algorithm and data structure design; programming in a high level Algol-like 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.

Textbook

Jensen K. & Wirth N. Pascal *User Manual and Report* Vol 18 Lec. Notes in Comp-Sci Springer-Verlag

6.601B S1 + S2 L3T2
Assembler Programming and Non-numeric Processing

Computer structure, machine language, instruction execution, addressing techniques and digital representation of data. Symbolic coding. Manipulation of strings, lists and other data structures.

Textbook

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 L2T3

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 L3T2

Organization and components of digital computing systems. Operating system components: processes, their implementation, control and interaction. Handling of interrupts, use of queues. Storage management and addressing techniques. Resource allocation and protection. Input/output control, file systems, data communications. System control job scheduling, error recovery, system interfaces. Software engineering.

Textbook

Tsichritzis P. C. & Bernstein P. A. *Operating Systems* Academic

6.602C
Computer Applications L3T2

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
Simila Reference Manual Control Data
Cohen C. & Stein J. *M.P.O.S. Users Guide* Northwestern Univ

6.602D L3T2
Programming Languages and Compiling Techniques

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.

Engineering

Undergraduate Study

5.010
Engineering A SS L4T2

Prerequisite: None.

Engineering Mechanics I: Two and three dimensional force systems, composition and resolution of forces, laws of equilibrium. Statics of rigid bars, pin-jointed frames. Shear force, axial force, bending moment. Simple states of stress. Kinematics of the plane motion of a particle. Kinetics of the plane motion of a particle; equations of motion, dynamic equilibrium, work and energy.

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
Meriam J. L. *Statics* Wiley
Svensson N. L. *Introduction to Engineering Design* N.S.W. U.P.
Walshaw A. C. *S1 Units in Worked Examples* Longman

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

5.020
Engineering B SS L4T2

Co-requisite: 5.010.

Engineering Mechanics II: Further development of Mechanics I together with: Virtual work. Cables and catenaries. Geometric properties of plane figures. Kinetics of systems of particles; impulse and momentum. Rotation of a rigid body about a fixed axis.

(Civil, Mechanical, Industrial and Aeronautical Engineering and Naval Architecture students must take this option) *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 *Engineering Mechanics II:*
Meriam J. L. *Statics* Wiley

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) *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.

2. (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.

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) *Mechanics of Solids I.*

As for 5.020 Engineering B.

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.

Textbooks

For *Engineering Drawing:*

Robertson R. G. *Descriptive Geometry* Pitman
Thomson R. *Exercises in Graphic Communication* Nelson

For *Production Technology:*
De Garmo E. P. *Materials and Processes in Manufacturing* Macmillan

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* C.U.P.

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

For *Introduction to Computing:*
Wirth N. *Systematic Programming: An Introduction* Prentice-Hall

General Biology

Undergraduate Study

17.011
Biology of Mankind L2T4
Mankind evolving: primate evolution; background of early man. Evolution of technological man: biological problems associated with communication and tool-making; development of man as a hunting

predator. Development of utilization of natural resources: development of man as a pastoralist and farmer; animal and plant domestication. Evolution of urban man, culture, society: reproductive biology and genetics of man; population growth, fluctuation, control; natural history of disease, background of medical and industrial microbiology. Effects of modern society: biology of social stress; effect of society in contemporary environments, planning and control.

Textbooks
Abercrombie M. et al *A Dictionary of Biology* Penguin
Boughey A. S. *Man and the Environment* 2nd ed Macmillan

17.021
Comparative Functional Biology L2T4
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* 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 L2T4
Evolution and environmental selection in the Australian contenent: geological, paleoclimatological, biogeographical and historical background. Organizational structure of biological populations, with special reference to plants, animals and microorganisms. Functional organization of ecosystems: energy budgets, hydrological and biogeochemical cycles. Integrated structure and function of ecosystems: case studies of soil, terrestrial, aquatic and urban ecosystems. Cropping and management of natural resources. Natural history of disease and pest invasion; integrated pest control. Systems analysis and dynamic programming in resource management and ecological problem-solving.

Textbooks
Odum E. P. *Fundamentls of Ecology* Saunders
Watt K. E. F. *Principles of environmental Science* McGraw-Hill

Geography

Undergraduate Study

For Students in the Science Course
The geographer studies variations from place to place on the earth arising from the spatial relationships of the phenomena making up man's physical and social environment. Apart from its cultural value, an understanding of these relationships is necessary for the

conservation and planned development of physical and economic resources. Courses in Geography should be of particular interest to those studying concurrently in the physical and biological sciences.

27.801
Introduction to Physical Geography   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 climatic controls in the Sydney region. The hydrologic cycle. Processes and factors of soil formation and the mature soil profile. Controls of vegetation in the Sydney region. The ecosystem.

Laboratory classes include: study and use of geologic and topographic maps and air photographs; use of climatic data and the weather map; soil profile description. Two field tutorials, equivalent to 16 tutorial hours, are a compulsory part of the course.

Textbook
Van Riper J. E. *Man's Physical World* McGraw-Hill

27.802
Introduction to Human Geography   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 hours tutorials.

Textbooks
Hammond R. & McCullagh P. S. *Quantitative Techniques in Geography* OUP
Hurst M. E. *A Geography of Economic Behaviour* Duxbury*

27.103
Climatology   L2T3½

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.

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   L2T3½

Ecosystms, 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 principal vegetation formations of Australia (rain forest, woodland, shrubland, heath and grassland). 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   L2T3½

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 sealevel changes. Drainage basic 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 in both coastal and fluvial components. Laboratory statistical exercises using data collected from maps, airphotos and in the field.

Textbooks
*Bird E. F. C. *Coasts* A.N.U.P.
Gregory K. J. & Walling D. E. *Drainage Basin Form and Process* Arnold

27.423
Pedology   L2T3½

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.

Geology

For Students in the Science Course

Students may major in Geology in the Science course (see regulations governing this course). This course is available on both a full-time and a part-time basis and leads to the degree of Bachelor of Science, Pass or Honours. Students majoring in Geology will complete the following subjects:

First Year 25.011 Geology I
Second Year 25.012 Geology IIA and 25.022 Geology IIB
Third Year 25.013 Geology IIIA and 25.023 Geology IIIB and 25.033 Geology IIIC.

*Paperback.

Sciences

In addition a first year course 25.151 Geoscience IA is offered as an alternative to 25.011 Geology I for students who do not intend studying Geology beyond first year. In general, *no further UNITS IN GEOSCIENCE* are normally available however, students may transfer from 25.011 to 25.151 and vice versa after advice from the **School of Applied Geology.**

Honours in Geology

Full-time students in the Faculty of Science who have completed the three third year Geology subjects and part-time students who have completed the course requirements up to the end of the sixth year and whose program includes the three third year Geology subjects may apply to the Head of the **School of Applied Geology** to read for an Honours Degree in Geology. Students who have majored in Physics or Mathematics or Chemistry or Botany or Zoology and Geology may also be admitted to the course.

The Honours course consists of: 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.

Full-time students cover the Honours work in the fourth year of the course. Part-time students are required to commence their field thesis work at the end of the sixth year of their course and advanced laboratory assignments are done in the eighth year along with the further work necessary to complete the field thesis work.

Students seeking to do Honours in Geology must satisfy the Head of the School that they have attained a sufficient standard in their pass course work to indicate their ability to undertake geological studies at a more advanced level.

Undergraduate Study

25.011
Geology I   L3T3

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

Bickford M. E. et al *Geology Today* CRM
Black R. M. *Elements of Palaeontology* C.U.P.
Rutley F. *Elements of Mineralogy* Read H. H. ed Murby
Tyrrell G. W. *The Principles of Petrology* Methuen

25.012
Geology IIa   L3T3

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.

Textbooks

Structural Geology

Ragan D. M. *Structural Geology: An Introduction to Geometrical Techniques* 2nd ed Wiley
Spencer E. W. *Introduction to the Structure of the Earth* McGraw-Hill
Mineralogy, Igneous and Metamorphic Petrology
Bloss F. D. *An Introduction to the Methods of Optical Crystallography* Holt, Rinehart & Winston
Heinrich E. W. *Microscopic Identification of Minerals* McGraw-Hill
Turner F. J. & Verhoogen J. *Igneous and Metamorphic Petrology* McGraw-Hill
Photogeology
Von Bandat H. F. *Aerogeology* Gulf Pub. Co.

25.022
Geology IIB   L1T2

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.

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 L3T3

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 L3T3

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. Introdution 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.

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 L6T6

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 minergraphy 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. Quarternary geology: methods of dating, sea level change, glacial sequences, surficial geology of non-glaciated areas of Australia, especially the Riverine Plain. Quaternary sequences in Canada and Europe.

Textbooks

Mathematical Geology and Geological Surveying

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
Carmichael I. S., Turner F. J. & Verhoogen J. *Igneous Petrology* McGraw-Hill

Micropalaeontology

Glaessner M. F. *Principles of Micropalaeontology* M.U.P. 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*

25.404
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

25.151
Geoscience IA   L3T3

This course is provided for students who do not intend studying geology beyond first year. The first part during Session 1 is identical to the first part of 25.111 Geoscience I, but during Session 2 certain additional topics are presented, while others are treated in less depth than in 25.111 Geoscience 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

Bickford M. E. et al. *Geology Today* CRM
Rutley F. *Rutley's Elements of Mineralogy* Read H. H. ed Murby
Tyrrell G. W. *The Principles of Petrology* Methuen

25.603A
Geological Oceanography   L2T4

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.

