FACULTY OF BIOLOGICAL SCIENCES AND FACULTY OF SCIENCE

COMBINED 1975 HANDBOOK

$1.50

SOME PEOPLE WHO CAN HELP YOU

Note: All phone numbers below are University extension numbers. If you are dialling from outside the University dial 663 0351 and ask for the extension.

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

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1975 HANDBOOK

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THE UNIVERSITY OF NEW SOUTH WALES

P.O. Box 1, Kensington, N.S.W. 2033

Phone: 663 0351

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General Information

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

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

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

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Calendar of Dates for 1975

Session 1:	March 3 to May 11
	May Recess: May 12 to May 18
	May 19 to June 15
	Midyear Recess: June 16 to July 20
Session 2:	July 21 to August 24
	August Recess: August 25 to August 31
	September 1 to November 2
	Study Recess: November 3 to November 9

JANUARY

Wednesday 1	New Year's Day—Public Holiday
Friday 10	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 13	Timetables for *deferred* examinations available
Friday 17	Last day for acceptance of applications by Admissions Office for transfer to another course within the University
Monday 27	Australia Day—Public Holiday
Tuesday 28	*Deferred* examinations begin

FEBRUARY

Saturday 8	*Deferred* examinations end
Friday 14	Last day for appeal against exclusion by students who infringed re-enrolment rules at *annual* examinations
Monday 17	Enrolment period begins for new students and students repeating first year
Friday 21	*Deferred* examination results available
Monday 24	Enrolment period begins for second and later year students
Tuesday 25	Last day for application for review of *deferred* examination results
Friday 28	Last day for application for permission to re-enrol by students who infringed re-enrolment rules at *deferred* examinations

MARCH

Monday 3	**Session 1 commences**
Friday 14	Last day for acceptance of enrolments by new students (late fee payable)
Thursday 20	Last day for appeal against exclusion by students who infringed re-enrolment rules at *deferred* examinations
Thursday 27	Last day for changes in course programmes
	Last day for acceptance of enrolments by students re-enrolling in second and later years (late fee payable)
Friday 28 to Monday 31	Easter

APRIL

Thursday 3	Last day for students other than those attending a university for the first time to discontinue without failure subjects which extend over Session 1 only
Thursday 24	Last day for students attending a university for the first time to discontinue without failure subjects which extend over Session 1 only
Friday 25	Anzac Day—Public Holiday

MAY

Tuesday 6	Publication of provisional timetable for June/July examinations
Monday 12	**May Recess begins**
Tuesday 13	Last day for acceptance of corrected enrolment details forms
Friday 16	Last day for students other than those attending a university for the first time to discontinue without failure subjects which extend over the whole academic year
Sunday 18	**May Recess ends**
Monday 19	Last day for students to advise of examination timetable clashes

JUNE

Tuesday 3	Publication of timetable for June/July examinations
Sunday 15	**Session 1 ends**
Monday 16	Queen's Birthday—Public Holiday **Midyear Recess begins**
Tuesday 17	Midyear examinations begin

JULY

Tuesday 1	Midyear examinations end
Sunday 20	**Midyear Recess ends**
Monday 21	**Session 2 begins**
Thursday 31	Foundation Day

AUGUST

Friday 1	Last day for students attending a university for the first time to discontinue without failure subjects which extend over the whole academic year
Thursday 21	Last day for students other than those attending a university for the first time to discontinue without failure subjects which extend over Session 2 only
Monday 25	**August Recess begins** Holiday for non-academic staff
Sunday 31	**August Recess ends** Last day for acceptance of applications for re-admission in 1976 after exclusion under the re-enrolment rules

SEPTEMBER

Friday 12	Last day for students attending a university for the first time to discontinue without failure subjects which extend over Session 2 only
Monday 15	Last day for return of corrected enrolment details forms Last day for applications from students graduating in 1976 for admission to University degrees and diplomas
Tuesday 23	Publication of provisional timetable for annual examinations

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OCTOBER

Wednesday 1	Last day to apply to MUAC for transfer to another university in Sydney metropolitan area and Wollongong
Friday 3	Last day for students to advise of examination timetable clashes
Monday 6	Eight Hour Day—Public Holiday
Tuesday 21	Publication of timetable for annual examinations

NOVEMBER

Monday 3	**Study Recess begins**
Sunday 9	**Session 2 ends**
Monday 10	Annual examinations begin

DECEMBER

Tuesday 2	Annual examinations end
Thursday 25	Christmas Day—Public Holiday
Friday 26	Boxing Day—Public Holiday

1976

Session 1:	March 1 to May 9
	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
	August Recess: August 23 to August 29
	August 30 to October 31
	Study Recess: November 1 to November 7

JANUARY

Friday 9	Last date for application for review of results of annual examinations
Monday 12	Publication of timetable for deferred examinations
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
Friday 20	Results of deferred examinations available
Monday 23	Enrolment period begins for second and later year students

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 1974 the University had 17,355 students and 3,958 staff who worked in more than eighty buildings. If staff and students at Broken Hill (W. S. and L. B. Robinson University College), Wollongong (an autonomous university in 1975), Duntroon (the Faculty of Military Studies) and Jervis Bay were included there were 19,594 students and 4,522 members of staff (academic and non-academic).

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 postgraduate 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 (e.g. the School of Chemistry, the School of Mathematics, etc.). 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 are 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 advise the Chairman of the Faculty you wish to attend, as different faculties have their own rules for the conduct of open meetings.

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 programmes; 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 Schools in which you will be studying, according to the following list:

Identi-fying Number	School, Faculty or Department	Identi-fying Number	School, Faculty or Department
1	School of Physics	43	School of Botany
2	School of Chemistry	44	School of Microbiology
3	School of Chemical Engineering	45	School of Zoology
4	School of Metallurgy	50	School of English
5	School of Mechanical and Industrial Engineering	51	School of History
		52	School of Philosophy
6	School of Electrical Engineering	53	School of Sociology
7	School of Mining Engineering	54	School of Political Science
8	School of Civil Engineering	55	School of Librarianship
9	School of Wool and Pastoral Sciences	56	School of French
		57	School of Drama
10	School of Mathematics	58	School of Education
11	School of Architecture	59	School of Russian
12	School of Psychology	62	School of History and Philosophy of Science
13	School of Textile Technology		
14	School of Accountancy	63	School of Social Work
15	School of Economics	64	School of German
16	School of Health Administration	65	School of Spanish and Latin American Studies
17	Biological Sciences		
18	Department of Industrial Engineering	66	University of Sydney subjects
		69	Centre for Medical Education, Research and Development
19	School of Transportation and Traffic		
		70	School of Anatomy
20	School of Highway Engineering	71	School of Medicine
21	Department of Industrial Arts	72	School of Pathology
22	School of Chemical Technology	73	School of Physiology and Pharmacology
23	School of Nuclear Engineering		
25	School of Applied Geology	74	School of Surgery
26	Department of General Studies	75	School of Obstetrics and Gynaecology
27	School of Geography		
28	School of Marketing	76	School of Paediatrics
29	School of Surveying	77	School of Psychiatry
31	School of Applied Physics and Optometry	79	School of Community Medicine
		80	Faculty of Medicine
33	Graduate School of Business	85	National Postgraduate School of Management Education
35	School of Building		
36	School of Town Planning	90	School of Law
41	School of Biochemistry	97	Division of Postgraduate Extension Studies
42	School of Biological Technology		

In Section D of the Calendar a short syllabus is given for each subject.

Student Services and Activities

The Library   The University Library is on the upper campus and adjacent to the Chancellery and the Sciences, Arts and Commerce Buildings. It contains about 650,000 books and subscribes to more than 18,000 periodicals.

Students may borrow books by presenting a current Union card and the books at the Circulation Desk. 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.

The Bio-Medical Library is located in the Biological Sciences Building. The Law Library is on the 4th Floor of the Sciences Building. A Physical Sciences Library is being developed at present in the main Library building.

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. It is anticipated that the fees in most colleges will be increased for 1975. In addition, assistance is 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. Board and residence fees, which are payable on a session basis, amount to slightly more than $30 per week. Apply in writing to the Master, P.O. Box 24, Kensington, N.S.W. 2033.

International House   International House accommodates over 120 students from Australia and twenty other countries. Preference is given to more senior undergraduates and postgraduate students. Fees in 1974 were $28 per week. Apply in writing to the Warden, International House, P.O. Box 88, Kensington, N.S.W. 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. Fees in 1974 were $31 for undergraduates and $32 for postgraduate students. Fees may change in 1975. Enquiries should be addressed to the Master, New College, Anzac Parade, Kensington, N.S.W. 2033.

Shalom College   Shalom College provides accommodation for 86 men and women students. The basic fee for residence in 1975 is $38 per week. 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, P.O. Box 1, Kensington, N.S.W. 2033.

Warrane College   An affiliated Roman Catholic residential college, Warrane provides accommodation for 200 men students, both postgraduate and undergraduate. Basic fees in 1974 were $30.50 per week for board and residence, payable on a session basis. Apply in writing to the Master, Warrane College, P.O. Box 123, Kensington, N.S.W. 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 programme 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 postgraduate scholarships is also available.
The service is located in the Chancellery on the ground floor.
Telephone 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 a.m. and 5 p.m. Monday to Friday, and 6 p.m.-9 p.m. on Tuesdays and Thursdays. Telephone extension 2679 or 3275.

Student Counselling and Research Unit   The Student Counselling and Research Unit provides individual and group counselling for all students—prospective, undergraduate and postgraduate. 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.

Confidential appointments are made by dropping in to the counselling unit (Huts B and I at the foot of Basser Steps) or by telephoning extensions 2600-2605 between 9.00 a.m. and 5.00 p.m. Evening appointments are also available.

Student Amenities and Recreation Unit   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 programme 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 Inquiry 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, 3261; 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 programme for both students and staff. If you would like to take part in any of the programmes 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 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 and conducts courses in many facets of the arts including weaving, photography, creative dance and yoga.

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:

(a) 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.

(b) A casual employment service.

(c) Organization of Orientation Week.

(d) Organization of Foundation Day.

(e) A nursery/kindergarten, "The House at Pooh Corner".

(f) Publication of the student paper "Tharunka".

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.

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 $4.00.

Details of sporting facilities are available in "Action 75", 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.

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.

The University Chapel is in Hut F near the Chemistry Building, where full-time chaplains are also located. They may be contacted by phone at the following extensions: Anglican, 2684; Jewish, 3273; Roman Catholic, 2379; Churches of Christ, Methodist and Seventh Day Adventist, 2683.

University Co-operative Bookshop Limited   Membership is open to all students, on payment of a fee of $5.00, refundable when membership is terminated. Members receive an annual rebate on purchases of books.

Cashier's Hours   The University cashier's office is open from 9.30 a.m. to 1.00 p.m. and from 2.00 p.m. to 4.30 p.m., Monday to Friday. It is open for additional periods during the first four weeks 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 663 0351, extn. 2406.
University of New South Wales Regiment: The Adjutant, Regimental Depot, Day Avenue (just west of Anzac Parade).
Air Force Squadron: The N.S.W. University Squadron has ceased to exist but students interested in the Royal Australian Air Force may apply for information to The Commanding Officer, N.S.W. Air Training Corps, 7 Hickson Road, Millers Point, N.S.W. 2000. Telephone 27 5412.

Financial Assistance to Students

Tertiary Education Assistance Scheme

The Tertiary Allowance Scheme, first introduced in 1974, has been renamed the Tertiary Education Assistance Scheme. Under this scheme assistance is available as follows:

- for full-time study in approved courses
- subject to a means test
- on a non-competitive basis
- without restriction
- to students who are not bonded
- to students who are permanent residents of Australia.

The following types of university courses will be eligible for assistance:

- Undergraduate and postgraduate degree courses
- Postgraduate 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 $6,300 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 $6,300 p.a. the amount of living allowance will be reduced by $2 for every $10 of income until the family income exceeds $12,600 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 p.a.

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 $8 per week for a dependent spouse and $5 per week for each child.

How To Apply

Two different forms are used:

1 1974 Higher School Certificate candidates will be sent forms in early January. Applications should be made immediately after enrolment.

2 All other students should apply by 31st October. Forms will be sent in September to students who have been receiving an allowance. Other students may obtain forms from the Admissions Section or the Student Employment and Scholarships Unit, or from the Regional Director, N.S.W. State Office, Department of Education, Central Square, 323 Castlereagh Street, Sydney, N.S.W. 2000 (Telephone 2 0929).

Scholarships, Cadetships

1 *Undergraduate Scholarships*   In addition to finance provided under the Australian Government's Tertiary Education Assistance Scheme there are a number of scholarships, cadetships and other forms of assistance available to undergraduate students.

Details of procedures for application for these awards are contained in the University Calendar.

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

2 *Postgraduate Awards*   An honours degree is generally an essential requirement for gaining one of the many postgraduate 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 postgraduate awards are contained in the University Calendar.

Other Financial Assistance

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

(a) The Students' Union and the University have co-operated to provide assistance to students who are in financial difficulties which are considered likely to prejudice their studies.

Three main 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.

In exceptional circumstances the University may consider granting deferments for up to twelve months or even longer. In cases where payment is deferred to 31st December, examination results will not be published or made available until such time as the outstanding fees are paid. Where deferments are granted to a date beyond 31st December, the University may require the student to enter into a formal agreement to repay the fees.

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 *Long Term Cash Loans*   An amount of up to $300 is available from this fund. Repayments must be started not later than twelve months after graduation or upon withdrawal from the course. This scheme is funded jointly by the University and the Students' Union. Students are required to enter into a formal agreement with the University to repay such a loan.

(b) 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 twelve months 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 of funds as mentioned in the preceding paragraph students who are in extremely difficult financial circumstances may apply for assistance by way of non-repayable grant. In order to qualify for a grant a student must generally show that the financial difficulty has arisen from misfortune beyond his control.

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

Applications may be made personally to the Deputy Registrar (Student Services), Room 148A, 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 enquiries relating to this scheme should be directed to the Deputy Registrar (Student Services), Room 148A, 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 University Calendar.

When and where do I enrol?   To effect formal enrolment it is necessary to present a duly completed and authorized enrolment form to the University cashier together with, where payable, either the appropriate fees, or an authority authorizing those fees to be charged to some other person or institution.

All students are required to attend the appropriate enrolment centre during the prescribed enrolment period for authorization of course programme. Failure to do so will incur a fee of $10. These enrolment centres and the times are listed in a leaflet called "Enrolment Procedures" which is available from the Admissions Office.

Fees should be paid during the prescribed enrolment period but will be accepted during the first two weeks of Session 1 (for late fees see below). No student is regarded as having completed enrolment until fees have been paid. Fees will not be accepted (i.e. enrolment cannot be completed) from new students in year-long courses after 14th March, 1975, and after 31st March from students who are re-enrolling, except with the express approval of the Registrar, which will be given in exceptional circumstances only.

Students enrolling for the first time in any year at the commencement of Session 2 for Session 2 courses only are required to pay all fees due within the first two weeks of that Session. Students' Activities fees payable will be half of the annual fees.

Medical Students

Although the structure of the academic year in the later years of the course in Medicine differs from that followed in other courses, medical students are required to observe the same dates for payment as apply to students in other courses.

How do assisted students (e.g. 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. If this voucher or letter is not available when enrolling they should complete their enrolment paying their own fees. A refund of fees will be made when the enrolment voucher or letter of authority is subsequently lodged with the Cashier.

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.

Your application must give year or stage, whether full-time or part-time, and the course in which you wish to enrol. State clearly and fully the reasons why payment cannot be made and the extension is sought and lodge your application before the date on which a late fee becomes payable. Normally the maximum extension of time for the payment of fees is one month for fees due in Session 1 and one month from the date on which a late fee becomes payable in Session 2.

If an extension of time is granted to a first year student in Session 1 the student may only attend classes on the written authority of the Registrar. This authority will not normally be given in relation to any course where enrolments are restricted.

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.

You will not be eligible to attend the annual examinations in any subject if any portion of your fees for the year is outstanding after the end of the fourth week of Session 2 (15th August, 1975).

In very special cases the Registrar may grant exemption from disqualifications referred to in the two preceding paragraphs 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 17th 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 programme? If you wish to seek approval to substitute one subject for another, add one or more subjects to your programme or discontinue part or all of your programme, 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 31st March.

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: one calendar month from the beginning 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 17th January of the same year that 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 the end of 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. They apply to all students other than those enrolled in pro-grammes leading to a higher degree or diploma. It should be noted that these rules are independent of one another in that a student may infringe more than one rule simultaneously. A subject is defined as a unit of instruction identified by a distinctive subject number. At present the Appeal Committee referred to in Rule 8 consists of a Pro-Vice-Chancellor (Chairman), the Chairman of the Professorial Board, and the Member of Council elected by the graduates of the University. The Pro-Vice-Chancellor is Professor J. B. Thornton.

First-year Rule

1 i A student enrolled in the first year or first stage of any course, other than course 380, the Medical (MB BS) degree course, shall be required to show cause why he should be allowed to continue the course if he fails more than half the subjects in that year or stage.

   ii A student enrolled in the first year of course 380, the Medical (MB BS) degree course, shall be required to show cause why he should be allowed to continue the course if he fails more than two subjects in that year.

   iii The provisions of paragraphs (i) and (ii) shall be deemed to apply to a student enrolled in the second or later year or the second or later stage of any course who has transferred from another course or institution and who, in the first year of enrolment immediately following transfer, is enrolled in subjects so chosen that half or more are listed in the current University Calendar as first-year subjects.

Repeated-failure Rule

2 A student shall be required to show cause why he should be allowed to repeat a subject which he has failed more than once. *Where the subject is prescribed as part of the student's course he shall be required to show cause why he 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.