Textbook
Gross M. G. *Oceanography* Prentice-Hall

History and Philosophy of Science

The division in educational curricula between science and the humanities obscures the fact that throughout history the natural sciences have been an integral component of general intellectual and cultural development. Until the nineteenth centry, for example, the term "philosophy" included science. The principal aims of the History and Philosophy of Science courses in the Science Course are to introduce students to the study of the history of science, to relate the sciences to the cultural environment which have given rise to them, to consider the social history of science, to look at analyses, changing through time, of its conceptual foundations, and to study the impact that the success of science has had on man's understanding of his own nature, and of the nature of knowledge.

An Honours year is introduced this year. Students intending to major in History and Philosophy of Science should take all three Level II units, and four Level III units. There is a small, but growing and distinctive range of career opportunities for students with a good science background combined with History and Philosophy of Science, especially in the field of science writing and science reporting, in the ABC Science Unit, the CSIRO Publications Branch, in industry and the newspapers. The program is well suited for intending science teachers. A major in History and Philosophy of Science in the Science Course would not constitute a formal training in science policy, but it would constitute a very good foundation for one. Problems of science policy and science administration arise in industry and the Public Service; this field is underdeveloped in Australia, but is unlikely to remain so. A major in History and Philosophy of Science is also a good foundation for a DipLib (for intending science librarians).

Undergraduate Study

62.012
The Origins of Modern Science   S1 L2T4

An introductory course dealing with the Scientific Revolution of the seventeenth centry, 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   S2 L3T3
The Social History of Science—From the French Revolution to the Second World War

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

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 U.P.
Popper K. R. *The Logic of Scientific Discovery* Harper Torchbook

62.013
History of the Philosophy of Science   L2T1

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.

*Paperback.

62.023
The Scientific Community   L3T3

The social dimension of contemporary science and the influence of society in general upon it (but only incidentally with the influence of science on society). The institutional structure of science in the leading countries of the world; the sociological functioning of the scientific community; the involvement of scientists in politics and the effects of political developments on the scientific community; science policy as it concerns basic science and the problems it raises; contemporary developments within the scientific community such as the concern with the social responsibility of science.

62.033
The Development of Theories of Matter   L3T3

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   L2T4

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   L2T4

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; social, psychological and medical consequences of the differences between the sexes in human beings.

Textbooks
No set texts.

62.063
History and Philosophy of Cosmology   L2T4

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   L2T1
(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

Community Medicine

Undergraduate Study

For Students in the Science Course

The course in population genetics theory is relatively new, having been offered for the first time in 1972. This course is a Level III unit and may be taken by students in their third year. It is designed for students who intend to specialize in population genetics or in a field in which population genetics is applied. It is available as a day course only.

Approximately one-third of the lecture time (2 hours) is reserved for mathematics and statistics. The tutorial time (1 hour) is used to relate the models covered in the main part of the course with descriptive treatments of population processes covered in other courses. Students are expected to prepare material for and take an active part in tutorials. Laboratory time is 2 hours.

Biochemical Genetics of Man is a slightly modified version of a course given for the first time at Harvard University in 1974 to students majoring in Biological Anthropology. It is a Level III one-session unit 6 hours/week designed for students who intend to specialize in genetics, particularly of human populations.

Approximately half of the teaching time is devoted to discussing various aspects of some representative hereditary characteristics, and the remaining time to mastering advanced laboratory techniques for detecting such characteristics. Whenever possible use is made of learning in small groups.

79.201
Population Genetics Theory   L3T3

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

79.302
Biochemical Genetics of Man   L2T4

Prerequisites: 43.101, 41.101A and 41.101B.

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 major interests of the Department of Applied Mathematics are: (a) optimization and control theory, with special attention to social science applications (control of economic systems, resource allocation, etc), (b) numerical analysis and computer-related mathematics, and (c) modern theoretical physics. The department offers complete training to graduate research level in areas (a) and (b); it provides some undergraduate training in area (c), in collaboration with other Schools, and accepts higher degree candidates in that area.

The Department of Theoretical and Applied Mechanics is interested in mathematical techniques and applications of mathematics to problems in classical and engineering science. There is also some emphasis on the environmental sciences, such as meteorology and oceanography, and specific courses are given for students wishing to specialize in these or similar areas.

Students interested in applications of mathematics are encouraged to take units offered by both the Applied Mathematics and Theoretical and Applied Mechanics Departments. Specialization need not necessarily occur until the Honours year.

Statistics is concerned with the evaluation of factual material as a basis for interference and decision making. Its mathematical foundation is the theory of probability, and statistical theory is applicable in various fields where probabilistic models are used to describe the observational results. The Department has strong interests in the areas of inference, sequential analysis, design of experiments, multivariate analysis, stochastic processes and geometric probability.

Mathematics

The School of Mathematics is divided into Pure Mathematics, Applied Mathematics, Department of Theoretical and Applied Mechanics, and Statistics and provides courses at the Pass and Honours levels in Pure Mathematics, Applied Mathematics, Theoretical Mechanics and Theory of Statistics. There is considerable overlap of interests and interaction between the departments; students in general will take units from more than one department.

The Pure Mathematicisn is concerned with the study of mathematics in itself, striving to solve new problems, to attain ever greater insight into the relations between different parts of mathematics, and thus to render the whole structure of mathematics more complete, more transparent, and more unified. Possible applications of his subject to problems in science or industry are not his primary concern, but they interest him in so far as they provide stimuli for the growth of new mathematical theories. The main avenues of employment for a Pure Mathematician are the universities, the teaching services and some research establishments such as the CSIRO.

Applied Mathematics and Theoretical Mechanics are concerned with the understanding of scientific phenomena by the construction, analysis, and interpretation of mathematical models. Problems may originate not only in the physical and engineering sciences, but also in the social, computing, biological, economic and management sciences. Courses in these Departments are suitable for students seeking a general education in mathematics and its applications, as well as for those students wishing to pursue specialized studies offered in either Department.

First Year Mathematics

10.001
Mathematics I

This is the standard course and is generally selected by the majority of students in the Faculties of Science, Biological Sciences, Engineering and Applied Science who intend to pursue further studies in mathematics, physics or chemistry.

For entry into 10.001 Mathematics I, students are required to have passed H.S.C. Mathematics at Level 2F or higher; or mathematics at Level 2S provided that the student's performance in mathematics and his general level of attainment are at standards acceptable to the Professorial Board. Students at the latter level are advised to undertake a bridging course before the beginning of lectures.

10.011
Higher Mathematics I (Day course only)

Covers all the material in 10.001 Mathematics I, plus other topics, at greater depth and sophistication. Though this course starts where Level 1 of the Higher School Certificate ends, some Level 2F students with ability might find it within their capabilities.

While it is expected that students aiming at the honours level in mathematics will take this course, it would be equally valuable for any mathematically able student whose course requires a considerable amount of mathematics.

10.021
Mathematics IT

This course provides for students who do not intend studying mathematics beyond first year but whose other studies require some knowledge of basic mathematical ideas and techniques. It is particularly designed to meet the needs of such students in Biological Sciences, Optometry, Applied Psychology and Wool and Pastoral Sciences.

The course assumes that the student has a mathematical background up to H.S.C. Level 2S Mathematics only; entry is open to all with a pass at this level or better. However, students who select this course should weigh seriously the implications of their choice because *no further mathematical units are normally available.*

10.041
Introduction to Applied Mathematics

The purpose of this course is to introduce students in the Science course who wish to major in mathematics to applications of mathematics in the fields of physical science, information science and the social sciences. It is a one-unit course in Session 2, and may be taken in conjunction with any other suitable one-unit course (eg engineering or biology). Entry to this unit is restricted to students who are also enrolled in 10.001 or 10.011, or who have already passed one of these.

Higher Level Mathematics

Many subjects in the School are offered at two levels. The higher level caters for students with superior mathematical ability. Where both levels are offered, the highest grade awarded in the ordinary level is Credit, except in exceptional cases.

Mathematics Majors in the Faculty of Science

Any students who completes at least four Level III units in the School of Mathematics is regarded as having majored in Mathematics as part of his BSc degree. Students should consider the merits of combining courses in Pure Mathematics, Applied Mathematics, Theoretical Mechanics, Statistics and Computer Science in accordance with their future interests. Senior members of staff in the School of Mathematics are available for consultation by students who wish to discuss their courses.

If students with to specialize and major in Pure Mathematics, Applied Mathematics, Theoretical Mechanics or Theory of Statistics, the following minimum courses are suggested.

1. *Pure Mathematics Majors*

In order to major in Pure Mathematics at the ordinary level a student should pass units and half units from the following list to a total unit value of 7 or more:

10.211A Applied Mathematics II;
10.111A, 10.111B, 10.1111, 10.1112, Pure Mathematics II;
10.112B, 10.112C, 10.1121, 10.1122, 10.1123, 10.1124, 10.1125, 10.1126, 10.1127 Pure Mathematics III.

In all cases the student must pass complementary units or subjects in accordance with Faculty rules.

2. *Applied Mathematics and Theoretical Mechanics Majors*

In second year the student should take the Level II units 10.211A and 10.211B Applied Mathematics, together with the units 10.111A and 10.111B Pure Mathematics. To complete a major the student should take at least four of the units 10.211C, 10.212A, 10.212D, 10.212L Applied Mathematics and 10.412A, 10.412B Theoretical Mechanics (Note that 10.211C is a Level II/III unit which may be taken in either

second or third year, whereas the other units listed are Level III units). Complementary units should be chosen in accordance with Faculty rules.

3. *Theory of Statistics Majors*

In second year the student should take the Level II Theory of Statistics units 10.311A and 10.311B; in addition, since the student will be expected to take some Level III Mathematics units in third year, the student should take the Level II units 10.111A and 10.111B Pure Mathematics and 10.211A Applied Mathematics.

In third year the student should take four Level III Theory of Statistics units: 10.312B, 10.312C, 10.312E plus one of 10.312A or 10.312D; together with at least two Level III Mathematics units (Pure or Applied).

In each year he should also take complementary units in accordance with Faculty rules; the recommended complementary units are 6.601A Introduction to Computing in second year, and one or other of 6.602C Computer Applications or 10.212L Optimization Techniques together with further Level III Mathematics units in third year.

Honours Courses in Mathematics

There are four separate fourth year honours courses: Pure Mathematics, Applied Mathematics, Theoretical Mechanics and the Theory of Statistics. The four-year course for an honours degree is intended primarily for professional pure mathematicians, statisticians or applied mathematicians, but will prove of interest also to intending specialists in mathematical areas of social sciences, physical sciences, and engineering. The minimum requirements for each honours course are given below but students seeking an honours degree in mathematics are advised to choose units or courses in mathematics according to their individual interests in consultation with senior members of staff of the School.

1. *Honours Course in Pure Mathematics*

In the Science Course in second year the student should attempt 10.121A, 10.121B, 10.121C Higher Pure Mathematics II, and 10.221A Higher Applied Mathematics II. In third year the student should attempt 10.122A, 10.122B, 10.122C and 10.122E Higher Pure Mathematics III.

In all cases complementary units or subjects must be chosen in accordance with Faculty rules.

Permission to enter fourth year in Pure Mathematics is granted only on the recommendation of one of the Professors of Pure Mathematics. Such recommendation is not usually granted unless the student's record contains a satisfactory number of graded passes.

2. *Honours Course in Applied Mathematics*

In the Science Course in second year the student should attempt 10.221A Higher Applied Mathematics II, 10.121A and 10.121B Higher Pure Mathematics II; at least one of 10.221B Higher Applied Mathematics II and 10.321A Higher Theory of Statistics II; together with other mathematics units at higher level to make a total of at least six such units.

In third year, students should attempt 10.222A, 10.222L, and at least two of 10.222C, 10.222D, 10.222F, together with at least one Level III higher Pure Mathematics unit.

Complementary units should be chosen in accordance with Faculty rules.

Students wishing to enter the third year of the honours course are advised to consult members of staff of the Department of Applied Mathematics before enrolment. Permission to enter fourth year is granted on the recommendation of the Head of the Department of Applied Mathematics.

3. *Honours Course in Theoretical Mechanics*

In the Science Course in second year the student should attempt 10.221A, 10.221B and 10.221C Higher Applied Mathematics II, and 10.121A and 10.121B Higher Pure Mathematics II. The student should also regard the inclusion of 1.122C Thermodynamics and Mechanics as desirable.

In third year students should attempt 10.422A, 10.422B Higher Theoretical Mechanics III, and 10.222C, 10.222D Higher Applied Mathematics III. Other optional relevant units are 10.122B, 10.122E Higher Pure Mathematics III, and 10.212A, 10.212L Applied Mathematics III as well as the sequences in the Theory of Statistics 10.311A/10.321A and 10.312A/10.322A.

The fourth year of the course contains some subjects of special interest to the Department (presently environmental fluid mechanics, oceanography, and related mathematical techniques). The student is also encouraged to take subjects in other Departments or Schools, with a view to broadening his experience of applications of mathematics in a variety of fields.

Students wishing to enter the third year of the honours course are advised to consult members of the staff of the Department of Theoretical and Applied Mechanics before enrolment. Permission to enter fourth year is granted on the recommendation of the Head of the Department of Theoretical and Applied Mechanics.

4. *Honours Course in Statistics*

In the Faculty of Science, in second year the student should take 10.321A and 10.321B Higher Theory of Statistics II, 10.111A and 10.111B Pure Mathematics II, or 10.121A and 10.121B Higher Pure Mathematics II, and 10.211A Applied Mathematics II or 10.221A Higher Applied Mathematics II; the student is strongly recommended to take also 6.601A Introduction to Computing. In third year the student should take four Level III Units: 10.322B, 10.322C, 10.322E plus one of 10.322A or 10.322D Higher Theory of Statistics, together with at least three Level III Mathematics units (Pure or Applied).

In all cases complementary units or subjects must be chosen in accordance with Faculty rules.

Students withing to attempt Third Year honours courses are advised to discuss their courses with a Professor of the Department of Statistics. Permission to enter the Fourth Year course in the Theory of Statistics is granted on the recommendation of a Professor of Statistics. Such permission will not usually be granted unless the applicant has obtained a graded pass in 10.322 Higher Theory of Statistics III and the student's record contains a satisfactory number of graded passes.

Mathematics as a Subsidiary Subject

The School also provides the sequence of two Units 10.031 and 10.032, at the second and third levels respectively, for students in the Science Course and the Faculty of Science who are mainly interested in the chemical and biological sciences. These courses offer an introduction to mathematical techniques for scientists and engineers. It should be noted, however, that these two units cannot be counted together with any Level II or Level III units in Pure Mathematics, Applied Mathematics, and Theoretical Mechanics, except when 10.412A is taken as part of a marine science major.

There is also a single unit in Statistics, 10.331, which is recommended for those scientists who wish to have some knowledge of Statistics but who would not normally wish to proceed to further courses in this subject.

For both the above courses the entry qualification is a pass in 10.001 Mathematics I, but in appropriate cases students who have passed in 10.021 Terminating Mathematics I at a satisfactory level may be given permission to enrol.

Schoolteachers

A student wishing to qualify for high school teaching in mathematics should have completed a sequence of Mathematics units similar to that outlined under Pure Mathematics majors at Pass level and should include other units from the Theory of Statistics and Applied Mathematics sequences. This extra work will broaden the prospective teacher's outlook and will certainly improve his teaching.

Those who feel that they may be interested in proceeding to a higher degree after graduation are advised to attempt some of the courses at the higher level.

Intending teachers should consult the School of Mathematics for advice on selection of units.

Students with Low Mathematical Qualifications

The School of Mathematics arranges a Bridging Course in Mathematics for those students intending to enrol in Mathematics I and who have inadequate mathematical background. The Bridging Course covers the gap between 2S and 2F Mathematics and is a very useful refresher course generally. The course will be held at the University during the period January to February 1976.

Attention is also directed to the Calculus Bridging Course given over the University of N.S.W. Radio Station VL2UV. The radio course explains the ideas of Calculus and assumes no previous knowledge of the subject.

Students transferring from other Courses

In some cases the mathematical subjects of the Science Course differ quite considerably from the mathematics taught to students following other courses (eg, Engineering). Students transferring to the Science Course and wishing to obtain credit for work done in previous courses should make application through the Admissions Office as early as possible. The staff of the School will advise students in such cases but this does not relieve the student of the responsibility of making an early application through the correct channels.

Mathematics Prizes

There are prizes available for certain coures in the School of Mathematics. They are open to all Kensington students proceeding to an undergraduate degree or diploma but will not be awarded if there is no candidate of sufficient merit. An award of $25 and a suitably inscribed certificate are available in the following subjects: Mathematics I, Higher Mathematics I, Higher Pure Mathematics II, Higher Applied Mathematics II, Higher Pure Mathematics III, Higher Applied Mathematics III.

Similarly, there are prizes of up to $50 available in Theory of Statistics subjects.

Undergraduate Study

10.001
Mathematics I   L4T2

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

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   L4T2

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.)
Spivak M. *Calculus* Benjamin

10.021
Mathematics IT   L4T2

Calculus, analysis, analytic geometry, algebra, probability theory, elementary computing.

Textbooks

Blatt J. M. *Basic Fortran IV Programming. Miditran Version* Computer Systems (Aust.)
Greening M. G. *First Year General Mathematics* N.S.W.U.P.
Saltz D. *A Short Calculus* Goodyear

10.031
Mathematics (one Level II unit)†   L1T1

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. *Mathematical Methods* 3rd ed Science Press
(*Alternatively:* Giles E., Pretorius W. J. & Prokhovnik S. J. *Supplement to Mathematical Methods* Science Press
and Keane A. & Senior S. A. eds *Mathematical Methods* 2nd ed Science Press)

10.032
Mathematics (one Level III unit)†   L1T1

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. *Mathematical Methods* 3rd ed Science Press
or
Keane A. & Senior S. A. eds *Mathematical Methods* 2nd ed Science Press
and
Giles E., Pretorius W. J. & Prokhovnik S. J. *Supplement to Mathematical Methods* Science Press

10.041
Introduction to Applied
Mathematics   S2 L4T2

Combinatorial mathematics, finite differences, games and networks, hydrostatics, mathematical models.

Pure Mathematics

10.111A
Pure Mathematics II
—Linear Algebra   L1½T½

Vector Spaces: inner products, linear operators, spectral theory, quadratic forms. Linear Programming: convex sets and polyhedra, feasible solutions, optimality, duality.

Textbook

Tropper A. M. *Linear Algebra* Nelson*

10.111B
Pure Mathematics II—Analysis   L1½T½

Real analysis: partial differentiation, multiple integrals. Analysis of real valued functions of one and several variables. Complex analysis: analytic functions, Taylor and Laurent series, integrals, Cauchy's theorem, residues, evaluation of certain real integrals, maximum modulus principles.