Time Rule—Completion of Years or Stages

3 i A full-time student in either course 340, the Arts (BA) degree course, or 403, the Social Work (BSW) degree course, shall be required to show cause why he should be allowed to continue the course if he is unable to complete eight one-session subjects (or the equivalent) by the end of his second year of attendance.

  ii Unless the provisions of paragraph (i) apply, a full-time student shall be required to show cause why he should be allowed to continue a course if he is unable to complete all subjects in the first year of the course by the end of his second year of attendance.

  iii A student in course 380, the Medical (MB BS) degree course, shall be required to show cause why he should be allowed to continue the course if he is unable to complete all subjects in the second year of the course by the end of his third year of attendance and the third year by the end of his fourth year.

  iv A part-time student in course 397, the Science (BSc) degree course, shall be required to show cause why he should be allowed to continue the course if he is unable to complete eight level-one units, including two in mathematics, by the end of his fourth year of attendance and fourteen units, including at least three at level two, by the end of his seventh year.

  v Unless the provisions of paragraph (iv) apply, a part-time student shall be required to show cause why he should be allowed to continue a course if he is unable to complete all subjects in the first two stages of the course by the end of his fourth year of attendance and the third and fourth stages by the end of his seventh year.

Time Rule—Completion of Course

4 A student shall be required to show cause why he should be allowed to continue a course which he is unable to complete in the time set down in the following schedule:

Number of years in course	Total years allowed from first enrolment to completion
3	5
4	6

5	8
6	9
7	11
8	12
9	14

Continuation Rule

5 i A student enrolled in a course who has transferred with a record of failure from another tertiary institution shall be required to show cause why he should be allowed to continue the course if he fails more than half the subjects in his first year of enrolment immediately following transfer.

ii A student excluded from a course under the provisions of the Rules who has subsequently been allowed to re-enrol in that course or to transfer to another course shall show cause why he should be allowed to continue the course if he fails one or more subjects in his first year of re-enrolment or transfer.

General Exclusion Rule

6 The Vice-Chancellor may, on the recommendation of the Re-enrolment Committee of the Professorial Board, exclude from a course or courses any student who has been excluded from any other course under the provisions of the Rules and whose record at the University demonstrates the student's lack of fitness to pursue such course or courses.

'Showing Cause'

7 i 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 should be lodged with the Registrar.

ii Any such application shall be considered by the Re-enrolment Committee which shall determine whether the cause shown is adequate to justify the student's being allowed to re-enrol.

Appeal

8 i 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 the Appeal Committee constituted by Council for this purpose. The decision of the Appeal Committee shall be final. In lodging such appeal with the Registrar the student should ensure that a complete statement is furnished of all grounds on which the appeal is based.

ii The notification to any student of a decision by the Re-enrolment Committee to exclude him from re-enrolling in a course and/or subject(s) shall indicate that the student may appeal against that decision to the Appeal Committee.

iii The Appeal Committee shall determine the appeal after consideration of the student's academic record and the stated grounds. In exceptional circumstances the Appeal Committee may require the student to appear in person.

Exclusion

9 i A student who is required to 'show cause' under the provisions of Rule 1 and either does not attempt to 'show cause' or whose application for special permission to re-enrol does not satisfy the Re-enrolment Committee (or the Appeal Committee on appeal) shall be excluded from re-enrolling in the subject(s) and course on account of which he was required to 'show cause'. Where the subjects are a prescribed part of any other course (or courses) he shall not be allowed to enrol in that course (or courses).

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

iii A student who is required to 'show cause' under one or more of Rules 3-5 and either does not attempt to 'show cause' or whose application for special permission to re-enrol does not satisfy the Re-enrolment Committee (or the Appeal Committee on appeal) shall be excluded from re-enrolling in the course on account of which he was required to 'show cause'.

iv A student excluded from a course under the provisions of any one or more of paragraphs (i)-(iii) may not enrol in miscellaneous subjects unless he has received the approval of the Admissions Committee of the Professorial Board.

Re-admission after Exclusion

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

ii An excluded student who intends applying for re-admission at a future date may seek advice as to ways in which he may enhance his prospects of re-admission. Such enquiries should be made on the form available from the Examinations and Student Records Section and should be lodged with the Registrar.

iii 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 31st August in the year prior to that for which re-admission is sought. A late application will only be accepted at the discretion of the University.

iv An application should include:

(a) evidence of appropriate study in the subject(s) (or the equivalent) on account of which the applicant was excluded, and

(b) 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.

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 12th September, in a student's final year. 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 programme, must be submitted in writing to the Registrar no later than 30th January.

Fees*

Do I have to pay fees for tuition?   No. On 1st January, 1974, fees for tuition were abolished. Other fees and charges remain 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. Late fees are charged where a student fails to observe required procedures by the appropriate time. 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 and 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 undergraduate students and students taking miscel-

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

laneous subjects (with the exception of External Students) will be required to pay:

University Union†—$20 entrance fee

Student Activities Fees

  University Union†—$30 annual subscription
  Sports Association†—$4 annual subscription
  Students' Union†

    Students enrolling in full-time courses—$10 annual subscription
    Students enrolling in part-time courses—$8 annual subscription

  Miscellaneous—$17 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.)

Where applicable, students will also be required to pay $10 for the Pathology Instrument Kit, refundable on return in satisfactory condition.

The Deputy Registrar (Student Services) may, on application, waive student fees for students who, while enrolled in a degree or diploma course at another University in New South Wales, are given approval to enrol at the University of New South Wales in miscellaneous subjects which will be acceptable for credit towards the degrees or diplomas for which they are enrolled.

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**

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† Life members of these bodies are exempt from the appropriate fee or fees.

What penalties exist for late payment of fees?   The following additional charges will be made in 1975 when fees are paid late:

Session 1—First Enrolments

Fees paid on the late enrolment date, 28th February or later
   but before 3rd March $10
Fees paid between 3rd and 14th March $20
Fees paid after 14th March with the express approval of the
   Deputy Registrar (Student Services) and Head of the
   School concerned $40

Session 1—Re-enrolments

Failure to attend enrolment centre during enrolment week
   24th to 28th February $10
Fees paid between 17th and 31st March $20
Fees paid after 31st March where accepted with the express
   approval of the Deputy Registrar (Student Services) $40

Session 2—All Enrolments

Fees paid between 4th and 11th August $20
Fees paid thereafter $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 a refund of all fees paid will be made. After that time only a partial refund will be made.

Examinations

When are examinations held?   Most annual examinations are held in November-December but examinations in many subjects are also held during the mid-year 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 Wallace Wurth Medical School, Biological Sciences Building, the Chancellery, Central Lecture Block, Dalton Building (Chemistry), Main Building (Mining and Physics), outside the Sciences Building and in the Western Grounds Area on 6th May and 23rd September. You must advise the Examinations Unit (Chancellery) of a clash in examinations by 19th May and 3rd October. Final timetables are displayed and individual copies are available for students on 3rd June and 21st 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 30th November) or to your vacation address (fill in a form obtainable at the Enquiry Desk, Chancellery, also by 30th November). Results are also posted on School noticeboards 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, 1974 .... Friday, 10th January, 1975

Deferred examinations held in
January/February, 1975 .... Tuesday, 25th February, 1975

Annual examinations held in
November/December, 1975 ... . Friday, 9th January, 1976

Deferred examinations held in
January/February, 1976 .... Tuesday, 24th February, 1976

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 *at an examination* 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, 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.

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

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

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

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

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

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

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

7   A candidate shall not by any improper means obtain, or endeavour to obtain, assistance in his work, give, or endeavour to give,

assistance to any other candidate, or commit any breach of good order.

8 Smoking is not permitted during the course of examinations.

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

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

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

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

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

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

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

In the Faculties of Arts, Commerce and Law special circumstances apply in the granting of deferred examinations. Details in each circumstance are given in the section *Faculty Information* in the respective handbooks for these faculties, or in Section A of the University 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 Enquiry 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, beyond prohibiting gambling on the campus and smoking during lectures, at examinations or in the library.

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 conduct yourself at all times in a seemly fashion.

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 programme 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 at the University Union Enquiry Desk as soon as possible after fee payment. In the meantime, the fees receipt form should be carried during attendance at the University and shown on request. A period of at least three weeks should be allowed to elapse after payment of fees before making application for the card. Cards will not be posted under any circumstances.

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 not reaching you. The University cannot accept responsibility if official communications fail to reach students who have not notified their change of address. A Change of Address Advice Form is available at Faculty and School offices and at the Enquiry Counters on the Ground Floor of the Chancellery Building.

How are student records kept up to date?   All students will receive enrolment details forms by 29th April and 1st September. 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 by 13th May and 15th September respectively. Amendments notified after the closing date will not be accepted unless exceptional circumstances exist and approval is obtained from the Registrar. Where a late amendment is accepted, a late fee of $8 will be payable. 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); higher degree students (limited issue, annual fee $7.80);

postgraduate, and senior undergraduate students who have completed three years of a full-time or part-time course (annual fee \$3.90). A permit will allow access to the campus between 5 p.m. and 11 p.m. 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.

Lost Property? All enquiries concerning lost property should be made to the Superintendent on extension 2503 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, scholarships 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 a.m. to 1 p.m. and 2 p.m. to 5 p.m. 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.

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".

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:

Faculty of Applied Science

‡School of Applied Geology ....   Mr. G. J. Baldwin

Faculty of Arts

School of Geography* ....   Mr. N. Lonergan

School of Philosophy**   ....   Professor C. L. Hamblyn

‡School of History and Philo-
sophy of Science   ....   Dr. J. Saunders

Faculty of Biological Sciences

First Year Biology Units
(prerequisite for all other units
in this Faculty excepting
Psychology) ....   Dr. A. E. Wood

School of Psychology ....   Dr. P. J. Cleary
Dr. A. Faust-Adams

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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
† Second and Third year levels only
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J. I. Dunlop, BSc PhD *N.S.W.*, AAIP, MAAS, ATI
J. E. Giutronich, BSc *Syd.*, PhD *N.S.W.*, AAIP
J. R. Hanscomb, BSc *Qld.*, MSc PhD *N.S.W.*, AAIP, GradInstP
N. R. Hansen, BSc DipEd *Syd.*, MSc *N.S.W.*, MInstP, AAIP
L. B. Harris, BSc *Lond.*, BA DipEd *Durh.*, PhD *N.S.W.*, AIM, AInstP
B. R. Lawn, BSc PhD *W.Aust.*, GradInstP
J. Oitmaa, BSc PhD *N.S.W.*, AAIP
R. G. Simons, BSc *Syd.*, MSc *Tel Aviv*, PhD *N.S.W.*

LECTURERS

P. R. Elliston, BSc *Melb.*, PhD *Monash*
C. T. Grainger, BSc DipEd *Syd.*, MSc *N.E.*, PhD *N.S.W.*, MInstP, AAIP
E. Harting, BSc PhD *N.S.W.*, ASTC
Veronica J. James, BA BSc *Qld.*, PhD *N.S.W.*, AAIP
K. Mann, BSc *Qld.*, MSc *N.S.W.*
K. H. Marsden, BSc *Lond.*, MSc *N.S.W.*, MInstP, ARCS, AAIP
P. Mitchell, BSc PhD *Adel.*, AAIP
G. L. Paul, MSc *Syd.*, PhD *Edin.*, AAIP
G. J. Russell, BSc PhD *N.S.W.*, GradInstP, GradAIP
J. R. Shepanski, MSc *Syd.*, AAIP
A. M. Stewart, DIC MA *Camb.*, AM *Harv.*, EE *Col.*, PhD *Lond.*, M.InstP, MIEEE

SENIOR TUTORS

I. R. Dunn, BSc BA *Melb.*, MIEEE
E. P. Eyland, BSc *N.S.W.*, BD *Lond.*
M. D. Knight, BSc *N.S.W.*

TUTORS

K. R. Doolan, BSc *Syd.*
Z. Kerestes, BSc *Syd.*
P. M. O'Halloran, BA *Macq.*, GradAIP
P. Pick, BSc PhD *Syd.*
J. D. Smith, BSc *I.S.U.*
F. Stootman, BSc *Syd.*, GradAIP
M. Varady, BSc *Syd.*
G. J. Vella, BSc PhD *N.S.W.*
W. H. Williams, BSc BE *N.S.W.*

TEACHING FELLOWS

R. L. Calvert, BSc *S'ton.*, MSc *Qu.*
K. C. Fitzsimmons, BSc *Syd.*
J. T. H. Ho, BSc *H.K.*
J. L. Menendez-Cortinas, LicSci(Phys) *Barcelona*
P. P. Narang, MSc *Delhi*
C. Uher, BSc *N.S.W.*, GradAIP

PROFESSIONAL OFFICERS

R. L. Dalgleish, BSc PhD *N.S.W.*
H. Hofer, PhD *Vienna*, AAIP
V. Kastalsky, BSc PhD *N.S.W.*, ASTC, MInstP, AAIP
F. G. M. Steenbeeke, DiplMechEng *Arnhem T.H.*

HONORARY ASSOCIATES

J. S. Dryden, MSc *Melb.*, PhD *Lond.*, DIC, FAIP
G. H. Godfrey, MA BSc *Syd.*, FInstP, FAIP, HonFIO
J. L. Symonds, BSc *Adel.*, PhD *Birm.*, FInstP, FAIP
G. K. White, MSc *Syd.*, DPhil *Oxon.*, FAA, FInstP, FAIP

HONORARY VISITING FELLOW

L. Lynch, BSc PhD *N.S.W.*, GradAIP

FACULTY INFORMATION

ENROLMENT PROCEDURES—BOARD OF STUDIES IN SCIENCE

Preliminary Enrolment

Science Course

Before the end of Session 2, each student must obtain a 1975 Programme Form (Form SC75), 1975 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 SC75 and lodge it, together with Re-enrolment Form filled in as far as possible, at the Science Faculty Office not later than 17th January 1975. Students whose Programme Forms and Re-enrolment Forms are not received by 17th January 1975 must re-enrol at a late re-enrolment session and pay the late fee.

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 26th February
Surnames A to G	9.30 a.m. to 12.30 p.m.
Surnames H to M	2.00 p.m. to 4.30 p.m.
	Thursday 27th February
Surnames N to R	9.30 a.m. to 12.30 p.m.
Surnames S to Z	2.00 p.m. to 4.30 p.m.

Year 3

	Monday 24th February
Surnames A to J	2.00 p.m. to 4.30 p.m.
	Tuesday 25th February
Surnames K to R	9.30 a.m. to 12.30 p.m.
Surnames S to Z	2.00 p.m. to 4.30 p.m.

Year 4

All students	Friday 28th February 9.30 a.m. to 12.30 p.m. 2.00 p.m. to 4.30 p.m.
New Students with *Advanced Standing*	Friday 28th February 9.30 a.m. to 12.30 p.m. 2.00 p.m. to 4.30 p.m.

Part-time Course

Stage 2 & Stage 1 Repeats	Monday 24th February 6.00 p.m. to 8.00 p.m.
Stage 3 & Stage 4 Students	Tuesday 25th February 6.00 p.m. to 8.00 p.m.
Stage 5 & Later Stages	Wednesday 26th February 6.00 p.m. to 8.00 p.m.
New Students with *Advanced Standing*	Thursday 27th February 6.00 p.m. to 8.00 p.m.

Enrolment Centre

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

ENROLMENT PROCEDURES—FACULTY OF BIOLOGICAL SCIENCES

Preliminary Enrolment

BSc in Psychology Course

Each student must obtain his or her personal enrolment form and Personal Programme Form P/RE from the School of Psychology. The forms will be available from 15th October 1974. After notification of the annual examination results the student should indicate the subjects already completed and the proposed programme for 1975 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 17th January 1975.

Enrolment Timetable

School of Psychology

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

Full-time Students

Year 2 & Year 1 repeats	Tuesday 25th February 10.00 a.m. to 12 noon
Years 3 & 4	Tuesday 25th February 2.00 p.m. to 4.00 p.m.

Part-time Students

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

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.

Students who fail to do this or fail to attend personally will be required to attend one of the late enrolment periods (see relevant section) and pay the late fee.

Enrolment Centre
School of Psychology
Level 10
The Sciences Building

ENROLMENT PROCEDURES—FACULTY OF SCIENCE

Preliminary Enrolment
Pure and Applied Chemistry Course and Optometry Course
Before proceeding on vacation students are required to attend the Office of the School 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:

a.   Full-time Course
     Year 2 & Year 1 repeats   Monday 24th February
                                       2.00 p.m. to 4.30 p.m.

Year 3	Wednesday 26th February 9.30 a.m. to 12.30 p.m.
Year 4	Friday 28th February 9.30 a.m. to 11.00 a.m.

b. Part-time Course

Stage 1 repeats and Stages 2, 3 & 4	Tuesday 25th February 2.00 p.m. to 4.00 p.m. 6.00 p.m. to 8.00 p.m.
Stages 5, 6 & later	Wednesday 26th February 2.00 p.m. to 5.00 p.m.

c. New Students with
    Advanced Standing   Wednesday 26th February
                                     3.30 p.m. to 5.00 p.m.

Optometry Course

Students enrolling in Years 2, 3 and 4 of the Bachelor of Optometry course are requested to bring with them a recent passport size photograph with their name and address printed on the back.

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

Year 2 & Year 1 repeats	Monday 24th February 2.00 p.m. to 4.30 p.m.
Year 3 and Year 4	Tuesday 25th February 2.00 p.m. to 4.30 p.m.

Enrolment Centre

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

LATE ENROLMENTS

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

There are two late enrolment sessions:

First Late Enrolment Period

Wednesday 5th March

Second Late Enrolment Period

Wednesday 12th March

The times and locations for late enrolment in each faculty are shown below:

Board of Studies in Science
Science Course

Room 14
(Conference Room)
Main Building
5.00 p.m. to 7.00 p.m.

Faculty of Biological Sciences

School of Psychology
Level 10
The Sciences Building
4.00 p.m. to 6.00 p.m.

Faculty of Science
Pure and Applied Chemistry
Course

The Robert Heffron
Building
Room 111, First Floor
5.00 p.m. to 7.00 p.m.

Optometry Course

The Newton Building
3rd Floor, Room 327
5.00 p.m. to 6.00 p.m.