Textbooks

Session 1
Kolman B. & Trench W. F. *Elementary Multivariable Calculus* Academic

Session 2
Churchill R. V. *Complex Variables and Applications* I.S.E. McGraw-Hill

10.1111
Pure Mathematics II
—Group Theory   S1 L1½T½

Mathematical systems, groups, determination of small groups, homomorphisms and normal subgroups.

10.1112
Pure Mathematics II—Geometry   S2 L1½T½

Elementary concepts of Euclidean, affine and projective geometries.

Textbook

Gans D. *Transformations and Geometries* Appleton-Century-Crofts

10.121A
Higher Pure Mathematics II—Algebra   L2T½

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.

*Paperback.
†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.

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   L2T½

Construction of reals; uniform convergence; implicit and inverse function theorems; analytic functions; Laurent and Taylor series; calculus of residues.

Textbooks

Session 1
Williamson R. E., Crowell R. H. & Trotter H. F. *Calculus of Vector Functions* Prentice-Hall

Session 2
Knopp K. *Elements of the Theory of Functions* Dover

10.121C
Higher Pure Mathematics II—Number Theory and Geometry   L2T½

Galois fields, quadratic reciprocity, quadratic forms, continued fractions, number theoretic functions; axioms for a geometry, affine geometry, Desargues' theorem, projective geometry.

10.1121
Pure Mathematics III—Number Theory   SS L1½T½

Euclidean algorithm, congruences, sums of squares, diophantine equations.

10.1122
Pure Mathematics II—Algebra   S2 L1½T½

Rings, polynomials, fields.

Textbook

Dean R. A. *Elements of Abstract Algebra* Wiley

10.112B
Pure Mathematics III—Real Analysis

Convergence of sequences and series; Taylor series; metric spaces; contraction mapping principle; sequences and series of functions; uniform convergence; Fourier series.

Textbook

Ball D. G. *An Introduction to Real Analysis* Pergamon

10.112C
Pure Mathematics III—Differential Geometry   L1½T½

Curves and surfaces in space. Differential forms. Frame fields. Gaussian curvature, Gauss-Bonnet theorem.

Textbook

O'Neill B. *Elementary Differential Geometry* Academic

10.1123
Pure Mathematics III— Set Theory   SS L1½T½

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   SS L1½T½

Elementary combinatorial topology of surfaces.

10.1125
Pure Mathematics III—Ordinary Differential Equations   S1 L1½T½

Systems of ordinary differential equations; variations of constants formula; stability; Poincaré space; Lyapunov's direct method.

Textbook

Rubinstein Z. *A Course in Ordinary and Partial Differential Equations* Academic

10.122A
Higher Pure Mathematics III—Algebra   L2T½

Field theory and theory of rings and modules.

Textbook

Stewart I. *Galois Theory* Chapman & Hall

10.1126
Pure Mathematics III—Partial Differential Equations   S2 L1½T½

Systems of partial differential equations; characteristic surfaces; classifications; Cauchy problem; Dirichlet and Neumann problems; the maximum principle; Poisson's formula; conformal mapping.

Textbook

Rubinstein Z. *A Course in Ordinary and Partial Differential Equations* Academic

10.1127
Pure Mathematics III—History of Mathematics   S1 L1T1

Topics from the History of Mathematics, with emphasis on the development of those ideas and techniques used in undergraduate courses. Students are expected to read widely and to present written material based on their readings.

10.122B
Higher Pure Mathematics III—Integration and Functional Analysis   L2T½

Lebesgue Integration; Fourier series; normed vector spaces; Hilbert spaces; measure theory.

10.122C
Higher Pure Mathematics III—Topology and Differential Geometry   L2T½

The axiom of choice, metric and topological spaces, compactness. Compact surfaces, triangulations, geodesics, Gauss-Bonnet theorem.

Textbook

Dungundji J. *Topology* Allyn & Bacon

10.122E
Higher Pure Mathematics III—Complex Analysis and Differential Equations   L2T½

Analytic continuation; entire and meromorphic functions; elliptic functions; normal families and further advanced topics in complex analysis. Existence and uniquenes 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

Specialized study in selected topics for students planning to graduate with honours.

For textbooks, see lectures concerned.

Applied Mathematics

10.211A
Applied Mathematics II—Mathematical Methods   L1½T½

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
Blatt J. M. *Basic Fortran IV Programming. Miditran Version* Computer Systems (Aust.)
Sneddon I. N. *Fourier Series* Routledge
Spiegel M. R. *Advanced Mathematics for Scientists and Engineers* Schaum
Spiegel M. R. *Theory and Problems of Vector Analysis* Schaum

10.211B
Applied Mathematics II—Analytical Dynamics   S1 L3T1

Kinematics of particles and rigid bodies. Dynamics of particles, including simple harmonic motion and motion in a central force field. Dynamics of systems of particles, conservation principles, collisions, rocket motion. Dynamics of rigid bodies, including compound pendulum and Euler's equations. Lagrange's and Hamilton's equations.

Textbook
Smith R. C. & Smith P. *Mechanics* Wiley

10.211C
Applied Mathematics II—Hydrodynamics   S2 L3T1

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

10.221A
Higher Applied Mathematics II—Mathematical Methods   L1½T1

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

10.221B
Higher Applied Mathematics II—Analytical Dynamics   S1 L3T1

As for 10.211B but in greater depth.

Textbook
Symon K. R. *Mechanics* 3rd ed Addison-Wesley

10.221C
Higher Applied Mathematics II—Hydrodynamics   S2 L3T1

As for 10.211C but in greater depth.

10.212A
Applied Mathematics III—Numerical Analysis   L1T1

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

10.212D
Applied Mathematics III—Mathematical Methods   L1½T½

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*

10.212L
Applied Mathematics III—Optimization Techniques   L1½T½

Origins of optimization problems. The Simplex Algorithm. Duality. Transportation problems. Numerical methods. Nonlinear programming. The Kuhn-Tucker theorem. Computational algorithms. Introduction to dynamic programming. Network problems.

Textbook
Cooper L. & Steinberg D. *Introduction to Methods of Optimization* Saunders

*Paperback.

10.222A
Higher Applied Mathematics III—Numerical Analysis L1T1

As for 10.212A but in greater depth.

10.222C
Higher Applied Mathematics III—Maxwell's Equations and Special Relativity L1½T½

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

10.222D
Higher Applied Mathematics III— Mathematical Methods L1½T½

Functions of a complex variable, contour integration. Fourier, Laplace and Mellin transforms, solutions of ordinary and partial differential equations. Asymptotic expansions.

10.222F
Higher Applied Mathematics III—Quantum Mechanics L1½T½

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 Techniques L1½T½

As for 10.212L but in greater depth.

Textbook

Luenberger D. G. *Introduction to Linear and Nonlinear Programming* Addison-Wesley

10.223
Applied Mathematics IV

Specialized study in selected topics for students who intend to graduate with honours. Includes preparation of an undergraduate thesis.

Textbooks

No set texts.

Statistics

10.311A
Theory of Statistics II—Probability and Random Variables S1 L4T3

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

Lawson H. J. *Introduction to Probability and Statistical Inference* 2nd ed Wiley
Statistical Tables

10.311B
Theory of Statistics II— Statistical Inference S2 L4T3

Point estimation (Moments, maximum likelihood, minimum X_n, 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

10.321A
Higher Theory of Statistics II— Probability and Random Variables S1 L5T3

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 2nd 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

10.321B
Higher Theory of Statistics II—Statistical Inference

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 2nd 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　　　SS L2T2

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. Renewal 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　SS L2T2

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)　　　SS L2T2

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　　　SS L2T2

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

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　　　SS L2½T2

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
Karlin S. A. *A First Course in Stochastic Processes* Academic

10.322B
Higher Theory of Statistics III— Experimental Design (Applications) and Sampling　　　SS L2½T2

As for 10.312B but in greater depth.

Textbooks

Cochran W. G. & Cox G. M. *Experimental Designs* I. S. E. Wiley

10.322C
Higher Theory of Statistics III— Experimental Design (Theory)　　SS L2½T2

As for 10.312C but in greater depth.

Textbook
As for 10.312C.

10.322D
Higher Theory of Statistics III—Probability Theory　　　SS L2½T2

As for 10.312D but in greater depth.

Textbook

Heathcote C. R. *Probability: Elements of the Mathematical Theory* Allen & Unwin

10.322E
Higher Theory of Statistics III—Statistical Inference

As for 10.312E but in greater depth.

Textbooks
As for 10.312E.

10.323
Theory of Statistics IV

Specialized study, from the topics set out, for students attempting honours in the Science 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　　　L1½T½

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
Kreizig E. *Introductory Mathematical Statistics* Wiley
Statistical Tables.

Theoretical and Applied Mechanics

10.412A
Theoretical Mechanics III—Dynamical and Physical Oceanography   L1½T½

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   L1½T½

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).

10.422A
Higher Theoretical Mechanics III—Fluid Dynamics   S2 L3T1

This course continues on from 10.221C. Topics: 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

As for 10.412B but in greater depth.

10.423
Theoretical Mechanics IV

Specialized study in selected topics for students who intend to graduate with honours. Includes preparation of an undergraduate thesis.

Textbooks

No set texts.

Graduate Study

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.

Microbiology

Microbiology is concerned with the nature and behaviour of the microscopic and submicroscopic forms of living organisms, particularly the fungi, bacteria and viruses. These agents have innumerable effects on human welfare, some of which are beneficial and others, clearly harmful. Thus, some microorganisms may aid in the decomposition of organic waste materials, increase the fertility of soils or be directly involved in the production of foodstuffs, beverages, pharmaceuticals (including antibiotics) and other industrially important compounds; others are important agents of human, animal and plant diseases, of food spoilage or destruction of a variety of structural materials. Knowledge of the behaviour of microorganisms can be applied directly both to increasing their benefits to man or minimizing their harmful effects. In the latter case, particularly human or animal disease, a knowledge of the "twin-science", immunology, is important for appreciating or developing methods for specific prevention or treatment of certain diseases. Additionally, fundamental studies in microbiology are being used to advance our knowledge of the nature of living organisms and the basic processes of life, particularly in the areas of molecular biology, genetics and metabolism.

Students may undertake Microbiology as a major or minor Science course, as part of the medical degree or in Food Technology, and in other courses in the Faculty of Applied Science, in Biological Technology, Public Health Engineering and Food and Drug Analysis or for the degree of BSc(Ed).

Medical students can interrupt their course to undertake the BSc(Med) degree in Microbiology.

It is essential that students who wish to enrol in any course offered by the School should ensure that they have satisfied all the prerequisites; only in special circumstances may these be waived or varied with the permission of the Head of School. The School's education advisory officer should be consulted for advice on the best course structure which might satisfy the student's particular interests.

For graduation with microbiology as a major subject students must have taken, as a minimum requirement, the two double units 44.102 General Microbiology and 44.112 Applied Microbiology.

For those who specifically wish to make a career in this discipline it is advised they should also take the single units 44.122 Immunology and 44.132 Virology which along with 44.112 are offered in Session 2 of the year. As alternatives to 44.122 and 44.132 students could take the single units 43.132 Fungi and Man, 43.152 Mycology—Plant Pathology (School of Botany), 42.102 Fermentation Technology (School of Biological Technology) or the double unit 41.102B Metabolic Pathways and Control Mechanisms (School of Biochemistry) assuming 41.102A has been taken; a double major in Microbiology and Biochemistry would be possible under the last alternative.

Students not wishing to major in Microbiology may choose one or more units from 44.102 Basic General Microbiology or 44.122 Immunology. Ordinarily 44.112 Applied Microbiology and 44.132 Virology cannot be taken without having done 44.102.

For details of level, unit value, when offered, hours per week and prerequisites, see tabular material earlier in this handbook.

Honours

Requirements for admission to the honours course are a high standard in the courses taken for the pass degree, which must include a major in Microbiology, and also the permission of the Head of School.

*Paperback.

Students undertaking an honours program must choose units from the following table to a total of *five* credit points. Individual programs must be approved by the Head of School and include *one* of the units 44.563, 44.573, 44.583.

Unit No.	Name	Credit Points	Excluded
44.513	General Microbiology	1	—
44.523	Applied Microbiology	1	—
44.533	Immunology	1	—
44.543	Virology	1	—
44.553	Electron Microscopy	1	—
44.563	Microbiology Project I	1	44.573, 44.583
44.573	Microbiology Project II	2	44.563, 44.583
44.583	Microbiology Project III	3	44.563, 44.573

The units 44.513, 44.523, 44.533, 44.543 and 44.553 are given as formal instructional units of 150 hours throughout the academic year. They consist of scheduled tutorial and seminar sessions, together with assigned reading and library work. Where appropriate, practical laboratory exercises may need to be completed satisfactorily. Assessment in each unit is based on regular essay presentations and a final three-hour written examination. These units provide an opportunity for in-depth study of certain important aspects of microbiology and immunology which are covered at a more superficial level in the year 3 Microbiology unit.

For the units 44.563 and 44.573 assessment is based on the submission of a satisfactory written report of the project work, together with the supervisor's recommendation concerning the student's aptitude in laboratory techniques and research methodology. A similar assessment is used in 44.583. However, the written report for this unit must be presented in the form of a scientific paper which might be suitable for submission to an appropriate journal.

Graduate Study

Microbiology and/or Immunology can be taken for the Master of Science and Doctor of Philosophy degrees. Higher medical degrees may also be taken in this subject. Such advanced studies will include research work as well as additional reading programs and in some cases, formal instruction. Students who have not majored in Microbiology but have otherwise suitable basic training may enrol for a higher degree.

Higher Degree Qualifying Program in Microbiology

All candidates will be required to take the course designated as Microbiology II (Honours). Individual programs will be determined by the Head of School following discussions between the applicant, the Course Convenor and appropriate members of staff.

Candidates enrolled in the External Higher Degree Qualifying Program will be permitted to take either 44.563 or 44.573 but not 44.583. The project work for these units may be carried out in an external laboratory approved by the Head of School who shall also nominate an external supervisor for the project.

Undergraduate Study

44.101
Introductory Microbiology   S2 L2T3

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
or
Pelczar M. J. & Reid R. D. *Microbiology* 3rd ed McGraw-Hill
or
Stanier R. Y., Doudoroff M. & Adelberg E. A. *General Microbiology* 3rd ed Macmillan (Also published as *The Microbial World* 3rd ed Prentice-Hall)
or
Hawker L. E. & Linton A. H. eds *M icro-organisms: Function, Form and Environment* Arnold

NOTE: Hawker and Linton is recommended for students wishing to major in Microbiology in the following year.

44.102
General Microbiology   S1 L4T8
Double unit, Level III.

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
Double unit, Level III.

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 diary 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
Single unit, Level III.

Basic immunology and immunological techniques. The interdisciplinary nature of the subject makes this unit suitable for students taking any major sequence in biological science and also for higher degree students who require a background training in immunology. The course includes phylogeny and ontogeny of the immune response; antigen and antibody structure; antigen-antibody reaction; immunochemistry; immunogenetics, clinical immunology; transplantation.

Textbook

Roitt I. *Essential Immunology* Blackwell Scientific Publications

44.132
Virology
S2 L2T4

Single unit, Level III.

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

Fenner F. & White D. O. *Medical Microbiology* Academic
and
As for 44.102.

44.111
Microbiology
SS L1T2

A short introductory course to microbiology which is designed to familiarize students, without previous biological training, with micro-organisms 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
Pelczar M. J. & Reid R. D. *Microbiology* 3rd ed McGraw-Hill

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; immuno-chemistry; 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 immuno-logical 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 con-siderable 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 develop-ment and use of specialized techniques relevant to the particular field of study.

Philosophy

The study of philosophy is partly the study of perennial problems of common interest to everyone; for example, the foundations of morality, the grounds of religious belief, the source and reliability of knowledge, and the relation between body and mind. Philosophy also leans out to and illuminates other fields of study. Consequently courses in philosophy are designed to make it possible for students to pursue a philosophical interest related to their other interests.

Students new to University who are taking Philosophy for the first time and wish to proceed to Level II work in it are recommended to enrol for two Level I half-units in each session of their first year, together with suitable supporting subjects. Students who do not take Philosophy in Session I may, however, still qualify for admission to Level II units by passing two or more Philosophy half-units in Session 2. 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. The General Studies ordinary elective 26.521 Philosophy may not be counted as well as Introductory Philosophy A or B.

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 will 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
Introduction to Political Philosophy

Of these, Predicate Logic is prerequisite to a range of advanced logic half-units, and Introduction to 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. Courses in Political Philosophy are also offered.

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 conditions of statements, the non-formal analysis of arguments, and the logical relations of propositions.

52.171
Philosophy of Religion   S1 or S2 L1½T½
Prerequisite: None.

The philosophy of religion consists in the attempt to answer certain questions. Among these question 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 the 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

52.172
Early Greek Philosophy   S2 L1½T½
Prerequisite: None.

The leading ideas of the Presocratic philosophers, with special attention to the conceptions embodied in such words as *arche*, *physis*, *moira*, *cosmos*, *enantia*, *peras*, *logos*, *eidos* and *einai*.

Textbook
Kirk G. S. & Raven G. E. *The Presocratic Philosophers* C.U.P.

52.182
Political Philosophy   S2 L1½ T½

Prerequisite: None.

A survey of some classic political philosophers from the modern period.

Textbooks and reference books to be notified.

52.153
Predicate Logic   S1 L2T0

Prerequisite: Level II status in Philosophy**

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

52.183
Greek Philosophy: Thales to Plato   S1

Prerequisites: Level II status in Philosophy**

The leading ideas of the Greek philosphers from Thales to Plato, with special reference to the Pre-Socratics.

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, counter-factual statements, and the paradoxes of confirmation.

Textbooks

Hempel C. G. *Philosophy of Natural Science* Prentice-Hall
Ryan A. ed *Philosophy of Social Explanation* OUP

52.203
Introduction to Political Philosophy   S1 L2T0

Prerequisite: Level II status in Philosophy**. Not available to students who have taken 52.182.

The main themes of modern political and social thought with special emphasis on philosophical issues.

52.213
Sartre   S1 L2T0

Prerequisite: 52.163

Sartre's account of man-in-the-world. Sartre's ontology, his use of a phenomenological method and his ethics.

Textbooks

Cumming R. D. ed *The Philosophy of Jean-Paul Sartre* Methuen
Manser A. *Sartre, a Philosophical Study* Athlone Press

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

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*Paperback.
Level II status in Philosphy 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.

52.253
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 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: 52.203 or 52.493.

Crucial structures involved in woman's situation.

52.293
Plato's Later Dialogues   S1 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

52.313
Ethics of Politics   S1 L2T0
Prerequisite: 52.203 (may be waived, with permission, for students who have already studied political philosophy).

Ethics and its relation to politics in the work of Hume, Kant and Hegel.

Principal Reference Books are given in lectures.