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.

SCHOLARSHIPS

Students undertaking courses in the Faculty of Science are eligible to apply for the following scholarships. Not all scholarships are offered each year. Towards the end of December prospective applicants should enquire from the Student Employment and Scholarships Unit which scholarships are available.

Except where otherwise specified, applications on the forms obtainable from the Admissions Office ('phone: 663 0351, ext. 2485) must be lodged with the Registrar, the University of New South Wales, P.O. Box 1, Kensington 2033. A separate application must be lodged for each category of scholarship.

Scholarships in Optometry

The Australian Optometrical Association (New South Wales Division) and Gibb & Beeman (Spectacle Makers) Pty. Ltd., offer annually one scholarship each to the value of $500 per annum. These scholarships are available to students who desire to enrol in the full-time degree course in Optometry leading to the degree of Bachelor of Optometry at the University of New South Wales. Applicants must be residents of New South Wales.

The Australian Optometrical Association offers annually a scholarship open to any student enrolling in the first or second year of the full-time degree course in Optometry, and provides him benefits of $250 p.a. if enrolled in Year 1 and $500 p.a. if enrolled in subsequent years. If his home address is more than 50 miles away from the University he receives an additional allowance of up to $150 p.a. and his first class return surface travel ticket to his home each year. The scholarship is open to students whose parents are ordinarily permanent residents of Australia or who are themselves permanent residents of Australia.

Further details are available in the University Calendar.

Applications on the prescribed form available from the Registrar should be lodged with the Registrar by the 14th January each year.

School/Department	Donor/Name of Prize	Value $	Awarded for
General	Sydney Technical College Union Award	50.00	Leadership in the development of student affairs and academic proficiency through-out the course.
	University of New South Wales Alumni Association	Statuette	Achievement for community benefit—students in their final or graduating year.
School of Botany	E. O. Tout Memorial	40.00	Best aggregate any five units offered by School of Botany.
School of Chemistry	Abbott Laboratories Pty. Ltd.	50.00	2.622 Organic Chemistry II.
	Australian Chemical Holdings Ltd.	21.00	2.001 Chemistry I.
	Australian Consolidated Industries Ltd.	30.00	Subject selected by Head of School.
	Borden Chemical Co. (Aust.) Pty. Ltd.	50.00	Subject selected by Head of School.
	Chamber of Manufactures of New South Wales	10.00	Subject selected by Head of School.
	C.S.R. Chemicals Ltd.	100.00	Chemistry Honours.
	Inglis Hudson Bequest	6.00	2.611 Organic Chemistry I.
	Merck, Sharp & Dohme (Aust.) Pty. Ltd.	52.50 52.50	Chemistry—Level 2 Units Science Course. Chemistry—Level 3 Units Science Course.
	The Nestlé Co. (Aust.) Ltd.	20.00	Subject selected by Head of School.

School/Department	Donor/Name of Prize	Value $	Awarded for
School of Chemistry (cont.)	Parke Pope	10.50	Subject selected by Head of School.
	V. S. Rawson	10.50	Subject selected by Head of School.
	Tooheys Ltd.	10.00	Subject selected by Head of School.
	Tooth & Co. Ltd.	10.00	Subject selected by Head of School.
	Univeler Aust. Pty. Ltd.	21.00	2.322 Physical Chemistry II.
	George Wright	10.50	Subject selected by Head of School.
School of Mathematics	School of Mathematics	25.00	Higher Mathematics I.
		25.00	Higher Pure Mathematics II.
		25.00	Higher Applied Mathematics II.
		25.00	Higher Pure Mathematics III.
		25.00	Higher Applied Mathematics III.
	The Broken Hill Proprietary Co. Ltd.	50.00	Higher Theory of Statistics II.
	The W.D. & H.O. Wills (Aust.) Ltd. Prize	50.00	Higher Theory of Statistics III.
	I.C.I. Australia Ltd.	50.00	Theory of Statistics IV.
	Statistical Society of Australia (New South Wales Branch)	20.00	General proficiency—Theory of Statistics subjects.
Department of Optometry	Australian Optometrical Association	30.00	Subject selected by Head of School.
	Chamber of Manufactures of New South Wales	10.00	Subject selected by Head of School.
	Arthur Cocks & Co. Ltd.	10.50	Subject selected by Head of School.

School/Department	Donor/Name of Prize	Value $	Awarded for
Department of Optometry (cont.)	Contavue Laboratories Pty. Ltd.	Trial fitting set of contact lenses	Subject selected by Head of School.
	Filmer Sceats	25.00	31.812 Optometry II.
	International Optical Corporation Ltd.	21.00	Subject selected by Head of School.
		21.00	Subject selected by Head of School.
	L. G. Darcey Memorial	25.00	31.811 Optometry I.
	Martin Wells Pty. Ltd.	30.00	31.821 Special Anatomy and Physiology.
		50.00	31.831 Diseases of the Eye.
		30.00	Final Year Essay.
	G. Nissel & Co. Aust. Pty. Ltd.	Trial fitting set of contact lenses	31.813 Optometry III and 31.841 Clinical Optometry. Contact Lenses sections.
	Optical Products Pty. Ltd.	21.00	Subject selected by Head of School.
	Opticians and Optometrists' Association of N.S.W.	25.00	Subject selected by Head of School.
School of Physics	Head of School's Prize in Physics	20.00	Area selected by Head of School.
	Physics Staff	60.00	Physics III.
	Physics IV Prize	40.00	Physics IV.
	School Prize for Physics II	40.00	Physics II.
School of Psychology	Australian Psychological Society	50.00	A Year IV Psychology subject selected by Head of School.

UNDERGRADUATE COURSES

There are two types of courses available within the Faculties of Science and Biological Sciences. The first is the Science Course, 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.

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 interdisciplinary 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.

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 3(a). 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—

(i) At least 23 Science units shall be included from the list set out in section 3(a) and three General Studies subjects from the list in section 3(b).

(ii) The 23 Science units shall comply with the pre-requisites, co-requisites and exclusion conditions set out in section 3(a) 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.

(iii) One of 10.001 Mathematics I, *OR*
          10.011 Higher Mathematics I, *OR*
          10.021 Mathematics IT

shall be included.

(iv) In addition to the specific prerequisites listed in Clause 3(a), 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.
	17.011 Biology of Mankind and 17.021
School of Botany	Comparative Functional Biology; plus one other subject.
School of Microbiology	*Note:* In making their choice students should consider carefully, in their first year,
School of Zoology	the requirements of level II and level III units.
School of An:.tomy	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.

- (v) Only one from each of the following subjects/ units may be included:
  - (a) 12.001 Psychology or 26.121 Psychology.
  - (b) 52.101 and 52.102 Philosophy or 26.521 Philosophy.
  - (c) Any unit listed in Section 3(a) or the equivalent unit offered at Wollongong University College which contains similar syllabus material.

- (vi) A full-time student is required to complete the appropriate level I Mathematics and six other approved level I units in the first two years of attendance or else show cause to the satisfaction of the Professorial Board why he should be allowed to re-enrol. 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 Clause 3(a).

- (vii) *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 the second year of 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*

(i) In order to qualify for admission to the honours degree of Bachelor of Science a candidate shall:

1. Satisfy the requirements for a pass degree but without proceeding to graduation;

2. Undertake an extra year of full-time or two extra years of part-time study.

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

(iii) A suitably qualified candidate may be admitted to an honours course in one of the following:

Anatomy
Applied Mathematics
Applied Physics
Biochemistry
Biological Technology
Botany
Chemistry
Computer Science
Entomology
Geoscience

History and Philosophy of Science**
Microbiology
Physics
Physiology
Psychology†
Pure Mathematics
Theoretical Mechanics
Theory of Statistics
Zoology

(iv) 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.

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* 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.

** The honours year will be offered in 1976 and subsequent years.

(v) Further to requirements listed in paragraph 2(b) (iv), 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.

(vi) 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 programme 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*

SCHOOL OF PHYSICS

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites‡	Co-requisites‡	Excluded
1.001	Physics I	I	2	Full yr.	6	Sc. Faculty Ent.		
1.011	Higher Physics I	IH	2	Full yr.	6	Sc. Faculty Ent.		
	PHYSICS LEVEL II							
1.112A	Electromagnetism	II	1	Session 2	6	1.001, 10.001	10.211A	1.122A
1.112B	Modern Physics	II	1	Session 1	6	1.001, 10.001	10.211A	1.122B, 1.212C
1.112C	Thermodynamics and Mechanics	II	1	Full yr.	2	1.001, 10.001	10.211A	1.122C
1.212T	Physics IIT (any two of 1.212A, 1.212B, 1.212C)	II	1	Full yr.	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							
1.122A	Electromagnetism	IIH	1	Session 2	6	1.011, 10.001	10.211A	1.112A
1.122B	Quantum Physics	IIH	1	Session 1	6	1.011, 10.001	10.211A	1.112B
1.122C	Thermodynamics and Mechanics	IIH	1	Full yr.	2	1.011, 10.001	10.211A	1.112C

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites‡	Co-requisites‡	Excluded
	PHYSICS LEVEL III							
1.113A	Wave Mechanics and Spectroscopy	III	1	Session 1	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	Session 2	6	1.112A, 10.211A		
1.113C	Statistical Mechanics and Solid State	III	1	Session 1	6	1.112B and 1.112C	1.113A	1.123B and 1.123C
1.113D	Astrophysics and Nuclear Physics	III	1	Session 2	6	1.112B	1.113A§ or 10.222F	1.123C
	HIGHER PHYSICS LEVEL III							
1.123A	Quantum Mechanics	IIIH	1	Session 1	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	Session 1	6	1.122C, 1.122A 10.211A		1.113C, 10.222C
1.123C	Solid State and Nuclear Physics	IIIH	1	Session 2	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	Session 2	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	Hours p w.	Prerequisites‡	Co-requisites‡	Excluded
1.133A	Electronics	III**	1	Session 1	6	1.001 or 1.011		
1.143A	Biophysics	III	1	Session 1	5	1.112C		
1.143B	Solid State Devices and Electronics	III	1	Session 2	6	1.133A		
1.143D	Conceptual Framework of Physics	III	1	Session 2	5	1.112C† 1.112A, 1.112B		
1.143E	Electrical and Optical Properties of Solids	III	1	Session 2	5		1.113C	
1.143F	Marine Acoustic and Seismic Methods (Oceanography Unit)	III	1	Full yr.	3	10.211A or 10.221A or 10.031		
1.153B	Relativity and Electro-magnetism	IIIH	1	Full yr.	4	1.122A and 1.122C 10.211A, 10.111A 10.111B		10.222C

† This unit may be a co-requisite in special cases

‡ Students should note the additional mathematics 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 unit may be taken in second year of the course provided prerequisites have been completed.

§ This co-requisite may be waived under certain circumstances subject to the approval of the School of Physics.

No.	Name	Level	Unit Value	When Offered	Hours p.w	Prerequisites	Co-requisites	Excluded
2.001	Chemistry I	I	2	Full yr.	6			
2.002A	Physical Chemistry	II	1	Full yr. & 1 session*	6	1.001 *or* 1.011 *and* 2.001 *and* 10.001 *or* 10.011 *or* 10.021		
2.042C	Inorganic Chemistry	II	1	Full yr. & 1 session*	6	2.001		
2.002D	Analytical Chemistry	II	1	Full yr. & 1 session*	6	2.001 *and* 10.001 *or* 10.011 *or* 10.021		
2.002B	Organic Chemistry	II	1	Full yr. & 1 session*	6	2.001		
2.003H	Molecular Spectroscopy and Structure	II/III	1	Full yr. & 1 session*	6	2.001		
2.003J	Fundamentals of Biological Chemistry	II/III	1	Full yr. & 1 session*	6	2.001		41.101A
2.013A	Introductory Quantum Chemistry	II/III	1	Full yr. & 1 session*	6	1.001 *or* 1.011 *and* 2.001 *and* 10.001 *or* 10.011 *or* 10.021		
2.003E	Nuclear and Radiation Chemistry	II/III	1	Full yr. & 1 session*	6	2.001 *and* 10.001 *or* 10.011 *or* 10.012		
2.003K	Solid State Chemistry	II/III	1	Full yr. & 1 session*	6	2.001 *and* 10.001 *or* 10.011		
2.003L	Applied Organic Chemistry	III	1	Full yr. & 1 session*	6	2.002B		{2.033L, 2.043L 2.013L

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

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites	Co-requisites	Excluded
2.003A	Physical Chemistry	III	1	Full yr. & 1 session*	6	2.002A		
2.003C	Inorganic Chemistry	III	1	Full yr. & 1 session*	6	2.042C		
2.003D	Instrumental Analysis	III	1	Full yr. & 1 session*	6	2.002D and 2.002A		
2.003B	Organic Chemistry	III	1	Full yr. & 1 session*	6	2.002B		
2.003M	Organometallic Chemistry	III	1	Full yr. & 1 session*	6	2.002B		
2.033A	Physical Chemistry of Macromolecules	III	1	Full yr. & 1 session*	6	2.003J or 2.002B and 1.112C or 2.002A		
2.043A	Environmental Chemistry	III	1	Full yr. & 1 session*	6	2.002A		
2.023A	Chemical Physics	III	1	Full yr. & 1 session*	6	2.002A and 10.211A		
2.013L	Chemistry and Enzymology of Foods	III	1	Full yr. & 1 session*	6	2.002B		{2.003L 2.033L, 2.043L
2.053A	Chemical Kinetics and Reaction Mechanisms	III	1	Full yr. & 1 session*	6	2.003J		
2.013M	Thermochemistry	III	1	Full yr. & 1 session*	6	2.003		
2.023L	Biological and Agri-cultural Chemistry	III	1	Full yr. & 1 session*	6	2.002B		2.053L

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites	Co-requisites	Excluded
2.063A	Advanced Molecular Spectroscopy	III	1	Full yr. & 1 session*	6	2.013A *or* 2.003A (old syll.)		
2.013C	Advanced Inorganic Chemistry	III	1	Full yr. & 1 session*	6	2.042C	2.003C	
2.013D	Advanced Analytical Chemistry	III	1	Full yr. & 1 session*	6	2.002D	2.003D	
2.013B	Synthesis of Complex Organic Molecules	III	1	Full yr. & 1 session*	6	2.002B	2.003B	
2.023B	Natural Product Chemistry	III	1	Full yr. & 1 session*	6	2.002B	2.003B	
2.033L	Applied Organic Chemistry	III	2	Full yr.	12	2.002B		2.003L, 2.053A, 2.013L, 2.043L
2.043L	Chemistry and Enzymology of Foods	III	2	Full yr.	12	2.002B		2.003L, 2.053A, 2.013L, 2.033L
2.053L	Biological and Agricultural Chemistry	III	2	Full yr.	12	2.002B		2.013L 2.023L

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

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites	Co-requisites	Excluded*
				MATHEMATICS				
10.001	Mathematics I	I	2	Full yr.	6			
10.011	Higher Mathematics I	IH	2	Full yr.	6			
10.021	Mathematics IT	IT	2	Full yr.	6			
10.041	Introduction to Applied Mathematics	I	1	Session 2	6		10.001 or 10.011	
10.031‡	Mathematics	II	1	Full yr.	2	10.001 or 10.011 or 10.021 Credit		
10.032§	Mathematics	III	1	Full yr.	2	10.031		
				PURE MATHEMATICS				
	Pure Mathematics Level II							
10.111A	Linear Algebra	II	1	Full yr.	2	10.001 or 10.011		10.121A
10.111B	Analysis	II	1	Full yr.	2	10.001 or 10.011		10.121B
10.111C	Algebra and Geometry	II/III	1	Full yr.	2	10.001 or 10.011	10.111A, 10.111B, 10.211A	10.121C 10.121A
	Higher Pure Mathematics Level II†							
10.121A	Algebra	IIH	1	Full yr.	2½	10.011		10.111A
10.121B	Real and Complex Analysis	IIH	1	Full yr.	2½	10.011		10.111B

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites	Co-requisites	Excluded*
10.121C	Number Theory and Geometry	IIH/IIIH	1	Full yr.	2½	10.011	10.121A, 10.121B, 10.221A or 10.211A	10.111C, 10.112A
	Pure Mathematics Level III***							
10.112A	Number Theory and Algebra	III	1	Full yr.	2	10.111A	10.111C	10.121A, 10.122A
10.112B	Real Analysis	III	1	Full yr.	2	10.111B		10.122B
10.112C	Differential Geometry	III	1	Full yr.	2	10.111A, 10.211A, 10.111B		10.122C
10.112D	Topology and Set Theory	III	1	Full yr.	2	10.001 or 10.011	10.111A, 10.111B, 10.211A	
10.112E	Complex Analysis and Differential Equations	III	1	Full yr.	2	10.111B, 10.211A		10.122E
	Higher Pure Mathematics Level III**							
10.122A	Algebra	IIIH	1	Full yr.	2½	10.121A		10.112A
10.122B	Integration and Functional Analysis	IIIH	1	Full yr.	2½	10.121B		10.112B
10.122C	Topology and Differential Geometry	IIIH	1	Full yr.	2½	10.121A, 10.121B		10.112B, 10.112C
10.122E	Complex Analysis and Differential Equations	IIIH	1	Full yr.	2½	10.121B		10.112E

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 1C.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	Hours p.w.	Prerequisites	Co-requisites	Excluded**
				APPLIED MATHEMATICS				
	Applied Mathematics Level II							
10.211A	Mathematical Methods	II	1	Full yr.	2	10.001		10.221A
10.211B	Analytical Dynamics	II	1	Session 1*	4	10.001, 1.001	10.211A	10.221B
10.211C	Hydrodynamics	II	1	Session 2	4	10.001, 1.001	10.211A, 10.111B	10.221C
	Higher Applied Mathematics Level II							
10.221A	Mathematical Methods	IIH	1	Full yr.	2½	10.011†		10.211A
10.221B	Analytical Dynamics	IIH	1	Session 1	4	10.011†, 1.011†	10.221A *or* 10.211A	10.211B
10.221C	Hydrodynamics	IIH	1	Session 2	4	10.011†, 1.011†	10.221A *or* 10.211A	10.211C

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites	Co-requisites	Excluded**
	Applied Mathematics Level III							
10.212A	Numerical Analysis	III	1	Full yr.	2	10.111A, 10.211A		10.222A
10.212D	Mathematical Methods	III	1	Full yr.	2	10.211A, 10.111A, 10.111B		10.032, 10.222D; 10.222E
10.212L	Optimization Techniques	III	1	Full yr.	2	10.111A, 10.111B, 10.211A		10.222L
	Higher Applied Mathematics Level III							
10.222A	Numerical Analysis	IIIH	1	Full yr.	2	10.221A, 10.121A‡		10.212A
10.222C	Maxwell's Equations and Special Relativity	IIIH	1	Full yr.	2	10.221A, 10.121B‡, 1.001		1.113B 1.123B, 1.153B
10.222D	Mathematical Methods	IIIH	1	Full yr.	2	10.221A, 10.121A 10.121B‡		10.212D
10.222F	Quantum Mechanics	IIIH	1	Full yr.	2	10.221A, 10.121A, 10.121B‡	10.222D	1.113A, 1.123A
10.222L	Optimization Techniques	IIIH	1	Full yr.	2	10.221A, 10.121A, 10.121B‡		10.212L

* The evening course for 10.211B 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.