52.323
Set Theory   S1 L2T0
Prerequisite: 52.153.

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

52.333
Philosophy of Perception†   S1 L2T0
Prerequisite: 52.163 or 52.173.

What it is that we are directly aware of when we perceive something? Emphasis on twentieth-century sense-date theories and their critics.

Textbook
There is not set text, but each student should, in consultation with the lecturer, select at least one of the principal reference books for especially close reading.

52.343
Privacy and Other Minds   S2 L2T0
Prerequisites: 52.163 and either 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*

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*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.

†Not offered in 1976.

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

52.373
Philosophical Foundations of
Marx's Thought   S2 L2T0
Prerequisite: 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
Prerequisite: 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.

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   S2 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

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.

52.493
Existentialism   S1 or S2 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 Nietszche, and secondly the epistemological foundations 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 + S2 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

Physics

The School of Physics provides both pass and honours courses. The pass course with major studies is available by taking Physics or Higher Physics units and may be completed in three years. This course may include the core units which aim to present a broad and balanced treatment of all branches of physics without undue emphasis on topics which may be temporarily prominent, and also a choice of elective units which aim to present more specific and detailed study in certain specialized areas. The course including Higher Physics units is normally a prelude to entry into the Honours year. These studies which are completed within the framework of the Science Course (see earlier) provide unit groupings which are appropriate for students seeking qualification as professional physicists, whether they intend to engage in research, industrial practice or the teaching of science.

A student intending to take a pass degree with a major in Physics must complete Physics 1.001, Physics units 1.112A, B and C, and four Level III Physics units of which three must be from 1.113A, B, C or D. Note that 10.001 Mathematics is a prerequisite of all Physics Level II units and that 10.211A Applied Mathematics is a co-requisite of all Physics Level II units. Students are also advised to take units 10.111A and 10.111B of Pure Mathematics in second year. Additional Mathematics units are prerequisite to Higher Physics Level III units (see regulations). Students are also advised to complete supporting units in accordance with the Science Course regulations and will normally include 2.001 Chemistry I. It should be understood that units of corresponding higher subjects can often be substituted for those mentioned above.

Honours
A student intending to take Honours in Physics will normally complete the sequence of Higher Physics units 1.011; 1.122A, B and C; 1.123A, B, C and D. However, students with a very good record in Physics 1.001 or in 1.112A, B and C may be considered for admission to Higher Physics units on application to the Head of School. Applied Mathematics 10.211A (or the Higher Applied Mathematics equivalent) is a co-requisite of Higher Physics Level II units and Pure Mathematics 10.111A and B (or the Higher Pure Mathematics equivalents) are prerequisites to Higher Physics Level III units. Students are also strongly advised to take Applied Mathematics units 10.212A and D (or equivalents) in their third year of study.

Full-time and part-time courses in Physics I and II are available at Broken Hill.

The following show typical programs which, together with the prescribed General Studies subjects, complete requirements for a degree.

A   Pass Course Majoring in Physics (suitable for Science Teachers)

First Year	Level	No. Units
Physics	I	2
Mathematics	I	2
Chemistry	I	2
General Biology	I	2
Second Year		
Physics	II	3
Pure Mathematics	II	2
Applied Mathematics	II	1
Geology	I	2
Third Year		
Physics	III	4
Chemistry	II	3
Other Units	II/III	1

or

B   Pass Course Majoring in Physics

First Year	Level	No. Units
*Physics	I	2
Mathematics	I	2
Chemistry	I	2
Other Units	I	2
Second Year		
*Physics	II	3
Applied Mathematics Unit A	II	1
Pure Mathematics Unit B	II	1
Other Units	I/II	4
Third Year		
†Physics	III	4
Pure Mathematics Unit A (if not previously taken)	II	1
Other Units	II/III	2 or 3

*Admission to Physics Level II units requires completion of 1.001 Physics or 1.011 Higher Physics. Admission to Higher Physics II units normally requires completion of 1.011, Higher Physics I, but students who complete 1.001 Physics I at a high standard and pass 10.001 Mathematics I or 10.011 Higher Mathematics I may be admitted with the approval of the Head of School.

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.

†Students must note that certain Applied Mathematics Level III units cannot be counted with certain Physics Level III units.

C   Leading to Honours in Physics

First Year	Level	No. Units
Higher Physics...............................	I	2
Mathematics.................................	I	2
Chemistry....................................	I	2
Other Units..................................	I	2
Second Year		
Higher Physics...............................	II	3
Pure Mathematics Units A, B..................	II	2
Applied Mathematics.........................	II	1
Other Units..................................	II	2
Third Year		
†Higher Physics A, B, C and D................	II	4
Applied Mathematics.........................	III	1
Physics Electives............................	III	1
Or other Units...............................	III	3

Physics Prizes

The following prizes are offered annually:

The School Prize, for the best overall performance in Physics Level II units or Higher Physics Level II units, value $40.

The Physics Staff Prize, for the best overall performance in Physics Level III units or Higher Physics Level III units, value $60.

The Head of School's Prize, for the best performance in laboratory work at Level III in the School of Physics, value $20.

The Physics IV Prize for the best performance in Physics IV, value $40.

Undergraduate Study

Physics Level I Units

1.001
Physics I   S1 + S2 L3T3

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.

The application of wave and particle theories in physics. A review of the atomic theory of matter and the structure and properties of atomic nuclei. 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   S1 + S2 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, A.C. and charged particle dynamics, physics of energy resources and conversion.

Textbooks
Russell G. J. & Mann K. *Alternating Current Circuit Theory* N.S.W.U.P.
Weidner R. T. & Sells R. L. *Elementary Physics, Classical and Modern* Allyn & Bacon

Physics Level II Units

1.112A
Electromagnetism   S2 L2½T3½

Electrostatics in vacuum and in dielectrics. Magnetostatics in vacuum and in magnetic materials. Maxwell's equations and simple applications.

Textbook
Parton J. E. & Owen S. J. T. *Applied Electromagnetics* Mac Press

1.112B
Modern Physics   S1 L2½T3½

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

1.112C
Thermodynamics
and Mechanics   S1 + S2 L1½T½
Thermodynamics: First and second laws of thermodynamics. Thermodynamic functions and simple applications. Statistical foundations of thermodynamics.

Mechanics: Properties of solids and liquids, elasticity, hydrostatics, hydrodynamics, vibration of systems with one degree of freedom, S.H.M., superposition, damped S.H.M., forced vibration, resonance. Fourier analysis, vibrations of coupled systems, Lagrangian mechanics, oscillations of continuous systems, waves, wave packet group velocity.

Textbooks
French A. P. *Vibrations and Waves* Nelson
Mandl F. *Statistical Physics* Wiley
Stephenson R. J. *Mechanics and Properties of Matter* Wiley

Higher Physics Level II Units

1.122A
Electromagnetism   S2 L2½T3½

Further electrostatics. Poisson's and Laplace's equations. Ferromagnetism. Maxwell's equations and application to waves in isotropic dielectrics. Poynting vector.

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

†Students must note that certain Applied Mathematics Level III units cannot be counted with certain Physics Level III units.

1.122B
Quantum Physics   S1 L2½ T3½

Syllabus as for 1.112B but treated at a higher level and including some solid state physics.

Textbook

Eisberg R. M. *Fundamentals of Modern Physics* Wiley

1.122C
Thermodynamics
and Mechanics   S1 + S2 L1½ T½

Thermodynamics: as for 1.112C Thermodynamics but at higher level and with some additional topics. *Mechanics:* oscillations and forced vibrations. Lagrange's equation, variational principles, Hamilton's equations.

Textbooks

Mandl F. *Statistical Physics* Wiley
Symon K. R. *Mechanics* 2nd ed Addison-Wesley

Note: 1.122A, B and C are units of Higher Physics II and the pre-requisite is normally 1.011 Physics.

Terminating Physics Level II Units

1.212
Physics IIT

Any two of the following half-units: 1.212A, 1.212B, 1.212C.

1.212A
Geometrical Optics   S1 L1T2

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

1.212B
Electronics   S1 L1T2

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

1.212C
Introduction to Solids   S2 L2T1

Introductory quantum mechanics and atomic physics; crystal structure; point and line defects; introductory band theory; conductors, semi-conductor and insulators; energy level diagrams.

Textbook

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

Physics Level III Units

1.113A
Wave Mechanics   S1 L2½ T3½

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.

Textbook

No set texts.

1.113B
Electromagnetic Fields
and Physical Optics   S2 L2½ T3½

Wave equation; propagation in dielectrics and ionized media; reflection and transmission; guided waves; coherence of radiation; interaction of radiation with matter; stimulated emission; laser oscillators; properties of laserlight; interferometry; diffraction; convolution theorem X-ray and neutron diffraction.

Textbook

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

1.113C
Statistical Mechanics
and Solid State   S1 L2½ T3½

Thermodynamic potentials, ensembles and partition functions, lattice vibrations, the grand canonical ensemble, Pauli exclusion principle, Bose-Einstein and Fermi-Dirac distributions.

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

Textbooks

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

1.113D
Astrophysics and
Nuclear Physics   S2 L2½ T3½

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 L2½ T3½

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 L2½ T3½

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 L2½ T3½

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 L2½ T3½

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

Physics Level III Supplementary Units

1.143A
Biophysics   S1 L3½ T1½

Ear and sound, eye and light, impulses by nerves, the brain, hearing, vision muscles, heart-beat, structure of proteins, nucleic acid, radiation effects, enzymes, diffusion and permeability.