No.	Name	Level	Unit Value	When Offered	Hours p.w.	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	Session 1	7	10.001 *or* 10.011; *or* 10.021 Cr		10.321A 10.331
10.311B	Statistical Inference	II/III	1½	Session 2	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	Session 1	8	10.001 *or* 10.011		10.311A 10.331
10.321B	Statistical Inference	IIH/ IIIH	1½	Session 2	8	10.001 *or* 10.011; 10.321A		10.311B 10.331
10.331	**Statistics SS**	II	1	Full yr.	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	Stochastic Processes and Applications	III	1	Half yr.	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	Half yr.	4	10.311B *or* 10.321B *or* 10.331 (nor. Cr)	10.211A *or* 10.221A	10.322B

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites (all units except as governed by *or*)	Co-requisites	Excluded*
	STATISTICS (Continued)							
10.312C	Experimental Design (Theory) and Project	III	1	Half yr.	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 and Contingency Tables	III	1	Half yr.	4	10.311A *or* 10.321A; 10.111A *or* 10.121A; 10.111B *or* 10.121B; 10.211A *or* 10.221A		10.322D
	Higher Theory of Statistics Level III							
10.322A	Stochastic Processes and Applications	IIIH	1	Half yr.	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	Half yr.	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) and Project	IIIH	1	Half yr.	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 and Contingency Tables	IIIH	1	Half yr.	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, Applied Mathematics or Theoretical Mechanics units.

THEORETICAL AND APPLIED MECHANICS

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites	Co-requisites	Excluded*
	Theoretical Mechanics Level III							
10.412A	Dynamical and Physical Oceanography	III	1	Full yr.	2	1.001 *or* 1.011, 10.211A *or* 10.221A *or* 10.031§		
10.412B	Continuum Mechanics	III	1	Full yr.	2	10.111A, 10.111B & 10.211A, B, C		10.422B
	Higher Theoretical Mechanics Level III							
10.422A	Fluid Dynamics	IIIH	1	Session 2	4	10.211A, 10.221C, 10.111B	#	
10.422B	Mechanics of Solids	IIIH	1	Session 1	4	10.111A, 10.111B, 10.221A. 10.221B & 10.221C		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.
# It is recommended that 10.422B be taken concurrently.

SCHOOL OF APPLIED PHYSICS AND OPTOMETRY

No.	Name	Level	Unit Value	When Offered	Hours p w.	Prerequisites	Co-requisites	Excluded
31.182	Optics and Optical Instruments	II	1	Full yr.	3	1.001 *or* 1.011		1.212
31.113A	Physics of Materials	III	1	Session 1	6	1.112B *or* 1.122B *and* 2.001 *or* 2.011		
31.113B	Physics of Measurement	III	1	Full yr.	3	1.112B *or* 1.122B		
31.113C	Applications of Radiation	III	1	Session 2 *and* Full yr.	6 3	1.112B *or* 1.122B		

FACULTY OF BIOLOGICAL SCIENCES
SCHOOL OF PSYCHOLOGY

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites	Co-requisites	Exclusions
12.001	Psychology I	I	2	Full yr.	5	Science Faculty entrance		
12.052	Basic Psychological Processes II	II	1	Session 1	4	12.001	12.152	
12.062	Complex Psychological Processes II	II	1	Session 2	4	12.001	12.152	
12.152	Research Methods II	II	1	Full yr.	3	12.001	12.052 and/or 12.062	
12.153	Research Methods IIIA	III	1	Session 1	4			
12.163	Research Methods IIIB	III	1	Session 2	4	+12.153		
12.253	Learning IIIA	III	1	Session 1	4			
12.263	Learning IIIB	III	1	Session 2	4	+12.253		
12.303	Personality IIIA	III	1	Session 2	4	12.052, 12.062 and 12.152 are prerequisites for any Level III unit		
12.313	Personality IIIB (Interpersonal Relations)	III	1	Session 1	4			12.623
12.323	Motivation IIIA	III	1	Session 1	4			
12.373	Psychological Assessment IIIA (Testing)	III	1	Session 1	4			12.042 (Psych BSc)
12.413	Physiological Psychology IIIA	III	1	Session 1	4			12.402 (Psych BSc)
12.423	Physiological Psychology IIIB	III	1	Session 2	4	+12.413		12.402 (Psych BSc)
12.453	Human Information Processing IIIA	III	1	Session 2	4			
12.473	Perception IIIA	III	1	Session 1	4			

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites	Co-requisites	Exclusions
12.483	Perception IIIB	III	1	Session 2	4	+12.473		
12.503	Social Psychology IIIA	III	1	Each Sess.	4			
12.513	Social Psychology IIIB*	III	1	Session 2	4	+*, 12.503		
12.553	Developmental Psychology IIIA	III	1	Each Sess.	4			
12.603	Abnormal Psychology IIIA	III	1	Session 1	4			
12.613	Abnormal Psychology IIIB*	III	1	Session 2	4	+*, 12.603		
12.623	Guidance and Counselling III*	III	1	Session 2	4	+*		12.313
12.653	Industrial Psychology III*	III	1	Session 1	4	+*, 12.503 (may be Co-requisite)		
12.663	Ergonomics III*	III	1	Session 2	4	+*		
12.703	Psychological Techniques III*	III	1	Session 2	4	+*, 12.373		
12.713	Behavioural Control and Modification III	III	1	Session 2	4			
12.733	Laboratory Instrumentation III*	III	1	Session 2	4	+*		12.042 (Psych BSc)

(rotated text in Prerequisites column) 12.052, 12.062 and 12.152 are prerequisites for any Level III unit

* 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.

Note: (1) A major in Psychology is minimally satisfied by the completion of 9 units value of Psychology units which have included 12.001, three level II units 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	Hours p.w.	Prerequisites	Co-requisites	Excluded
17.011	Biology of Mankind	I	1	Session 1	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	Session 2	6	Sc. Faculty Entrance	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	III*	1	Session 1	6	17.001 or 17.011 and 17.021		

* This unit may be taken in *either* second *or* third year of the Science Course provided that prerequisites have been completed.

SCHOOL OF BIOCHEMISTRY

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites**	Co-requisites	Excluded
41.101A	Chemistry of Biologically Important Molecules	II	1	Session 1	6	For any level II unit: 17.001† or 17.011† and 17.021† and 2.001†	41.101B*	2.003J
41.101B	Metabolism	II	1	Session 1	6		41.101A	

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites	Co-requisites
41.101C	Control Mechanisms	II	1	Session 2	6	both 41.101A and 41.101B	
41.102A	Biochemistry of Macromolecules and Cell Biochemistry	III	2	Session 1	12	For any level III unit: 41.101A, 41.101B and 41.101C and two level II Chemistry units, including 2.002B and preferably 2.002A as the second Chemistry unit.	
41.102B	Metabolic Pathways and Control Mechanisms	III	2	Session 2	12		

‡ Third level 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	Hours p.w.	Prerequisites*
42.102	Fermentation Technology	III	1	Session 2	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	Hours p.w.	Prerequisites
17.012	General Ecology II					See under **GENERAL BIOLOGY**
43.101	Genetics	II	1	Session 2	6	⎰ 17.001
43.111	Plant Evolution and Ecology	II	1	Session 1	6	⎱ *or* 17.011 and 17.021
43.121	Plant Physiology	II	1	Session 2	6	17.001 *or* 17.011 and 17.021 2.001 *or* 1.001**
43.102	Advanced Genetics	III*	1	Session 2	6	43.101
43.112	Plant Taxonomy	III*	1	Session 2	6	43.111; 43.101 pre- or co-requisite
43.122	Advanced Plant Physiology	III*	1	Session 1	6	41.101A; 41.101B; 43.121
43.132	Mycology	III*	1	Session 2	6	17.001 *or* 17.011 & 17.021
43.142	Environmental Botany	III*	1	Session 1	6	17.001 *or* 17.011 & 17.021; 1.001**
43.152	Plant Pathology	III*	1	Session 2	6	17.001 *or* 17.011 & 17.021

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.

† Third level 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.

* 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.

SCHOOL OF MICROBIOLOGY†

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites*
44.101	Introductory Microbiology	II	1	Session 2	6	17.001 *or* 17.011 & 17.021
44.111	Microbiology**	II	1	Full yr.	3	
44.102	General Microbiology	III	2	Session 1	12	44.101, 41.101A and 41.101B
44.112	Applied Microbiology	III	2	Session 2	12	44.102
44.122	Immunology	III	1	Session 2	6	17.001 *or* 17.011 and 17.021; 41.101A, 41.101B
44.132	Virology	III	1	Session 2	6	44.102

† All level 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	Hours p.w.	Prerequisites	Co-requisites
45.101	Biometry	II	1	Session 1	6	17.011 *and* 17.021	
45.201	Invertebrate Zoology	II	1	Session 2	6	17.011 *and* 17.021	
45.301	Vertebrate Zoology	II	1	Session 1 or 2	6	17.011 *and* 17.021	
45.111**	Field Ecology	II	1	Session 2	6*	45.101	45.201 *or* 45.301

SCHOOL OF ZOOLOGY† (Continued)

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites	Co-requisites	Excluded
45.112	Marine Ecology	III	1	Session 1	6	17.011 and 17.021 plus 45.201 *or* 25.112A *and* 25.112B		
45.122	Animal Behaviour	III	1	Session 2	6	45.101, 45.201, 45.301		
45.132	Comparative and Environmental Physiology	III	1	Session 2	6	41.101A & B; 45.301	45.101C	
45.142	Developmental and Reproductive Biology	III	1	Session 1	6	45.201, 45.301		
45.202	Advanced Invertebrate Zoology	III	1	Session 1	6	45.201		
45.302	Vertebrate Zoogeography	III	1	Session 2	6	45.301		
45.402	Insect Structure and Classification	III	1	Session 1	6	45.101, 45.201		
45.412	Insect Physiology	III	1	Session 1	6	45.402		
45.422	Applied Entomology	III	1	Session 2	6	45.412		
45.432	Project	III	1	Session 2	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 Geoscience.

* This unit includes a two-week camp in November/December.

† Third level 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.

** Not available in 1975.

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites	Co-requisites	Excluded
25.111*	Geoscience I	I	2	Full yr.	6	Sc. Faculty Ent.	2.001	25.151
25.151	Geoscience IA	I	2	Full yr.	6	Sc. Faculty Ent.	2.001	25.111
25.112A**	Geoscience IIA	II	2	Full yr.	6	25.111 2.001		
25.112B**	Geoscience IIB	II	1	Full yr.	3	25.111 2.001		
25.113A	Geoscience IIIA	III	2	Full yr.	6	25.112A and 25.112B		
25.113B***	Geoscience IIIB	III	2	Full yr.	6	25.112A and 25.112B		
25.603A†	Geological Oceanography	III	1	Full yr.	3	25.111 and 25.112B		

* Three field tutorials, up to five days in all, are an essential part of the course. Attendance is compulsory.
** Field work: approximately seven days will be spent on field tutorials throughout the year. Attendance is compulsory.
*** Field work is an essential part of the course and consists of approximately ten days of field tutorials. Attendance is compulsory.
† Compulsory field work to be arranged.

SCHOOL OF GEOGRAPHY

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites
27.801*	Introduction to Physical Geography	I	1	Session 1	4½	Sc. Faculty Ent.
27.802*	Introduction to Human Geography	I	1	Session 2	4½	Sc. Faculty Ent.
27.103*	Climatology	II	1	Session 1	5½	1.001 *and* 27.801 *and* 27.802
27.203*	Biogeography	II	1	Session 2	5½	27.801 *and* 27.802
27.413*	Geomorphology	II	1	Session 1	5½	27.801 *and* 27.802 *or* 25.111 *or* 25.151
27.423*	Pedology	II	1	Session 2	5½	2.001 *and* 27.801 *and* 27.802 *or* 25.111 *or* 25.151

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

SCHOOL OF PHILOSOPHY

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites	Co-requisites
52.101	Introductory Philosophy A	I	1	Session 1	4	Sc. Faculty Ent.	
52.102	Introductory Philosophy B	I	1	Session 2	4	Sc. Faculty Ent.	52.101*
52.153	Predicate Logic	II	½	Session 1	2	52.102	
52.163	Descartes	II	½	Session 1	2	52.102	
52.173	British Empiricism	II	½	Session 1	2	52.102	
52.183	Greek Philosophy: Thales to Plato	II	½	Session 1	2	52.101 and 52.102	
52.193	Scientific Method	II	½	Session 1	2	52.102	
52.203	Introduction to Political Philosophy	II	½	Session 1	2	52.102*	
52.213	Sartre	II	½	Session 1	2	52.163	
52.223	Foundations of Mathematics	II	½	Session 2	2	52.153	
52.233	Argument	II	½	Session 2	2	52.102	
52.243	Logical Atomism	II	½	Session 2	2	52.102	
52.253	Philosophy of Biology	II	½	Session 2	2	52.101 and 52.102	
52.263	Philosophy of Psychology	II	½	Session 2	2	52.193	
52.273	Aesthetics	II	½	Session 2	2	52.102	
52.283	Oppression and Liberation	II	½	Session 2	2	52.102	
52.293	Plato	II	½	Session 2	2	52.183	

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites	Co-requisites
52.303	Spinoza and Leibniz	II	½	Session 2	2	52.163	
52.313	Ethics of Politics	II	½	Session 2	2	52.203*	
52.323	Set Theory	II	½	Session 1	2	52.153	
52.333	Philosophy of Perception	II	½	Session 1	2	52.163 or 52.173	
52.343	Privacy and Other Minds	II	½	Session 2	2	52.163 and 52.173 or 52.243	
52.353	History of Modern Logic	II	½	Session 1	2	52.153	
52.363	Wittgenstein	II	½	Session 1	2	52.243	
52.373	Philosophical Foundations of Marx's Thought	II	½	Session 2	2	52.203*	
52.383	Twentieth Century Marxist Philosophy	II	½	Session 2	2	52.203*	
52.393	History of Traditional Logic	II	½	Session 2	2	52.353	
52.403	Model Theory	II	½	Session 2	2	52.323	
52.413	Reading Option	II	½	Either Sess.		Satisfactory performance in Upper Level units	
52.423	Seminar A	II	½	Session 2	2	Upper Level units (Cr)	
52.433	Seminar B	II	½	Session 1	2	Upper or Advanced Level units (Cr)	

* In exceptional circumstances a student may apply to the School for variation of the prerequisite or co-requisite.

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites	Co-requisites
62.012	The Origins of Modern Science	II	1	Session 1	6	A pass in *two* of: 1.001, 17.011 and 17.021, 2,001, 10.001, 25.111 *or* 25.151, 1.011, 10.011, 10.021, 27,801 and 27.802, 12.001	
62.022	The Social History of Nineteenth and Twentieth Century Science	II	1	Session 2	6	A pass in *two* of: 1.001, 17.011 and 17.021, 2,001, 10.001, 25.111 *or* 25.151, 1.011, 10.011, 10.021, 27.801 and 27.802, 12.001	
62.032	The Scientific Theory	II	1	Session 2	6		
62.013	History of the Philosophy of Science	III	1	Full yr.	3	62.012 *or* 62.032	
62.023*	The Scientific Community	III	1				
62.033	The Development of Theories of Matter	III	1	Session 1	6	62.012 *or* 62.032	
62.043	The Historical Foundations of Experimental Biology	III	1	Session 1	6	62.012 *or* 62.032	
62.053	The History of Theories of Generation and Heredity	III	1	Session 2	6	62.012 *or* 62.032	
62.063	History and Philosophy of Cosmology	III	1	Session 2	6	62.012 *or* 62.032	
62.073	Predicate Logic and the Foundations of Mathematics	III	1	Full yr.	3	Permission of head of School or H.P.S.	

* Not available in 1975.

FACULTY OF ENGINEERING

SCHOOL OF MECHANICAL AND INDUSTRIAL ENGINEERING

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites	Co-requisites
5.010	Engineering A	I	1	Session 1 or 2	6	Sc. Faculty Entrance	
5.020	Engineering B	I	1	Session 1 or 2	6		5.010
5.030	Engineering C	I	1	Session 1 or 2	6		

SCHOOL OF ELECTRICAL ENGINEERING

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites	Co-requisites
6.601A	Introduction to Computer Science	II	1	Session 1	5	10.001	
6.601A*	Introduction to Computer Science	II	1	Full yr.	$2\frac{1}{2}$	10.001	
6.601B	Assembler Programming & Non-numeric Computing	II	1	Session 2	5	10.001	6.601A
6.601B	Assembler Programming and Non-numeric Computing	II	1	Full yr.	$2\frac{1}{2}$	10.001	6.601A
6.602A	Computer Systems I	III	1	Session 1	5	6.601B	
6.602B	Computer Systems II	III	1	Session 2	5		6.602A
6.602C	Computer Applications	III	1	Session 1	5	6.601A	
6.602D	Programming Languages	III	1	Session 2	5	6.601A	

* Offered only in the evening.

FACULTY OF MEDICINE
SCHOOL OF ANATOMY

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites	Co-requisites
70.011A	Mammalian Histology	II	1	Session 1	6	17.011 and 17.021	
70.011B	Mammalian Embryology	II	1	Session 2	6	17.011 and 17.021	
70.011C	Systematic Anatomy I	II	1	Session 1	6	17.001, 70.011A*	
70.012A	Systematic Anatomy II	III	1	Session 1	6	70.011A, 70.011C	
70.012B	Systematic Anatomy III	III	1	Session 1	6	70.011A, 70.011C	
70.012C	Systematic Anatomy IV	III	1	Session 2	6	70.011A, 70.011C	
70.012D	Comparative Histology	III	1	Session 1	6	70.011A	

* In some circumstances this subject may be taken as a co-requisite rather than a prerequisite.

SCHOOL OF COMMUNITY MEDICINE

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites	Co-requisites
78.201	Population Genetics Theory	III	1	Session 2	5	45.101 or 10.311A and 10.311B or 10.321A and 10.321B or 10.331	

SCHOOL OF PHYSIOLOGY AND PHARMACOLOGY

No.	Name	Level	Unit Value	When Offered	Hours p.w.	Prerequisites	Co-requisites
73.011A	Principles of Physiology	II	2	Full yr.	6	2.001 10.001 or 10.011 or 10.021 17.011 and 17.021	
73.012	Physiology II	III	4	Full yr.	13	73.011A; 41.101 (A + 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.

(b) *General Studies*

Almost all undergraduates in Faculties other than Arts and Law are required to complete a General Studies programme. Courses (in addition to the Faculties of Arts and Law) which do not have this requirement are Bachelor of Science in Psychology, Bachelor of Science in Economic Geography, Bachelor of Science (Education) and Bachelor of Health Administration. The Department of General Studies publishes its own Handbook which is available free of charge. All details regarding General Studies courses and requirements are contained in it, and students are advised to obtain a copy. All enquiries about General Studies should be made to the General Studies Office, Room G15, Morven Brown Building (663-0351 Extn. 2091).

Students shall select *three* general studies subjects (see General Studies handbook *and* School of History and Philosophy of Science in Subject Information and Textbook Lists section in this handbook); in addition, honours students shall be required to complete an Advanced General Studies Elective.

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 patterns 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 or six 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, an advanced 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 accordance with these regulations save that Clause 2a(vi) is modified so that he must complete level I Mathematics and

6 other level I units in the first four years of enrolment or else show cause to the satisfaction of the Professorial Board why he should be allowed to re-enrol.

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 least 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 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.

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*In Rule 1, the word "undergraduates" includes graduands, i.e., 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.

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 programme 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, 2.042C, 2.002D, 2.002B, 2,003H,
   2.013A*, 2.003C, 2.003D, 2.003B (or equivalent whole
                                                year units)

   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.

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*2.003A (old syllabus) in 1975.

Electives offered by the School of Chemistry

Level	No.	Title	Prerequisites	Co-requisites	Excluded
II/III	2.003H	Molecular Spectroscopy and Structure	2.001		
II/III	2.003J	Fundamentals of Biological Chemistry	2.001		41.101A
II/III	2.013A	Introductory Quantum Chemistry	1.001 or 1.011 *and* 2.001 *and* 10.001 or 10.011 or 10.021		
II/III	2.003E	Nuclear and Radiation Chemistry	2.001 *and* 10.001 or 10.011 or 10.012		
II/III	2.003K	Solid State Chemistry	2.001 *and* 10.001 or 10.011		
III	2.003L	Applied Organic Chemistry	2.002B		{ 2.033L, 2.043L 2.013L
III	2.003A	Physical Chemistry	2.002A		
III	2.003C	Inorganic Chemistry	2.042C		
III	2.003D	Instrumental Analysis	2.002D *and* 2.002A		
III	2.003B	Organic Chemistry	2.002B		
III	2.003M	Organometallic Chemistry	2.002B		
III	2.033A	Physical Chemistry of Macromolecules	2.003J *or* 2.002B *and* 1.112C *or* 2.002A		
III	2.043A	Environmental Chemistry	2.002A		
III	2.023A	Chemical Physics	2.002A *and* 10.211A		

Level	No.	Title	Prerequisites	Co-requisites	Excluded
III	2.013L	Chemistry and Enzymology of Foods	2.002B		{ 2.003L, 2.033L 2.043L
III	2.053A	Chemical Kinetics and Reaction Mechanisms	2.002A		
III	2.013M	Thermochemistry	2.002A		
III	2.023L	Biological and Agricultural Chemistry	2.002B		2.053L
III	2.063A	Advanced Molecular Spectroscopy	2.013A *or* 2.003A (old syll.)		
III	2.013C	Advanced Inorganic Chemistry	2.042C	2.003C	
III	2.013D	Advanced Analytical Chemistry	2.002D	2.003D	
III	2.013B	Synthesis of Complex Organic Molecules	2.002B	2.003B	
III	2.023B	Natural Product Chemistry	2.002B	2.003B	
III	2.033L	Applied Organic Chemistry (double unit)	2.002B		{ 2.003L, 2.013L 2.043L
III	2.043L	Chemistry and Enzymology of Foods (double unit)	2.002B		{ 2.003L, 2.013L 2.033L
III	2.053L	Biological and Agricultural Chemistry (double unit)	2.002B		2.023L

391. PURE AND APPLIED CHEMISTRY
FULL-TIME COURSE

Bachelor of Science

			Hours per week for 2 sessions		
			Lec.	Lab. Tut.	Total
YEAR 1					
1.011	Higher Physics I *or*		3	3	
1.001	Physics I				
2.001	Chemistry I		2	4	
10.011	Higher Mathematics I *or*		4	2	
10.001	Mathematics I *or*				
10.021	Mathematics IT				
Plus one of					
5.010	Engineering A *and*		3	3	
5.020	Engineering B *or*				
5.030	Engineering C				
	or				
17.011	Biology of Mankind *and*		2	4	
17.021	Comparative Functional Biology				
	or				
25.111	Geoscience I*		2	4	
	or				
25.151	Geoscience IA		2	4	
	or				
27.801	Introduction to Physical Geography *and*		2	4	
27.802	Introduction to Human Geography				
YEAR 2					
2.002A	Physical Chemistry		1½	1½	3
2.042C	Inorganic Chemistry		1	2	3
2.002D	Analytical Chemistry		1	2	3
2.002B	Organic Chemistry		1½	1½	3
2.003H	Molecular Spectroscopy and Structure		3		3
	Science Electives** (3 units)				9
	General Studies Elective				1½
					25½

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* 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 ⎫	
17.021	Comparative Functional Biology ⎬	6
41.101A	Chemistry of Biologically Important Molecules	6*
41.101B	Metabolism	6*
41.101C	Biochemical Control	6*
44.101	Introductory Microbiology	3
73.011A	Principles of Physiology	6

* One session only.

GEOLOGY

25.111	Geoscience I	6
25.112A	Geoscience IIA	6
25.112B	Geoscience IIB	3

		Hours per week for 2 sessions		
			Lab.	
YEAR 3		Lec.	Tut.	Total
2.003A	Physical Chemistry†	1½	1½	3
2.003C	Inorganic Chemistry	1	2	3
2.003D	Analytical Chemistry	1	2	3
2.003B	Organic Chemistry	1	2	3
	Advanced Electives* (4 units)			12
	Two General Studies Electives			3
				27

* 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.

† Old syllabus.

YEAR 4 — HONOURS

As prescribed by the School.

Part-time Course

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

391. PURE AND APPLIED CHEMISTRY
PART-TIME COURSE

Bachelor of Science

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 for 2 sessions	
		Lec.	Lab. Tut.
1.011	Higher Physics I *or*	3	3
1.001	Physics I		
2.001	Chemistry I	2	4
10.001	Mathematics I *or*	4	2
10.021	Mathematics IT		
Plus one of			
5.010	Engineering A *and*	3	3
5.020	Engineering B *or*		
5.030	Engineering C		
	or		
17.011	Biology of Mankind *and*	2	4
17.021	Comparative Functional Biology		
	or		
25.111	Geoscience I*	2	4
	or		
25.151	Geoscience IA	2	4
	or		
27.801	Introduction to Physical Geography** *and*	2	4
27.802	Introduction to Human Geography**		

* 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.

		Hours per week for 2 sessions		
		Lec.	Lab. Tut.	Total
STAGE 3				
2.002A	Physical Chemistry	1½	1½	3
2.042C	Inorganic Chemistry	1	2	3
	Science Electives* (two units)			6
				12

STAGE 4				
2.002D	Analytical Chemistry	1	2	3
2.002B	Organic Chemistry	1½	1½	3
2.003H	Molecular Spectroscopy and Structure	3		3
	Science Elective* (one unit)			3
	General Studies Elective			1½

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

STAGE 5				
2.003A	Physical Chemistry	1½	1½	3
2.003C	Inorganic Chemistry	1	2	3
2.003D	Analytical Chemistry	1	2	3
2.003B	Organic Chemistry	1	2	3
	General Studies Elective			1½
				13½

STAGE 6				
	Advanced Electives* (4 units)			12
	General Studies Elective			1½
				13½

* 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 honours 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.

395. OPTOMETRY—FULL-TIME COURSE
Bachelor of Optometry

		Hours per week for 2 sessions	
		Lec.	Lab. Tut.
YEAR 1			
1.001	Physics I	3	3
2.001	Chemistry I	2	4
10.001 10.011 10.021	Mathematics I *or* Higher Mathematics I *or* } .... Mathematics IT	4	2
17.011 17.021	Biology of Mankind } .... General Functional Biology	2	4
		11	13
YEAR 2			
31.811	Optometry I	4	4
31.821	Special Anatomy and Physiology	3	3
73.011A	Principles of Physiology	3	3
	General Studies Elective	1	½
		11	10½
YEAR 3			
12.001	Psychology I	3	2
31.812	Optometry II	8	7
31.831	Diseases of the Eye	2	1
	Two General Studies Electives	2	1
		15	11

Hours per week for 2 sessions

YEAR 4		Lec.	Lab. Tut.
12.741	Psychology	2	0
31.813	Optometry III	6	0
31.841	Clinical Optometry*	1	14
74.001	Indication for Medical Referralt	1	0
	Advanced General Studies Elective	1	½
		11	14½

* Lectures cease after first 9 weeks.
† Lectures commence after first 9 weeks.

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, i.e., 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.

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, industrial, human factors, and educational. In addition, the student must complete a research thesis or project.

Details of qualifications 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, followed by some recommended course patterns.

RULES GOVERNING THE PSYCHOLOGY BSc COURSE

I. 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 I.

II. (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:—

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* 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.

1. *Each of:*—
   12.001 Psychology I
   12.042 Psychology IIA
   <div align="center">*and*</div>
   A total value of 11 units of Psychology (Level II and III)

   (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).
   <div align="center">*and*</div>
   12.004 Psychology IV.

2. *Five other subjects* (or their equivalent in units) selected to meet the following requirements:

   (a) that they shall include *at least* one of:
      (i) 10.011 Higher Mathematics I, *or*
          10.001 Mathematics I, *or*
          10.021 Mathematics IT
          <div align="center">*or*</div>
      (ii) 17.011 Biology of Mankind, *and*
           17.021 Comparative Functional Biology.
      [They may include both (i) and (ii).]

   (b) that they shall include *at least* one of:
      53.101 Sociology IA and 53.102 Sociology IB
      15.001 Economics IA and 15.011 Economics IB
      54.501 Political Science I
      52.101 Introductory Philosophy A and 52.102 Introductory Philosophy B

      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:

(i) 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;

(ii) 17.001 General and Human Biology (or both of 17.011 Biology of Mankind and 17.021 Comparative Functional Biology) followed by 12.402 Physiological Psychology, or by the equivalent of one subject chosen from the following units according to the regulations of the Faculty of Biological Sciences:

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 Mechanisms

43.101 Genetics

45.101 Biometry

45.301 Vertebrate Zoology

73.011A Principles of Physiology I (equivalent to 2 units)

(iii) Sociology I, followed by two Upper Level Sociology 2 units

Economics I, followed by two Upper Level Economics II units

Political Science I, followed by two units value of Political Science II Upper Level units

Philosophy I, followed by two units value of Philosophy II 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.

III. *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.

IV. 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:

(a) a solid core of psychology to equip the psychologist-in-training with psychological theory, skill in experimentation and psychological techniques by way of the equivalent of 6 compulsory psychology subjects [although the student may choose from a number of level II, III and IV units];

(b) some supporting studies in mathematics and/or biology, of which a minimum of one course is compulsory;

(c) some supporting studies in the social sciences, of which a minimum of one course is compulsory; and

(d) the special needs, interests and academic or vocational background of the individual student to be considered 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 this reason, 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 full-time 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	3 Psychology units value 12.042	8 Psychology units value	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	10.112A unit 10.112B unit 10.112E unit 10.111C unit	
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*	

		Year I	Year II	Year III	Year IV
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*	
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*		

	Year I	Year II	Year III	Year IV
(3 Yrs.)	A Social Science Subject (A) I*	Social Science Subject (A) II*	Social Science Subject (A) III*	
	10.011 or 10.001 or 10.021 or 17.011 and 17.021			
	Any approved level I Subject*			
General	Social Science Subject (A) I*		Social Science Subject (A) II*	
	17.011 and 17.021	12.402	or	
	10.001 or 10.021		Social Science Subject B (I)*	
			or	
			Any approved level I or II Subject*	

* or equivalent units.

SCHEDULE: MAIN PSYCHOLOGY BSc COURSE SUBJECTS

	No.	Subject or Unit	Level	Hours p.w.	When Offered	Prerequisites	Co-requisites
	12.001	Psychology I	I	5	Full yr.		
	12.042	Psychology IIA*	II	6	Full yr.	12.001	12.012
PSYCHOLOGY	12.004	Psychology IV	IV	15	Full yr.	All other Course requirements	
	12.402	Physiological Psychology 11 Psychology units**	II & III	4	Full yr.	12.001, 17.001 *or* 17.011 *and* 17.021	
	10.001	Mathematics I	I	6	Full yr.		
	10.011	Higher Mathematics I	I	6	Full yr.		
MATHEMATICS §	10.021	Mathematics IT	I	6	Full yr.		
	10.111A 10.111B 10.211A } Mathematics II		II	6	Full yr.	10.001 *or* 10.011	
	10.311A 10.311B } Theory of Statistics II		II	7	Full yr.	10.001 *or* 10.011 *or* 10.021 Cr.	
	10.321A 10.321B } Higher Theory of Statistics II		II	8	Full yr.	10.001 *or* 10.011	
HUMAN BIOLOGY	17.011	Biology of Mankind	I	6	Session 1		
	17.021	Comparative Functional Biology	I	6	Session 2		
BIOCHEMISTRY UNITS §	41.101A	Chemistry of Biologically Important Molecules	II	6	Session 1	17.001 *or* 17.011 *and* 17.021	41.101B
	41.101B	Metabolism	II	6	Session 1	2.001	41.101A
	41.101C	Control Mechanisms	II	6	Session 2	10.001 *or* 10.011 *or* 10.021	41.101A 41.101B

	No.	Subject or Unit	Level	Hours p.w.	When Offered	Prerequisites	Co-requisites
ZOOLOGY UNITS §	43.101	Genetics	II	6	Session 2	17.001 *or* 17.011 *and* 17.012	
	45.101	Biometry	II	6	Session 1	2.001	
	45.301	Vertebrate Zoology	II	6	Session 1 or 2	10.001 *or* 10.011 *or* 10.021	
PHYSIOLOGY UNITS §	73.011A	Principles of Physiology (Equiv. Unit Value = 2)	II	6	Full yr.	17.001 *or* 17.011 *and* 17.012 2.001 10.001 *or* 10.011 *or* 10.021	
ECONOMICS†	2 units 2 units	Economics I Economics II	I Upper	4 4	Full yr. Full yr.	2 units Economics I	
PHILOSOPHY†	2 units 2 units	Philosophy I Philosophy II	I Upper	4 4	Full yr. Full yr.	2 units Philosophy I	
SOCIOLOGY†	2 units 2 units	Sociology I Sociology II	I Upper	3 5	Full yr. Full yr.	2 units Sociology I	
POLITICAL SCIENCE†	2 units 2 units	Political Science I Political Science II	I Upper	3½ 3-4	Full yr. Full yr.	2 units Political Science I	

* Day-time attendance for tutorials and practical work, including visits to institutions, etc., is required.

** For details of level II and level III Science units, including pre- and co-requisites, refer to Science Course details.

§ 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.

POSTGRADUATE COURSES

On completion of a first degree course (BSc) the student may wish to proceed to a higher qualification. This may be to a research oriented higher degree of two or three years' duration or a higher degree or graduate diploma awarded after the completion of course work oriented study. A limited number of Scholarships are available at this and other Universities, and these are competitive.

The regulations governing higher degrees are to be found in the University Calendar. A candidate thinking of undertaking such a course should first discuss the matter with the Head of the School in which he wishes to study.

A multidiscipline graduate diploma in Current Science is offered to graduates and professional workers in science and science-based disciplines. This course is 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. It is intended to broaden rather than deepen and specialize the student's knowledge, and the course is one which is equally appropriate for students who have gained a BSc degree at pass level, an MSc or a PhD degree.