Textbook
Ackerman E. *Biophysical Science* Prentice-Hall

1.143B
Solid State Devices and Electronics   S2 L2T4

Generalized amplifiers, negative feedback, special amplifiers, regulated power supplies, modulation, pulse circuits, silicon-controlled rectifier circuits, instruments.

Textbooks
No set texts.

1.143D
Conceptual Framework of Physics   S2 L3T2

Physics and Metaphysics: The place of speculation in theory formation. Space and Time: Systems of coordinates, the nature and arrow of time, parity, micro causality. Fundamental Physical Phenomena: The fundamental phenomena on which physical theories have been based; electrical, gravitational, inertial nuclear and entropy/probability. Field Theory: In particular E.M. and gravitational field theory. Mathematical formalization of physical phenomena, action at a distance, field propagation, field energy, connection to relativity. Relativity: The fundamental postulates, simultaneity, limiting speeds, connection with field theory, mass and energy. Relationship between Micro- and Macro-Cosmos: Divisibility of matter (molecules, atoms, nuclei, nucleon), matter and anti matter, statistical nature of the behaviour of large aggregates or systems, the concept of entropy, the second law of thermodynamics. The place of determinism in physics. Matter and Energy: Conservation laws, inertial mass, equivalence principle, field energy, spatial delimitation of material particles. Theory of Quantum Processes: Granularity effects, uncertainty principle, effects of measurements, virtual processes. Determinism vs. indeterminism in physics, application to nuclear phenomena.

Textbooks
No set texts.

1.143F
Marine Acoustic and Seismic Methods
(Oceanography Unit)   S1 L1T1
Prerequisite: 10.211A or 10.221A or 10.031.

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.

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
Towne D. H. *Wave Phenomena* Addison-Wesley

1.114
Physics IV (Honours)
Compulsory Courses: Quantum mechanics, solid state physics, nuclear and atomic physics, statistical mechanics.

Supplementary Courses: To be arranged with the Director of Fourth Year.

1. *Quantum Mechanics*
Textbook
Schiff L. F. *Quantum Mechanics* 3rd ed McGraw-Hill

2. *Solid State Physics*
Textbook
To be approved.

3. *Nuclear and Atomic Physics.*
Textbook
To be approved.

4. *Statistical Mechanics*
Textbook
To be approved.

Graduate Study

Not all graduate course subjects are necessarily offered in any one year.

1.281G
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.

1.282G
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.

1.283G
Acoustic Measuring Systems   S1 L1T0
For MSc(Acoustics) students.

Microphones, amplifiers, loudspeakers, filters, recorders, pick-ups, noise generators. Acoustic measuring instruments.

1.284G
Electro-Acoustics   S2 L1T0
For MSc(Acoustics) students.

Sound reinforcement systems; ambiophony; assisted resonance. Special requirements for translation; language laboratories.

1.285G
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.

1.286G
Acoustic Laboratory And Analysis   S1 L1T2
For MSc(Acoustics) students.

Practical experiments related to the subject matter of 1.282G Acoustic Theory.

Theory and practice of digital methods of analysis in the time and frequency domains.

1.287G
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.

1.288G
Physical and Applied Acoustics   S1 L2T1
For GradDip in Current Science.

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.

1.420G
Research Project
For MPhysics students.

1.421G
Critical Literature Review
For MPhysics students.

1.422G
Methods of Experimental Physics
For PhD, MSc and MPhysics.

Part 1. General Methods: Signal processing, characterization of specimens, vacuum, high temperatures, low temperatures.

Part 2. Non-Specific Techniques: Thermal diffusion and electrodiffusion, 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.

1.423G
Methods of Theoretical Physics
For PhD, MSc and MPhysics.

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.

1.535G
Biophysics   S2 L2T1
For GradDip in Current Science.

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.

1.585G
Basic Solid State Physics   S1 L2T0
For GradDip in Current Science.

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.

1.586G
Solid State Device Physics   S2 L2T0
For GradDip in Current Science.

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.

1.751G
Acoustics
For MPhysics

Acoustic waves in solids. Effects of radiation-induced defects on ultrasonic propagation, internal friction, acoustic spectroscopy, propagation in heterogeneous media, transients.

1.752G
Atomic Physics
For MPhysics.

Ionization of gases, electron scattering, impact ionization, ion sources, atomic spectroscopy.

1.753G
Biophysics
For MPhysics.

N.M.R. 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.

1.754G
Crystallography
For MPhysics.

Diffraction and lattice dynamics, improved methods of structure determination, X-ray and neutron diffraction.

1.755G
Solid State Transport
For MPhysics.

Thermogalvanomagnetic effects in semiconductors, lattice conductivity, high field transport in insulators, electrical breakdown, effects of defects and dislocations on diffusion.

1.756G
Magnetic Materials
For MPhysics.

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.

1.757G
Materials Irradiation
For MPhysics.

Interaction of energetic charged particles and photons with solids, channelling, blocking and sputtering phenomena, radiation damage, strength of solids, fracture propagation.

1.758G
Surface Physics
For MPhysics

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.

Physiology and Pharmacology

For Students in the Science Course

Physiology is the study of the normal functions and phenomena of living things. It covers a very wide field of study, from the physical and chemical function of single cells to the highly integrated control systems operating within the animal body. These control systems, which involve nervous, hormonal and chemical components, regulate the activities of the various cells throughout the animal. Although most aspects of physiology are included in the courses offered in this School, the main research interests of members of staff and graduate students lie in the following areas: control of blood vessels;

physical properties of excitable membranes; mechanisms of synaptic and neuromuscular transmission; movement of materials across small blood vessels; gas exchange in the respiratory system, reflex mechanisms in respiratory and cardiovascular activity; proprioception; the coding of sensory information by the nervous system, studies on endocrine functions.

The field covered by physiology overlaps that of many other disciplines, and it is necessary for a student to have a sound understanding of chemistry, mathematics, biology and physics in order to gain value from any course in physiology. In addition, a good knowledge of biochemistry is necessary for the study of physiology as a major subject.

Considerable care should be exercised in choosing subject combinations for a science degree. Biochemistry, or courses offered by the School of Zoology may make up suitable combinations with physiology for the major subjects in third year.

Career Opportunities

Job opportunities for science graduates in physiology are limited, and in most cases it is necessary to gain a higher degree, preferably a PhD, to be eligible for the positions that are available. However, students with high ability and good academic records should be able to equip themselves for jobs in CSIRO, Universities or Hospitals. These jobs are generally concerned with some aspects of physiological research or teaching, though hospital physiologists may be concerned with testing of physiological variables in patients. In addition, in recent years there have been increasing numbers of teaching jobs available in colleges and institutes of advanced education. There may also be some opportunities in drug companies for students majoring in physiology and biochemistry.

Requirements for the Study of Physiology

The following subjects are prerequisites for the study of Principles of Physiology (73.011A): Chemistry I (2.001); Biology of Mankind (17.011); Comparative and Functional Biology (17.021); Mathematics (10.001 or 10.011 or 10.021). Students are advised to take Physics as their other first year subject. The prerequisites for Physiology II (73.012) are Principles of Physiology (73.011A) and Biochemistry 41.101 (A, B, C).

Undergraduate Study

73.011A
Principles of Physiology　　　　　　　　L2T4

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* McGraw-Hill

73.012
Physiology II　　　　　　　　　　　　L4T8

A major subject offered in third year, providing a more advanced course of study concentrating on 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.

Psychology

The study of psychology as a formal discipline in undergraduate courses is traditional in Australian Universities. Psychology as a subject is concerned with the systematic study of human behaviour and associated mental processes. The School of Psychology offers psychology as a major subject in the full-time Arts and Science Courses and also offers a full-time undergraduate professional degree course in psychology in the Faculty of Biological Sciences.

In the Science course, Psychology may be studied as a major sequence in accordance with Science course regulations. A student who wishes to proceed to Honours in Psychology should refer to the requirements set out in Section **2.B** of the same regulations.

The four-year course in Psychology, which leads to the degree of Bachelor of Science in the Faculty of Biological Sciences, is a full-time course 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. Full details of this course are given in tabular material earlier in this handbook.

Prizes in Psychology

The *Australian Psychological Society* Prize in Psychology is awarded annually to a fourth-year student. The Society also awards annually two-years Student Subscriberships to the *Australian Journal of Psychology* to two outstanding students at the end of second year.

The Staff Prize in Psychology is awarded annually to an outstanding second-year student.

Undergraduate Study

12.001
Psychology I   L3T2

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

CRM *Psychology Today: An Introduction* 3rd ed CRM
or
Hilgard E. R., Atkinson R. C. & Atkinson R. L. *Introduction to Psychology* 6th ed Harcourt, Brace & Jovanovich
Lumsden J. *Elementary Statistical Method* WAUP
Selected *Scientific American reprints* as advised by the School

12.004
Psychology IV

Psychology IV in the BSc (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, educational psychology) or in research.

Textbooks

To be determined in colsultation with Head of School.

12.014
Psychology IV

Psychology IV (Honours) in the Science Course. Research and thesis, course work and readings to be determined in consultation with the Head of School.

12.042
Psychology IIA

BSc Psychology students only.

Observational methods and laboratory instrumentation in applied psychology.

1. *Laboratory Instrumentation III*

2. *Psychological Assessment (Testing)*

3. *Interviewing Techniques*

12.052
Basic Psychological Processes II   L2T2

The basic phenomena of behaviour and experience in a biological context.