A course in Food and Drug Analysis is offered by the School of Chemistry on a part-time basis over two years and leads to a diploma (DipFDA). The course is designed to provide systematic training at an advanced level for chemists who wish to extend their acquaintance with analytical techniques, and is thus suitable for those who wish to practise as public analysts. The School also offers a formal graduate course for the degree of Master of Chemistry (MChem) in Analytical Chemistry, on a full-time basis for one year. The programme may also be extended in the future to part-time students. For full details see Calendar.

The School of Psychology offers a postgraduate formal course leading to the award of Master of Psychology (MPsychol). It is available to selected graduates with Honours in Psychology and

provides professional training in either Experimental Clinical Psychology or Psychodynamic Clinical Psychology.

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 postgraduate diploma (DipBiochemEng). The course may be completed in one year of full-time study or part-time over two years and is intended for graduates in chemical engineering, chemistry, biological sciences and agriculture.

The School also offers advanced treatments of important areas of Biotechnology in a postgraduate formal course leading to the award of Master of Science (Biotechnology) (MSc(Biotech)). It may be undertaken by graduates with honours in Biotechnology or those who have completed the preliminary or qualifying programmes available in the School. The course is of one year's duration full time but may be completed over a longer period by part-time study.

The School of Mathematics offers a postgraduate course which covers a wide range of statistical theory and practice. It leads to the award of the degree of Master of Statistics (MStats), 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 School of Physics offers a postgraduate course, with an emphasis on Solid State Physics, which leads to the award of MPhysics. The course may be completed in one year of full-time study or two years of part-time study.

A formal graduate course for the degree of Master of Optometry (MOptom) is given by the School of Applied Physics and Optometry. For details see page 126.

HIGHER DEGREE QUALIFYING PROGRAMME

Students without a BSc Honours degree wishing to register as higher degree candidates must usually complete a qualifying programme, 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 programme. The duration of the qualifying programme is a minimum of one year for full-time and two years for part-time or external students.

Content of Qualifying Programme

The qualifying programme consists of the whole of the usual programme for the final Honours year of the undergraduate course, the following being the prescribed Level IV subjects:

        41.103 Biochemistry Honours
        42.103 Biological Technology Honours
        43.103 Botany Honours
        44.103 Microbiology Honours
        12.014 Psychology Honours
        45.103 Zoology Honours

The qualifying programme is graded in the usual way, and in appropriate cases the results are expressed as a grading equivalent to Honours.

Alternative Qualifying Programme

Applicants who cannot attend the University regularly may be admitted as external qualifying students to a programme 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 Programme are exempt from student services fees.

SUBJECT INFORMATION AND TEXTBOOK LISTS

The following pages list details of textbooks, subject descriptions, etc. Reference books are not included here but the reference lists will be made available by the various schools. Information concerning general studies subjects is contained in the Handbook of the Board of General Studies which is available free of charge.

SCHOOL OF ANATOMY

The School of Anatomy offers three Level II units and four 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) and Comparative Histology. Students who major in Anatomy and who attain an adequate standard may proceed to a BSc degree with honours. 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 page 92.

70.011A Mammalian Histology

Cell form and tissue structure. Cell structure and function. Cell function and evolution. Epithelial cells and tissue. Connective tissues and connective tissue cells. Muscle cell 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.

TEXTBOOK
Ham, A. W. *Histology*. 6th ed. Lippincott, Philadelphia and Toronto.
or
Bloom, W. & Fawcett, D. W. *A Textbook of Histology*. 9th ed. Saunders.
    1968.

70.011B Mammalian Embryology

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, 1965.

70.011C Systematic Anatomy I

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, 1970.

PRINCIPAL REFERENCE BOOKS
Snell, R. S. *Clinical Anatomy for Medical Students*. 1st ed. Little, Brown, Boston.
Gardner, E., Gray, D. J. & O'Rahilly, R. *Anatomy, A Regional Study of Human Structure*. 3rd ed. Saunders, 1969 ($19.00).

70.012A Systematic Anatomy II

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, 1970.

PRINCIPAL REFERENCE BOOKS
As for 70.011C.

70.012B Systematic Anatomy III

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

TEXTBOOK
Basmajian, J. V. *Primary Anatomy*. 6th ed. Williams & Wilkins Co., Baltimore, 1970.

PRINCIPAL REFERENCE BOOKS
As for 70.011C.

70.012C Systematic Anatomy IV

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. Paperback.

70.012D Comparative Histology

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.* 6th ed. Lippincott, Philadelphia and Toronto.
or
Bloom, W. & Fawcett, D. W. *A Textbook of Histology.* 9th ed. Saunders, 1968.

SCHOOL OF 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, development, 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; in 1976, 31.182 [prerequisite 1.001] will become a co-requisite 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 programme 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 (or 1.123 Higher Physics III (units A, B, C and D))	Physics III (units A, B and C)
	31.113	Applied Physics III (units A, B & C)

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

"Preferred List" of Science Course units

Level I*	17.011	General Biology	} †(1 unit each)
	17.021	Comparative Functional Biology	
	12.001	Psychology I	} (2 units each)
	25.111	Geoscience I	
Level II	2.002A	Physical Chemistry	
	2.042A	Inorganic Chemistry	
	2.002D	Analytical Chemistry	
	2.002B	Organic Chemistry	} (1 unit each)
	6.601A	Introduction to Computing	
	10.331	Statistics SS	
Level III	1.133A	Electronics	
	1.143	Physics (units A, B, C, E and F)	

One only of 6.601B, 6.602C and 6.602D

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 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 programme" which the

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* The Science Course Regulations (see 2(a)(ii)) require that not less than 8 nor more than 10 units be from level I.

Completion of a 24-unit pass degree programme (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.

† Prior to 1974, 17.001 General and Human Biology (2 units).

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.

31.182 Optics and Optical Instruments

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 Physics of Materials I

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, 1970.

PRINCIPAL REFERENCE BOOKS
Dekker, A. J. *Solid State Physics.* Macmillan.
Di Benedetto, A. T. *The Structure and Properties of Materials.* McGraw-Hill.
Meares, P. *Polymers: Structure and Bulk Properties.* Van Nostrand.
Wulff, J. et al. *The Structure and Properties of Materials,* 4 vols., Wiley, 1965.

31.113B Physics of Measurement

Errors of observation and their treatment. Data processing: analogue-to-digital converters, data recording, computer input, data handling by desk calculator.

Mass, force, acceleration, displacement, length, velocity, time, thermal, optical measurements. Radiometry, photometry and colorimetry. 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, 1963.

PRINCIPAL REFERENCE BOOKS
Blatt, J. M. *Introduction to FORTRAN IV Programming,* Goodyear, 1971.
Braddick, H. J. J. *The Physics of Experimental Method,* Chapman & Hall, 1956.
Davies, O. L. *Statistical Methods in Research and Production.* Oliver & Boyd.
Norton, H. N. *Handbook of Transducers for Electronic Measuring Systems.* Prentice-Hall, 1969.
Rowe, J. *An Introduction to Digital Electronics.* Electronics Australia, 1970.

31.113C Applications of Radiation

This survey proceeds from long-wave to short-wave electromagnetic radiations and then covers some uses of electron beams and other radiations.

Microwave radio and radar systems, use of beams of optical radiations, 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.

TEXTBOOK
No set text.

PRINCIPAL REFERENCE BOOKS
Hackforth, H. L. *Infra-Red Radiation.* McGraw-Hill, 1960.
Sears, F. W. *Optics.* Addison-Wesley, 1956.

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

31.114A Advanced Physics of Materials

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.

TEXTBOOK

No set text.

PRINCIPAL REFERENCE BOOKS

Bowden, F. & Tabor, D. *Friction and Lubrication of Solids*. I & II. O.U.P.

Cottrell, A. H. *The Mechanical Properties of Matter*. Wiley.

Di Benedetto, A. T. *The Structure and Properties of Materials*. McGraw-Hill.

Evans, U. *Introduction to Metallic Corrosion*. Arnold.

Hermans, J. J. *Flow Properties of Disperse Systems*. North-Holland.

Houwink, R. H. & Decker, H. K. *Elasticity, Plasticity and Structure of Matter*. C.U.P.

Hutchinson, T. S. & Baird, D. C. *Physics of Engineering Solids*. Ch. 7. Wiley.

Kubaschewski, O. & Hopkins, B. E. *Oxidation of Metals and Alloys*. Butterworths.

31.114B Advanced Physical Instruments

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.

TEXTBOOK

No set text.

PRINCIPAL REFERENCE BOOKS

Brown, J. G. *X-rays and Their Applications*. Iliffe, 1966.

Davis, H. E. et al. *The Testing and Inspection of Engineering Materials*. McGraw-Hill, 1964.

Grivet, P. *Electron Optics*. Pergamon, 1972.

Hirsch, P. B. et al. *Electron Microscopy of Thin Crystals*. Butterworths, 1965.

McDowell, C. A. *Mass Spectrometry*. McGraw-Hill, 1964.

31.114C Introduction to Industrial Practice

A course of lectures, each followed by a tutorial discussion. A typical series of titles: 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.

TEXTBOOK

No set text.

DEPARTMENT OF OPTOMETRY

The following courses are offered by the Department.

(a) 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 N.S.W. 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.

(b) An extended undergraduate course leading to the double degree BSc/BOptom.

(c) A formal graduate course for the degree of Master of Optometry (MOptom). This course involves the study of three elective postgraduate 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.

(d) 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.

31.811 Optometry I

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. *Optics.* Butterworths.
Jalie, M. *The Principles of Ophthalmic Lenses.* Assoc. of Dispensing Opticians, London.

PRINCIPAL REFERENCE BOOKS

Bennett, A. G. *Ophthalmic Lenses.* Hatton.
Emsley, H. H. *Aberrations of Thin Lenses.* Hatton.
Sears, F. W. *Optics.* Addison-Wesley.

31.812 Optometry II

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.

PRINCIPAL REFERENCE BOOKS

Davson, H. *The Eye*. Vols. 3 & 4. Academic.

Doggart, J. H. *Ocular Signs in Slit Lamp Microscopy*. Kimpton.

Dowaliby, M. *Modern Eyewear—Fashion and Cosmetic Dispensing*. Professional Press.

Giles, G. H. *The Practice of Orthoptics*. Hammond.

Giles, G. H. *The Principles and Practice of Refraction*. Hammond.

Ogle, K. N. *Researches in Binocular Vision*. Saunders.

Shapero, M., Cline, D. & Hofstetter, H. W. *Dictionary of Visual Science*. Chilton.

31.813 Optometry III

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 electro-physiology. 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, London.

Burnham, R. W., Hanes, R. M. & Bartleson, C. J. *Color: A Guide to Basic Facts and Concepts.* Wiley.

Mandel, R. B. *Contact Lens Practice: Basic and Advanced.* Thomas.

PRINCIPAL REFERENCE BOOKS

Corson, R. *Fashion in Eyeglasses.* Owen.

Emsley, H. H. *Aberrations of Thin Lenses.* Hatton.

Gibson, J. J. *Perception of the Visual World.* Houghton-Mifflin.

Johnson, B. K. *Optics and Optical Instruments.* Hatton.

Polyak, S. *The Vertebrate Visual System.* Chicago U.P.

Stone, J. & Phillips, A. J. *Contact Lenses.* Barry & Jenkins.

Wyszecki, G. & Stiles, W. S. *Color Science.* Wiley.

31.821 Special Anatomy and Physiology

Histology, Anatomy, and Embryology of the Eye and Associated Structures—Anatomy and histology of the eyeball, ocular adnexae, bony orbit, visual nervous pathways and visual cortex. The blood vessels, muscles, and nerves of the orbit and associated structures. The motor and sensory pathways associated with the visual apparatus. Elementary embryology and the detailed development of the eye and adnexae. Developmental defects of the eye and adnexae.

Physiology of the Eye and Vision—Physiology of the eyelids and lacrimal apparatus, cornea, aqueous humour and intra-ocular pressure, iris and pupil, lens and accommodation, retina and photo-chemistry of vision. Sensory responses to 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.

PRINCIPAL REFERENCE BOOKS

Davson, H. *The Eye.* Vols. 1, 2 & 3. Academic.

Keeney, A. H. *Chronology of Ophthalmic Development.* Thomas.

Spooner, J. D. *Ocular Anatomy.* Hatton.

31.831 Diseases of the Eye

Introductory Bacteriology and Pathology—Pathogenic organisms, infection, immunity, allergic manifestations. Antiseptics and germicides, antibiotics. Pathological tissue changes; cysts, neoplasms. Diseases of the blood, arteries, veins, heart, lungs, and kidneys. Venereal diseases. Diseases of the nervous system.

The Aetiology, Pathology, Diagnosis and Prognosis of Diseases of the Eye and Adnexae—Diseases of the eyelids, lacrimal apparatus, orbit, conjunctiva, cornea, sclera, uveal tract, lens, vitreous, retina, and optic nerve. Glaucoma. Ocular injuries. Sympathetic ophthalmia. Disease resulting from blood-borne infection. Disturbances of vision of central origin. Disturbances of ocular motility. Developmental abnormalities.

The Ocular Manifestation of Systemic Diseases—Ocular manifestations of: tuberculosis, syphilis, disorders of metabolism, dental sepsis, diseases of the kidneys, cardiovascular system, blood, endocrine system, central nervous system, phakomatoses and hereditary syndromes.

TEXTBOOKS

Lyle, T. K. & Cross, A. G. *May & Worth's Manual of Diseases of the Eye.* Bailliere.
Passmore, R. & Robson, J. S. eds. *A Companion to Medical Studies.* Vol. 2. Blackwell.
Perkins, E. S. & Hansell, P. *An Atlas of Diseases of the Eye.* Churchill.

PRINCIPAL REFERENCE BOOKS

Ballantyne, A. J. & Michaelson, I. C. *Textbook of the Fundus of the Eye.* Livingstone.
Doggart, J. H. *Ocular Signs in Slit-Lamp Microscopy.* Kimpton.
Duke-Elder, S. *Textbook of Ophthalmology.* Kimpton.
Larsen, H. W. *Atlas of the Fundus of the Eye.* Munsgaard.
Nover, A. *The Ocular Fundus.* Lea & Febiger, Philadelphia.

SCHOOL OF 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 break-down 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 under-standing the hundreds of different types of enzymes, large protein mole-cules, 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 pre-requisite 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, e.g., in Universities, C.S.I.R.O., 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, prere-quisites and co-requisites, see page 81.

41.101A Chemistry of Biologically Important Molecules

The chemical properties of amino acids, peptides and proteins, carbo-hydrates, nucleic acids and lipids and the biological roles of these com-pounds. The nature and function of enzymes. Practical work to amplify the lecture course.

TEXTBOOKS

Montgomery, R. & Swenson, C. A. *Quantitative Problems in the Biological Sciences.* Freeman, 1969.

White, A., Handler, R. & Smith, E. L. *Principles of Biochemistry.* 5th ed. McGraw-Hill, 1973.

41.101B Metabolism

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.

TEXTBOOKS

As for 41.101A plus

McGilvery, R. W. *Biochemistry: A Functional Approach.* Saunders, 1970.

41.101C Control Mechanisms

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

TEXTBOOKS

As for 41.101B.

PRINCIPAL REFERENCE BOOK

Frieden, E. & Lipner, H. *Biochemical Endocrinology of the Vertebrates.* Prentice-Hall, 1971.

41.102A Biochemistry of Macromolecules and Cell Biochemistry

Polysaccharides and glycoproteins including bacterial cell walls. Chem-istry 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

Barker, R. *Organic Chemistry of Biological Compounds.* Prentice-Hall, 1971.

Frieden, E. & Lipner, H. *Biochemical Endocrinology of the Vertebrates.* Prentice-Hall, 1971.

Scientific American. *The Chemical Basis of Life. An Introduction to Molecular and Cell Biology.* Freeman, 1973.

White, A., Handler, R. & Smith, E. L. *Principles of Biochemistry.* 5th ed. McGraw Hill, 1973.

or

Lehninger, A. L. *Biochemistry: The Molecular Basis of Cell Structure and Function.* Worth Publishers Inc., 1970.

Wold, F. *Macromolecules: Structure and Function.* Prentice-Hall, 1971.

PRINCIPAL REFERENCE BOOKS
Bernhard, S. *The Structure and Function of Enzymes.* Benjamin, 1968.
Davidson, J. N. *The Biochemistry of the Nucleic Acids.* 7th ed. Methuen, 1972.
Watson, J. D. *The Molecular Biology of the Gene.* 2nd ed. Benjamin, 1970.

41.102B Metabolic Pathways and Control Mechanisms

Haemoproteins, and electron transport, photosynthesis, photophosphorylation and oxidative phosphorylation. The 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.

PRINCIPAL REFERENCE BOOK
McGilvery, R. W. *Biochemistry: A Functional Approach.* Saunders, 1970.

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

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* See Postgraduate Scholarships in Section C of the Calendar.

42.102 Fermentation Technology

An introduction to 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

Aiba, S., Humphrey, A. E. & Millis, N. *Biochemical Engineering*. 2nd ed. Academic, 1973.

Casida, L. E. Jr. *Industrial Microbiology*. Wiley, 1968.

Kubitschek, H. E. *Introduction to Research with Continuous Cultures*. Prentice-Hall, 1970.

PRINCIPAL REFERENCE BOOKS

Blakebrough, N. ed. *Biochemical and Biological Engineering Science*. Vols. 1 & 2. Academic, 1968.

Ghosh, T. & Fiechter, A. *Advances in Biochemical Engineering*. Springer-Verlag, 1971.

Rhodes, A. & Fletcher, D. *Principles of Industrial Microbiology*. Pergamon, 1966.

Solomons, G. L. *Materials and Methods in Fermentation*. Academic, 1969.
Webb, F. C. *Biochemical Engineering*. Van Nostrand, 1964.

For details of level, unit value, when offered, hours per week, prerequisites and co-requisites, see page 82.

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.) A brief treatment of 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.

PRINCIPAL REFERENCE BOOK

Aiba, S., Humphrey A. E. & Millis, N. *Biochemical Engineering*. 2nd ed. Academic, 1973.

SCHOOL OF 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 specialise in a particular branch of Botany.

Research facilities are available within the School for postgraduate 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 page 83.

43.101 Genetics

An introduction to 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
Srb, A. M., Owen, R. D. & Edgar, R. S. *General Genetics.* 2nd ed. Freeman, 1965.

43.111 Plant Evolution and Ecology

A study of the evolution of vegetative form and structure of vascular plants; an examination of their organization into terrestrial communities; identification, evolution and distribution of elements of the Australian flora. Students are required to attend field excursions, all of which form an integral part of the course.

TEXTBOOKS

Beadle, N. C. W., Evans, O. E. & Carolin, R. C. *Flora of the Sydney Region*. Reed, 1972.

Fahn, A. *Plant Anatomy*. Pergamon, 1967.

Principal Reference Books for the plant ecology section of this unit are supplied during the course.

43.121 Plant Physiology

A general introduction to the physiology of the whole plant including a consideration of photosynthesis, inorganic nutrition, transport, translocation, physiology of growth and development, and plant growth substances and their application in agriculture.

TEXTBOOKS

Galston, A. W. & Davies, P. J. *Control Mechanisms in Plant Development*. Prentice-Hall, 1970.

Richardson, M. *Translocation in Plants*. Arnold, 1968.

Sutcliffe, J. *Plants and Water*. Arnold, 1968.

Whittingham, C. P. *Photosynthesis*. O.U.P., 1971.

43.102 Advanced Genetics

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

43.112 Plant Taxonomy

Considers the assessment, analysis and presentation of data for classifying plants both at the specific and supra-specific level. Students are required to attend field excursions all of which form an integral part of the course.

TEXTBOOKS*

Beadle, N. C. W., Evans, O. D. & Carolin, R. C. *Flora of the Sydney Region*. Reed, 1972.

Cronquist, A. *The Evolution and Classification of Flowering Plants*. Nelson, 1968.

Heywood, V. H. *Plant Taxonomy*. The Institute of Biology's Studies in Botany No. 5. Arnold, 1970.

43.122 Advanced Plant Physiology

The physiology of flowering plants. Topics of study include the growth of cells, roles of growth substances, carbon metabolism in leaves, lipid metabolism and the effects of light on plant development. Laboratory projects may require attendance outside the hours set down in the timetable.

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

43.132 Mycology

General structure and ultrastructure of the fungal cell. Morphology of members of the major taxonomic groups. Spore liberation, dispersal, deposition and germination. Cytology, genetics and patterns of life cycles. Growth and differentiation of hyphae and fruit bodies. Response to nutritional and environmental conditions for growth and reproduction. Transport processes, metabolism and metabolic products. Ecological considerations of fungi in specialised habitats.

TEXTBOOKS

Alexopoulos, C. J. *Introductory Mycology*. Wiley, 1962.
Burnett, J. H. *Fundementals of Mycology*. Arnold, 1968.

43.142 Environmental Botany

An introduction to 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 Plant Pathology

History of plant pathology; pathogenic organisms; symptoms of disease. Specific diseases caused by fungi, nematodes, bacteria and viruses. Host-pathogen relationships including stages of infection, evolution of host-pathogen relationships, adaptation for successful parasitism, resistance mechanisms and genetics of resistance. Control of diseases by the use of fungicides, nematicides, crop rotation and breeding for resistance.

TEXTBOOKS

Alexopoulos, C. J. *Introductory Mycology*. Wiley, 1962.
Walker, J. C. *Plant Pathology*. 3rd ed. McGraw-Hill, 1968.

SCHOOL OF 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 foods 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 with 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 (e.g., 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 (e.g. 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 30th 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.

2.001 Chemistry I

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

TEXTBOOKS

Aylward, G. H. & Findlay, T. J. V. *SI Chemical Data.* Wiley, 1974.
Chemistry I Laboratory Manual. Univ. of N.S.W., 1975.
Kneen, W. R., Rogers, M. J. W. & Simpson, P. *Chemistry: Facts, Patterns and Principles.* Addison-Wesley, 1972.
Schaum Outline Series. *Theory and Problems of College Chemistry.* SI (Metric) ed. McGraw-Hill.

PRINCIPAL REFERENCE BOOKS

Barrow, G. M., Kenney, M. E., Lassila, J. D., Litle, R. L. & Thompson. W. E. *Understanding Chemistry.* Benjamin, 1969.
Brown, G. I. *A New Guide to Modern Valency Theory.* Longman, 1967.
Eastwood, F. W., Swan, J. M. & Yonatt, J. B. *Organic Chemistry. A First University Course in Twelve Programs.* Science Press, 1967.
Gray, H. B. & Haight, G. P. *Basic Principles of Chemistry.* Benjamin, 1967.
Pauling, L. *College Chemistry.* 3rd ed. Freeman, 1964.
Runquist, O., Cresswell, C. J. & Head, J. T. *Chemical Principles. A Programmed Text.* Burgess Pub. Co., 1968.
Sisler, H. H., Van der Werf, C. A. & Davidson, A. W. *College Chemistry.* 3rd ed. Collier-Macmillan, 1967.
Vogel, A. I. *Macro and Semimicro Qualitative Analysis.* 4th ed. Longman, 1954.

Level II units

2.002A Physical Chemistry

Prerequisites: 1.001 or 1.011 and 2.001 and 10.001, 10.011 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 non-electrolytes 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, 1973.
Shaw, D. J. *Introduction to Colloid and Surface Chemistry.* 2nd ed. Butterworth, 1970.

PRINCIPAL REFERENCE BOOKS

Adamson, A. W. *Textbook of Physical Chemistry.* Academic, 1973.
Alexander, A. E. & Johnson, P. *Colloid Science.* O.U.P., 1950.
Daniels, F. & Alberty, R. A. *Physical Chemistry.* 3rd ed. Wiley, 1966.
Daniels, F. et al. *Experimental Physical Chemistry.* 7th ed. McGraw-Hill, 1970.
Glasstone, S. *Textbook of Physical Chemistry.* 2nd ed. Van Nostrand, 1948.
Moore, W. J. *Physical Chemistry.* 4th *or* 5th ed. Longman, 1963 *or* 1972.
Shoemaker, D. P. & Garland, C. W. *Experiments in Physical Chemistry.* 2nd ed. McGraw-Hill, 1967.

2.042C Inorganic Chemistry

Prerequisite: 2.001.

Chemistry of the non-metals including B, C, Si, N, P, S, Se, Te, halogens, and noble gases. Chemistry of the metals of groups IA, IIA, and 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, 1966.

Larsen, E. M. *Transitional Elements.* Benjamin, 1965.

Quagliano, J. V. & Vallarino, L. M. *Coordination Chemistry.* Heath, Lexington, 1969.

or

2.

Cotton, F. A. & Wilkinson, G. *Advanced Inorganic Chemistry.* 2nd ed. Wiley, 1966.

PRINCIPAL REFERENCE BOOKS

Bailar, J. C. *Chemistry of Coordination Compounds.* Reinhold, 1960.

Barnard, A. K. *Theoretical Basis of Inorganic Chemistry.* McGraw-Hill, 1965.

Basolo, F. & Johnson, R. *Introduction to Coordination Chemistry.* Benjamin, 1964.

Graddon, D. P. *An Introduction to Coordination Chemistry.* 2nd ed. Pergamon, 1968.

Huheey, J. E. *Inorganic Chemistry: Principles of Structure and Reactivity.* Harper & Row, 1972.

Jones, M. M. *Elementary Coordination Chemistry.* Prentice-Hall, 1964.

Vogel, A. *A Textbook of Macro and Semi-micro Qualitative Inorganic Analysis.* Longman.

Wells, A. F. *Structural Inorganic Chemistry.* 3rd ed. O.U.P., 1962.

2.002D Analytical Chemistry

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

Ewing, G. W. *Instrumental Methods of Chemical Analysis.* McGraw-Hill, 1969.

Fischer, R. B. & Peters, D. G. *Quantitative Chemical Analysis.* Saunders, 1968.

2.002B Organic Chemistry

Prerequisite: 2.001.

Chemistry of the more important functional groups; aliphatic hydro-carbons, 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. Int. Stud. Ed.
    Allyn & Bacon, 1973.
    Only if proceeding to further study of Organic Chemistry:
Vogel, A. I. *Elementary Practical Organic Chemistry.* Pt. II. Qualitative
    Organic Analysis. Longman, 1957.

Level II/III units

2.003H 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

Williams, D. H. & Fleming, I. *Spectroscopic Methods in Organic Chemistry.*
    2nd ed. McGraw-Hill, 1973.

PRINCIPAL REFERENCE BOOK

Brittain, E. F. H., George, W. O. & Wells, C. H. J. *Introduction to Mole-cular Spectroscopy.* Academic, 1970.

2.003J Fundamentals of Biological Chemistry

Prerequisite: 2.001. Excluded: 41.101A.

An introductory discussion of aspects of the chemical and physical properties of materials important in biological systems. Attention is given to methods of separation 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 synthesis.

Treatment of carbohydrates, establishment of structures reactivity. Chemistry of monosaccharides, disaccharides and polysaccharides. Methods of analysis, chemical and physicochemical.

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, 1967.
Barker, R. *Organic Chemistry of Biological Compounds.* Prentice-Hall, 1971.

PRINCIPAL REFERENCE BOOK

Gunstone, F. D. *Introduction to the Chemistry and Biochemistry of Fatty Acids and Their Glycerides.* Chapman & Hall, 1968.

2.013A Introductory Quantum Chemistry

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 Franck-Condon principle. Delocalization; Hückel 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

Dixon, R. N. *Spectroscopy and Structure.* Methuen, 1969.
Hanna, M. W. *Quantum Mechanics in Chemistry.* 2nd ed. Benjamin, 1969.

PRINCIPAL REFERENCE BOOKS

Barrow, G. M. *Structure of Molecules.* Benjamin, 1964.
Carrington, A. & McLachlan, A. D. *Introduction to Magnetic Resonance.* Harper & Row, 1967.
King, G. W. *Spectroscopy and Molecular Structure.* Holt, Rinehart & Winston, 1964.
Phillips, L. F. *Basic Quantum Chemistry.* Wiley, 1965.

2.003E 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 ionzing radiation in gases, liquids and solids. Free radical detection and reactions. Technological applications and techniques. Mass spectrometry and electron impact studies. Separation of isotopes by physical and chemical means. Preparation of radionuclides in high energy machines and nuclear reactors. Radiochemical techniques—carriers, ion-exchange solvent extraction. Hand-

ling 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, 1967.
or
Friedlander, G., Kennedy, J. & Miller, J. M. *Nuclear and Radiochemistry*. 2nd ed. Wiley, 1964.
or
Harvey, B. *Introduction to Nuclear Physics and Chemistry*. Prentice-Hall, 1962.

PRINCIPAL REFERENCE BOOKS

Ausloos, P. *Fundamental Processes in Radiation Chemistry*. Interscience, 1968.
Denaro, A. R. & Jayson, G. G. *Fundamentals of Radiation Chemistry*. Butterworths, 1972.
Farley, S. *Elements of Pulse Circuits*. Methuen, 1955.
Haissinsky, M. *Nuclear Chemistry and its Applications*. Tuck, D. C. trans. Masson, 1957.
Sharpe, J. *Nuclear Radiation Detectors*. Methuen, 1964.
Spinks, J. W. T. & Woods, R. J. *An Introduction to Radiation Chemistry*. Wiley, 1964.
Taylor, D. *The Measurement of Radioisotopes*. Methuen, 1959.

2.003K Solid State Chemistry

Prerequisites: 2.001 and 10.001 or 10.011.

Use of electron neutron and X-ray diffraction methods in the determination of crystal structures.

Precise measurements of electron density and site symmetries and environments in minerals. Deviations from stoichiometry, lattice defects, intergrowth phases. Correlation between electrical, optical properties and structure. Solid state reactions, surface properties and catalysis.
Applications of EPR, NMR and mass spectrometry.

TEXTBOOKS

Bond, G. C. *Catalysis by Metals*. Academic, 1965.
Greenwood, N. N. *Ionic Crystals, Lattice Defects and Non-stoichiometry*. Butterworths, 1969.
Moore, W. J. *Seven Solid States*. Benjamin, 1967.

Level III units

2.003L Applied Organic Chemistry

Prerequisite: 2.002B. Excluded: 2.013L, 2.033L, 2.043L.

Discussion at advanced level of the chemistry of selected commercially important groups of organic materials. Mechanisms of reaction and physical properties are treated, together with methods of examination, in overall unit approach, correlating structure with behaviour. Emphasis is placed on breakdown to model systems.

Theory of physical techniques, refractometry, polarimetry etc. from basis of additivity. Fatty acids with emphasis on unsaturation, thermal and oxidative polymerizations, alkyl resins, analysis of mixtures. Waxes and sterols; selected natural and synthetic macromolecules; polymerization processes, including treatment of initiators, chain transfer agents, retarders. Vulcanization and sulphur-olefin reactions. Photochemical processes; electro-organic chemistry. Fine chemicals, soaps and detergents. Aspects of metal catalysis in industry.

TEXTBOOK

No set text.

PRINCIPAL REFERENCE BOOKS

Heftmann, E. *Chromatography*. 2nd ed. Reinhold, 1967.
Joslyn, M. A. *Methods in Food Analysis*. Academic, 1950.
Karrer, P. & Jucker, E. *Carotenoids*. Elsevier, 1950.
Markley, K. L. *The Fatty Acids*. 2nd ed. Interscience, 1960-67.
Neurath, H. *The Proteins*. Vols. I-IV. 2nd ed. Academic, 1963-68.
Pigman, W. *The Carbohydrates*. Academic, 1957.
Winton, A. L. & Winton, K. B. *Structure and Composition of Foods*. Wiley, 1932.

Subsidiary lists are supplied from the Department.

2.003A Physical Chemistry

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, 1973.

PRINCIPAL REFERENCE BOOKS

Andrews, F. C. *Equilibrium Statistical Mechanics*. Wiley, 1963.
Conway, D. E. *Theory and Principles of Electrode Processes*. Ronald, 1965.
Glasstone, S. *Textbook of Physical Chemistry*. 2nd ed. Van Nostrand, 1948.
Hill, T. L. *Introduction to Statistical Thermodynamics*. Addison-Wesley, 1960.
Knox, J. H. *Molecular Thermodynamics*. Wiley, 1971.
Moelwyn-Hughes, E. A. *Physical Chemistry*. 2nd ed. Pergamon, 1961.
Moore, W. J. *Physical Chemistry*. 4th *or* 5th ed. Longman, 1963 *or* 1972.
Purdon, S. F. & Slater, V. W. *Aqueous Solutions and the Phase Diagram*. Arnold, 1946.
Shoemaker, D. P. & Garland, C. W. *Experiments in Physical Chemistry*. 2nd ed. McGraw-Hill, 1967.
Tabor, D. *Gases, Liquids and Solids*. Penguin, 1969.

2.003C Inorganic Chemistry

Prerequisite: 2.042C.

Coordination chemistry: valence bond and crystal field theory and their application to magnetic and spectral properties of complexes. Factors affecting the stability of complexes; unusual oxidation states of transition metals. Chemistry of the groups IIIA (the lanthanides and actinides), IVA, VA, VIA and VIIA. More advanced chemistry of groups IIIB, IVB, VB, VIB, and VIIB and the noble gases.

TEXTBOOK

Cotton, F. A. & Wilkinson, G. *Advanced Inorganic Chemistry*. 2nd ed. Wiley, 1966.

PRINCIPAL REFERENCE BOOKS

Bailar, J. C. *Chemistry of Coordination Compounds*. Reinhold, 1960.
Barnard, A. K. *Theoretical Basis of Inorganic Chemistry*. McGraw-Hill, 1965.
Dwyer, F. & Mellor, D. P. *Chelating Agents and Metal Chelates*. Academic, 1964.
Huheey, J. E. *Inorganic Chemistry, Principles of Structure and Reactivity*. Harper & Row, 1972.
Lewis, J. & Wilkins, R. G. *Modern Coordination Chemistry*. Interscience, 1960.
Sienko, M. J. & Plane, R. A. *Physical Inorganic Chemistry*. Benjamin, 1965.
Wells, A. F. *Structural Inorganic Chemistry*. 3rd ed. O.U.P., 1962.

2.003D Instrumental Analysis

Prerequisites: 2.002A and 2.002D.

Selected spectrophotometric methods of analysis: infrared, emission, flame, precision spectroscopy, spectrofluorimetry, X-ray fluorescence, mass spectroscopy. Instrumental chromatography, thermal analysis. Electrochemical and kinetic methods. Introduction to automation and data processing.

TEXTBOOKS

Chalmers, R. A. *Aspects of Analytical Chemistry*. Contemporary Science. Oliver & Boyd, 1968. Paperback.
Eckschlager, K. *Errors and Measurements in Chemical Analysis*. Chalmers, R. A. trans. ed. Van Nostrand, 1969.
Ewing, G. W. *Instrumental Methods of Chemical Analysis*. McGraw-Hill, 1969.
Hamilton, L. F., Simpson, S. & Ellis, D. W. *Calculations of Analytical Chemistry*. 7th ed. McGraw-Hill, 1969.

2.003B Organic Chemistry

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

1. Morrison, R. T. & Boyd, R. N. *Organic Chemistry*. 3rd ed. Int. Stud. Ed. Allyn & Bacon, 1973.
or
    Roberts, J. D. & Caserio, M. C. *Basic Principles of Organic Chemistry*. Benjamin, 1964.

2. Tedder, J. M., Nechvatal, A., Murray, A. W. & Carnduff, J. *Basic Organic Chemistry*. Pt. 3. Wiley, 1970.
3. Vogel, A. I. *Elementary Practical Organic Chemistry*. Pt. II. Qualitative Organic Analysis. Longman, 1957.