Textbooks

Gray J. A. *The Psychology of Fear and Stress* World Univ Library
and either
Haber R. N. & Hershenson M. *The Psychology of Visual Perception* Holt, Rinehart & Winston
(Recommended for students proceeding to the Perception option in S2.)
or
Lindsay D. H. & Norman D. A. *Human Information Processing* Academic
(Recommended for students proceeding to the Cognition option in S2.)

12.062
Complex Psychological Processes II   L2T2

Choice of two areas from visual perception, social bases of behaviour, and information processing and cognitive functioning.

Information Processing and Cognitive Functioning
Textbook
Lindsay P. H. & Norman D. A. *Human Information Processing* Academic

Perception
Textbook
Haber R. N. & Hershenson M. *The Psychology of Visual Perception* Holt, Rinehart & Winston

Social Psychology
Textbook
McDavid J. W. & Harari H. *Social Psychology and Behaviour* Harper ISE
Higgin G. *Symptoms of Tomorrow* Plume/Ward Lock

12.152
Research Methods II   L2T1

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   L2T2

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   L2T2

Experimental Design; complex analysis of variance; planned and *post hoc* comparisons; multivariate procedures as data reduction techniques.

Textbooks

Hays W. L. *Statistics* International ed Holt, Rinehart & Winston
Lieberman B. *Contemporary Problems in Statistics* OUP

12.173
Psychological Issues*

Historical background to modern psychology, emphasizing philosophical, conceptual, and methodological problems. Literature project.

*Not offered in 1976.

12.253
Learning IIIA   L2T2

Current experimental and theoretical problems in learning; classical and operant conditioning; reinforcement issues.

Textbook

Nevin J. ed *The Study of Behavior* Scott, Foresman

12.263
Learning IIIB   L2T2

Addictions and attachments in animals and man. The themes of addiction and attachment will be pursued from a learning theory base through imprinting and induced behaviours in animals to love, grief and narcotic addiction in man.

Textbooks

To be determined.

12.303
Personality IIIA   L2T2

The development and structure of personality, with reference to biological and social determinants. Problems of theory and measurement.

12.313
Personality IIIB*

The psychology of interpersonal relationships and transactions. Techniques of interpersonal influence.

12.323
Motivation IIIA*

The conditions governing the arousal and direction of behavioural sequences, with particular reference to the social determinants of the goals of behaviour.

Textbooks

Cofer C. N. *Motivation and Emotion* Scott, Foresman,
Russell W. A. ed *Milestones in Motivation: Contribution to the Psychology of Drive and Purpose* Appleton-Century-Crofts

12.373
Psychological Assessment (Testing) IIIA*

Principles and techniques of psychological assessment. Types of tests and their application in selection and allocation procedures.

12.383
Psychological Assessment (Psychometric Theory) IIIB*

12.402
Physiological Psychology   L2T2

BSc Psychology students only.

Elementary neurophysiology 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   L2T2

Elementary neurophysiology and neuroanatomy. Brain control of eating, aggression, copulation, memory, language and functional disorders.

Textbook

As for 12.402.

12.423
Physiological Psychology IIIB   L2T2

Physiological bases of human performance. Hormones and behaviour. Psychophysiology of selected psychological states such as stress, sleep and relaxation. Genetics and behaviour.

Textbook

As for 12.402.

12.453
Human Information Processing IIIA   L2T2

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

Lindsay P. H. & Norman D. A. *Human Information Processing* Academic
Posner M. I. *Cognition* Scott, Foresman
Slobin D. I. *Psycholinguistics* Scott, Foresman

12.463
Human Information Processing IIIB*

12.473
Perception IIIA   L2T2

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

12.483
Perception IIIB   L2T2

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

*Not offered in 1976.

12.503
Social Psychology IIIA   L2T2

The bases of interpersonal attraction; class and race as determinants of behaviour; the experimental study of social processes in small groups; cross-cultural studies of social influence.

Textbook

Aronson E. *The Social Animal* Freeman

A detailed reading list is available from the School

12.513
Social Psychology IIIB   L2T2

A restricted unit for potential Psychology IV students approved by the Head of School.

For subject description and a detailed reading list students should contact the School of Psychology.

12.553
Developmental Psychology IIIA

The study of individual differences and basic psychological processes within a developmental framework. Psychological processes at various stages from infancy to senescence. The study of exceptional individuals within a developmental framework.

Textbooks

To be announced early in 1976.

12.563
Developmental Psychology IIIB*

12.603
Abnormal Psychology IIIA   L2T2

Conflict, anxiety and avoidance behaviour. Anti-social behaviour, psychosomatic disorders, brain pathology, mental deficiency, schizo-phrenia, depression, methods of diagnosis and treatment.

12.613
Abnormal Psychology IIIB   L2T2

A restricted unit for potential Psychology IV students approved by the Head of School.

Techniques and findings of experimental psychopathology. Measure-ment and assessment problems relating to description and prediction in the field of abnormal behaviour. Evaluation of treatment and intervention programs.

Textbook

Hammer M., Salzinger K. & Sutton S. eds *Psychopathology. Contri-butions from Social Behavioural and Biological Sciences* Wiley

12.623
Guidance and Counselling III   L2T2

A restricted unit for potential Psychology IV students approved by the Head of School.

A review of significant therapeutic approaches from prior to Freud through to the present day and their implied views of man. The con-cluding 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   L2T2

A restricted unit for potential Psychology IV students approved by the Head of School.

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.

Textbooks

Davis L. & Taylor J ed *Design of Jobs* Penguin
Emery F. ed *Systems Thinking* Penguin
Lupton T. *Management and the Social Sciences* Penguin

12.663
Ergonomics III   L2T2

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* W.H.O.

12.703
Psychological Techniques III*

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   L2T2

Aversive and appetitive reinforcement in the control and modification of undesirable behaviour. The conditions of attitude change and behavioural influence. Ethical Issues.

12.733
Laboratory Instrumentation III   L2T2

A restricted unit for potential Psychology IV students approved by the Head of School.

Use of laboratory equipment, and experimental techniques in Psycho-logy. 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.

*Not offered in 1976.

12.741
Psychology (Optometry) L2T0

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 principle 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 thereapeutic 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, 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 sensitivy, group dynamics, family therapy or other group procedures.

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 colloguium

Zoology

Zoology is concerned with all aspects of the structure and function of animals and the relation of animals to the environment. The branch of Zoology which deals with the biology of Insects is Entomology. The School of Zoology provides undergraduate courses in Zoology and Entomology. A pattern of units to suit individual interests may be selected from 10 units of Zoology and four units of Entomology. All course patterns leading to a Science Degree in Zoology are dependant on an adequate background in supporting units from other schools, such as Biochemistry, Botany or Mathematics.

The major aspects of the subjects which are taught in undergraduate courses in the school are Vertebrate and Invertebrate structure and function, Environmental Physiology, Animal Behaviour, Evolutionary Biology, Marine Ecology, Experimental and Applied Entomology. In all cases Australian fauna and environment are emphasized.

A Fourth Year honours course is available for students wishing to specialize in a particular branch of Zoology. Students hoping for a research career are advised to complete the requirements for an honours degree, to be followed by graduate study leading to the award of the degree of Master of Science or Doctor of Philosophy.

Graduates at the bachelor level may find employment in scientific and technical departments of various State and Commonwealth organizations concerned with wildlife, Fisheries or Agriculture in certain industries and in teaching at the secondary level.

In addition to the usual lectures, tutorials and laboratory work, several units of Zoology include a substantial element of field work, carried out during vacations. Field work associated with the invertebrate zoology and marine ecology courses is done at the Smiths Lake Field Station of the School of Zoology. Field work associated with the vertebrate zoology and vertebrate zoogeography courses may be carried out at Smiths Lake or the University of New South Wales Arid Zone Research Station at Fowler's Gap north of Broken Hill.

Undergraduate Study

45.101
Biometry   L2T4

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   L2T4

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.

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   L2T4

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* C.U.P.

45.112
Marine Ecology   L2T4

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.

Textbook
Tait R. V. *Elements of Marine Ecology. An Introductory Course* 2nd ed Butterworths

45.121
Evolutionary Theory   L3T1

Current evolutionary theory, emphasizing the population level. Ecological genetics, evolutionary aspect of ecological niche theory, speciation, coevolution, and general evolutionary genetics.

Textbook
No set texts. Use is made of the original literature and the principal references.

45.122
Animal Behaviour   L2T4

An introduction to Ethology, the biological study of behaviour. Physiological, ecological, developmental and evolutionary aspects of behaviour are examined as important elements of the study of causal factors underlying behaviour. Both field and laboratory work are included.

Textbook
Manning A. *An Introduction to Animal Behaviour* 2nd ed Arnold

45.132   L2T4
Comparative and Environmental Physiology

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* C.U.P.
Wessells N. K. *Vertebrate Structure and Functions* Readings from Scientific American. Freeman

45.142
Developmental and
Reproductive Biology   L2T4

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 Embryololgy* McGraw-Hill
Additional book to be advised at a later date.

45.202
Advanced Invertebrate Zoology   L2T4

A comparative approach to functional aspects of invertebrate biology. Metabolism, nervous and chemical co-ordination and locomotion and animal associations.

Textbooks

Gardiner M. S. *The Biology of Invertebrates* McGraw-Hill
Wells M. *Lower Animals* Weidenfeld & Nicolson

45.302
Vertebrate Zoogeography   L2T4

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   L2T4

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* M.U.P

45.412
Insect Physiology   L2T4

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* E.U.P.

45.422
Applied Entomology   L2T

Fundamentals of insect control. Pest species and types of damag 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   L2T4

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.