PRINCIPAL REFERENCE BOOKS
Acheson, R. M. *An Introduction to the Chemistry of Heterocyclic Compounds*. 2nd ed. Wiley Int. Ed., 1967.
Eliel, E. L. *Stereochemistry of Carbon Compounds*. McGraw-Hill, 1962.
Eliel, E. L., Allinger, N. L., Angyal, S. J. & Morrison, G. A. *Conformational Analysis*. Interscience, 1965.
Gould, E. S. *Mechanism and Structure in Organic Chemistry*. Holt, Rinehart & Winston, 1959.
Hallas, G. *Organic Stereochemistry*. McGraw-Hill, 1965.
March, J. *Advanced Organic Chemistry: Reactions, Mechanisms and Structure*. McGraw-Hill, 1968.
Sykes, P. *A Guidebook to Mechanism in Organic Chemistry*. 3rd. ed. Longman, 1971.
Whitham, G. H. *Alicyclic Chemistry*. Oldbourne.

2.003M Organometallic Chemistry

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
Coates, G. E., Powell, P. & Wade, K. *Principles of Organometallic Chemistry*. Methuen, 1968.
Pauson, P. *Organometallic Chemistry*. Arnold, 1967.

PRINCIPAL REFERENCE BOOKS
Coates, G. E., Green, M. L. H. & Wade, K. *Organometallic Componds*. 3rd ed. Vols 1 & 2. Methuen, 1967.
George, W. O. *Spectroscopic Methods in Organometallic Chemistry*. Butterworths, 1970.

2.033A Physical Chemistry of Macromolecules

Prerequisites: 1.112C or 2.002A and 2.002B or 2.003J or 2.002A.

Macromolecules in solution; determination of molecular size: gel permeation chromatography, diffusion, sedimentation, viscometry, osmometry and light scattering. Spectroscopic properties: circular dichroism and optical rotary dispersion; conformation of macromolecules in solution; helix-random coil transitions. Macromolecules in the solid state; X-ray diffraction; basic structural features.

TEXTBOOK
Van Holde, K. E. *Physical Biochemistry*. Prentice-Hall, 1971.

PRINCIPAL REFERENCE BOOKS
Amdur, I. & Hammes, G. C. *Chemical Kinetics*. McGraw-Hill, 1966.
Caldin, E. F. *Fast Reactions in Solution*. Blackwell, 1964.
Mahler, H. R. & Cordes, E. H. *Biological Chemistry*. Harper & Row, 1971.
Poland, D. & Sheraga, H. A. *Theory of Helix-Coil Transitions In Biopolymers*. Academic, 1970.
Tanford, C. *Physical Chemistry of Macromolecules*. Wiley, 1961.

2.043A Environmental Chemistry

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
Hamilton, C. H. *Chemistry in the Environment*. Freeman, 1973.
Schaum Outline Series. *Numerical Analysis*. McGraw-Hill, 1968.

2.023A Chemical Physics

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, 1969.

2.013L Chemistry and Enzymology of Foods

Prerequisite: 2.002B. Excluded: 2.003L, 2.033L, 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, carbo-

hydrates 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.

TEXTBOOK
   No set text.

PRINCIPAL REFERENCE BOOKS
   As for 2.003L Applied Organic Chemistry.

2.053A Chemical Kinetics and Reaction Mechanisms

Prerequisite: 2.002A.

   Basic kinetic concepts, mechanisms of elementary processes and funda-mental 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. Appli-cations of the above concepts to inorganic and organic reaction mechanisms.

TEXTBOOK
Laidler, K. J. *Chemical Kinetics.* 2nd ed. McGraw-Hill, 1965.

PRINCIPAL REFERENCE BOOKS   .
Amdur, I. & Hammes, G. C. *Chemical Kinetics.* McGraw-Hill, 1966.

Benson, S. W. *Thermochemical Kinetics.* Wiley, 1968.

Calvert, J. G. & Pitts, J. N. *Photochemistry.* Wiley, 1966.

Caldin, E. F. *Fast Reactions in Solution.* Blackwell, 1964.

Daniels, F. et al. *Experimental Physical Chemistry.* 6th *or* 7th ed. McGraw-Hill, 1962 *or* 1970.

Gardiner, W. C. *Rates and Mechanisms of Chemical Reactions.* Benjamin, 1969.

Glasstone, S., Laidler, K. J. & Eyring, H. *Theory of Rate Processes.* McGraw-Hill, 1941.

Shoemaker, D. P. & Garland, C. W. *Experiments in Physical Chemistry.* 2nd ed. McGraw-Hill, 1967.

Weston, R. E. & Schwarz, H. A. *Chemical Kinetics.* Prentice-Hall, 1972.

2.013M Thermochemistry

Prerequisite: 2.002A.

   Thermochemistry of metal complex and organometallic reactions: Dis-sociation 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, 1968.
.

PRINCIPAL REFERENCE BOOKS

Cottrell, T. L. *The Strengths of Chemical Bonds.* 2nd ed. Butterworths, 1958.
Hill, H. A. O. & Day, P. *Physical Methods in Advanced Inorganic Chemistry.* Wiley, 1968.
Litzow, M. R. & Spalding, T. R. *Mass Spectrometry of Inorganic and Organometallic Compounds.* Elsevier, 1973.

2.023L 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 non-toxic 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.

2.063A Advanced Molecular Spectroscopy
Prerequisite: 2.013A or 2.003A (old syll.).

Theory: Born-Oppenheimer approximation; theory of transition probabilities; group theory; normal mode analysis.

Spectra: rotational, vibrational and electronic structure in molecular spectra, including microwave, infrared, Raman, UV-visible and photoelectron spectra. Kinetic spectroscopy. Lasers.

TEXTBOOK

No set text.

PRINCIPAL REFERENCE BOOKS

Hanna, M. W. *Quantum Mechanics in Chemistry.* 2nd ed. Benjamin, 1969.
Herzberg, G. *Molecular Spectra and Molecular Structure. I. Spectra of Diatomic Molecules.* Van Nostrand, 1950.
Herzberg, G. *Molecular Spectra and Molecular Structure. II. Infrared and Raman Spectra of Polyatomic Molecules.* Van Nostrand, 1945.
Herzberg, G. *Molecular Spectra and Molecular Structure. III. Electronic Spectra and Electronic Structure of Polyatomic Molecules.* Van Nostrand, 1956.
Herzberg, G. *Spectra and Structures of Simple Free Radicals.* Cornell, 1971.
Phillips, L. F. *Basic Quantum Chemistry.* Wiley, 1965.
Lasers and Light. Readings from Scientific American. Freeman, 1969.
Wilson, E. B., Decius, J. C. & Cross, P. C. *Molecular Vibrations.* McGraw-Hill, 1955.

2.013C 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 Mossbauer 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*. 2nd ed. Wiley, 1966.

PRINCIPAL REFERENCE BOOKS

Adams, D. M. & Raynor, J. B. *Advanced Practical Inorganic Chemistry*. Wiley, 1965.
Basolo, F. & Pearson, R. *Mechanism of Inorganic Reactions*. 2nd ed. Wiley, 1965.
Chemical Society of London. Special Publication No. 17, 1964. *Stability Constants of Metal Ion Complexes*.
Cotton, F. A. *Chemical Applications of Group Theory*. Wiley, 1963.
Dwyer, F. P. & Mellor, D. P. *Chelating Agents and Metal Chelates*. Academic, 1964.
Edwards, J. O. *Inorganic Reaction Mechanisms*. Benjamin,, 1964.
Hannay, N. B. *Solid State Chemistry*. Prentice-Hall, 1967.
Huheey, J. E. *Inorganic Chemistry, Principles of Structure and Reactivity*. Harper & Row, 1972.
Lewis, J. & Wilkins, R. *Modern Coordination Chemistry*. Interscience, 1959.
Nakamoto, K. *Infrared Spectra of Inorganic and Coordination Compounds*. 2nd ed. Wiley/Interscience, 1970.
Nakamoto, K. & McCarthy, P. J. *Spectroscopy and Structure of Metal Chelate Compounds*. Wiley, 1968.
Wells A. F. *Structural Inorganic Chemistry*. 3rd ed. O.U.P., 1962.

2.013D 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.

TEXTBOOKS

Chalmers, R. A. *Aspects of Analytical Chemistry*. Contemporary Science. Oliver & Boyd, 1968. Paperback.
Eckschlager, K. *Errors and Measurements in Chemical Analysis*. Chalmers, R. A. trans. ed. Van Nostrand, 1969.
Ewing, G. W. *Instrumental Methods of Chemical Analysis*. McGraw-Hill, 1969.
Hamilton, L. F. Simpson, S. & Ellis, D. W. *Calculations of Analytical Chemistry*. 7th ed. McGraw-Hill, 1969.
Kolthoff, I. M., Sandell, E. B., Meehan, E. J. & Bruckenstein, S. *Quantitative Chemical Analysis*. Macmillan, 1969.
Schwarzenbach, G. & Flaschka, H. *Complexometric Titrations*. Irving, H. M. trans. 2nd ed. Methuen, 1969.

2.013B Synthesis of Complex Organic Molecules
Prerequisite: 2.002B. Co-requisite: 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, formations, 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., 1971.

2.023B Natural Product Chemistry
Prerequisite: 2.002B. Co-requisite: 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, 1972.

2.033L Applied Organic Chemistry
Prerequisite: 2.002B. Excluded: 2.003L, 2.013L, 2.043L.

As for 2.003L but in greater detail and depth.

TEXTBOOK
No set text.

PRINCIPAL REFERENCE BOOKS
Carney, T. P. *Laboratory Fractional Distillation.* Macmillan, 1949.
Flory, P. J. *Principles of Polymer Chemistry.* Cornell 1953.
Heftmann, E. *Chromatography.* 2nd ed. Reinhold, 1967.
Kan, R. O. *Organic Photochemistry.* McGraw-Hill, 1966.
Kharasch, N. ed. *The Chemistry of Organic Sulphur Compounds.* Vol. I. *Organic Sulphur Compounds.* Pergamon, 1961.
Lenz, R. W. *Organic Chemistry of Synthetic Polymers.* Interscience, 1967.
Markley, K. L. *The Fatty Acids.* 2nd ed. Interscience, 1960-67.
Pinder, A. R. *Chemistry of the Terpenes.* Chapman & Hall, 1960.
Pryor, W. A. *Mechanisms of Sulphur Reactions.* McGraw-Hill, 1962.
Schwarz, J. C. P. *Physical Methods in Organic Chemistry.* Oliver & Boyd, 1964.
Scott, G. *Atmospheric Oxidation and Antioxidants.* Elsevier, 1965.
Solomon, D. H. *Organic Film Formers.* Wiley, 1967.

2.043L Chemistry and Enzymology of Foods
Prerequisite: 2.002B. Excluded: 2.003L, 2.013L, 2.033L.

As for 2.013L but in greater detail and depth.

TEXTBOOK
No set text.

PRINCIPAL REFERENCE BOOKS
Gunstone, F. D. *An Introduction to the Chemistry and Biochemistry of the Fatty Acids and their Glycerides.* Chapman & Hall, 1968.
Heftmann, E. *Chromatography.* 2nd ed. Reinhold, 1967.
Karrer, P. & Jucker, E. *Carotenoids.* Elsevier, 1950.
Markley, K. L. *The Fatty Acids.* 2nd ed. Interscience, 1960-67.
Neurath, H. *The Proteins.* Vols. I-IV. 2nd ed. Academic, 1963-68.
Pigman, W. *The Carbohydrates.* Academic, 1957.
Reed, G. *Enzymes in Food Processing.* Academic, 1966.
Schultz, H. W. ed. *Carbohydrates and Their Roles.* Avi. Pub. Co., 1969.
Schwarz, J. C. P. *Physical Methods in Organic Chemistry.* Oliver & Boyd, 1964.
Scott, G. *Atmospheric Oxidation and Antioxidants.* Elsevier, 1965.
Walton, H. F. *Principles and Methods of Chemical Analysis.* 2nd ed. Prentice-Hall, 1964.
Willard, H. H., Merritt, L. L. & Dean, J. A. *Instrumental Methods of Analysis.* 4th ed. Van Nostrand, 1965.

Subsidiary lists are supplied from the Department.

2.053L Biological and Agricultural Chemistry
Prerequisite: 2.002B. Excluded: 2.023L.

As for 2.023L but in more detail and depth.

TEXTBOOK
No set text.

COMPUTER SCIENCE

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).

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.

6.601A 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

To be advised.

PRINCIPAL REFERENCE BOOKS

Bates, F. & Douglas, M. L. *Programming Language/One*. Prentice-Hall.
Dahl, O. J., Dijkstra, E. W. & Hoare, C. A. R. *Structured Programming*. Academic Press.
Knuth, D. *Fundamental Algorithms. The Art of Computer Programming*. Vol. I. Addison-Wesley.
Maurer, H. A. & Williams, M. R. *A Collection of Programming Problems and Techniques*. Prentice-Hall.
Ralston, A. *Introduction to Programming and Computer Science*. McGraw-Hill.
Ralston, A. *Fortran IV Programming: A Concise Exposition*. McGraw-Hill.
Wirth, N. *Systematic Programming—An Introduction*. Prentice-Hall.

6.601B 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.

TEXTBOOKS

APL-CYBER Reference Manual. Control Data, 1973.
Griswold, R. E., Poage, J. F. & Polansky, I. P. *The SNOBOL 4 Programming Language*. Prentice-Hall.

PRINCIPAL REFERENCE BOOKS

Barron, D. W. *Assemblers and Loaders.* Macdonald/Elsevier.

Campbell-Kelly, M. *An Introduction to Macros.* Macdonald/Elsevier.

I.B.M. *System/360: Principles of Operation.* Form A22-6821, I.B.M.

I.B.M. System/360 Assembler Language. Form C28.6514, I.B.M.

Katzan, H. *APL Programming and Computer Techniques.* Van Nostrand Reinholt.

Knuth, D. *The Art of Computer Programming.* Vols. 1, 2, 3. Addison Wesley.

Maurer, H. A. & Williams, M. R. *A Collection of Programming Problems and Techniques.* Prentice-Hall.

6.602A Computer Systems I

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

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.

PRINCIPAL REFERENCE BOOKS

Genuys, F. ed. *Programming Languages.* Academic.

Hoare, C. A. R. & Perrott, R. H. eds. *Operating System Techniques.* Academic.

Knuth, D. E. *Fundamental Algorithms, The Art of Computer Programming.* Vol. I. Addison-Wesley.

Rosen, S. *Programming Systems & Languages.* McGraw-Hill.

Yourdon, E. *Design of On-Line Computer Systems.* McGraw-Hill.

6.602C Computer Applications

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 GPSS. 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.

PRINCIPAL REFERENCE BOOKS
Gass, S. I. *Linear Programming.* McGraw-Hill.
Gordon, G. *System Simulation.* Prentice-Hill.
Barrodale, I., Roberts, F. D. K. & Ehle, B. L. *Elementary Computer Applications.* Wiley.

6.602D 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.

PRINCIPAL REFERENCE BOOKS
Aho, A. V. & Ullman, J. D. *Theory of Parsing, Translation and Compiling.* Vols. I & II. Prentice-Hall.
Foster, J. M. *Automatic Syntactic Analysis.* Macdonald/Elsevier.
Gries, D. *Compiler Construction for Digital Computers.* Wiley.
Higman, B. *A Comparative Study of Programming Languages.* Macdonald/ Elsevier.
Hopgood, F. R. A. *Compiling Techniques.* Macdonald/Elsevier.
Knuth, D. *Fundamental Algorithms. The Art of Computer Programming* Vol I. McGraw-Hill.
McKeeman, W. M., Horning, J. J. & Wortman, D. B. *A Compiler Generator.* Prentice-Hall.
Rosen, S. *Programming Systems & Languages.* McGraw-Hill.
Sammet, J. *Programming Languages: History and Fundamentals.* Prentice-Hall.
Wegner, P. *Programming Languages, Information Structures & Machine Organization.* McGraw-Hill.

ENGINEERING

5.010 Engineering A

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
Svensson, N. L. *Introduction to Engineering Design.* N.S.W. U.P.
Walshaw, A C. *SI Units in Worked Examples.* Longman.

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

PRINCIPAL REFERENCE BOOKS
Beakley, G. C. & Chilton, E. G. *Introduction to Engineering Design and Graphics.* Macmillan.
Beer, F. P. & Johnston, E. R. *Statics and Dynamics.* Vector, ed. McGraw-Hill.
Harrisberger, L. *Engineersmanship.* Wadsworth.
Krick, E. V. *Introduction to Engineering and Engineering Design.* Wiley.
Meriam, J. L. *Statics and Dynamics.* Wiley.

5.020 Engineering B

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.

and either

(i) *Introduction to Systems and Computers:* Introduction to computers to follow the computer work in Mathematics I. Develops familiarity with algorithms and the use of procedure-oriented languages, and introduces computing equipment. *Systems:* Some of the concepts used in engineering, the relationship of these concepts to phenomena within

students' experience, and the illustration of the concepts by case histories and engineering examples. Quantities. Concepts. Components. Systems.

or
(ii) (Civil Engineering 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 *Introduction to Systems and Computers:*
Karbowiak, A. E. & Huey, R. M. eds. *Information Computers, Machines and Man.* Wiley.

For *Mechanics of Solids I:*
Hall, A. S. *Introduction to Mechanics of Solids.* Wiley.

PRINCIPAL REFERENCE BOOKS

Beer, F. P. & Johnston, E. R. *Statics and Dynamics.* Vector ed. McGraw-Hill.
Meriam, J. L. *Statics and Dynamics.* Wiley.

5.030 Engineering C

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

And one of the following options (determined by the course of study):

(i) *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.

(ii) (Civil Engineering students must take this option) *Introduction to Materials II:* Creep of materials. Relaxation. Fatigue. Experimental techniques. Variability of materials. Temperature effects. Rate of 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.

(iii) *Introduction to Systems and Computers*
As for 5.020 (i).

(iv) (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.

(v) (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.

(vi) (Mining Engineering and Industrial Arts students must take this option) *Mechanics of Solids I.*

As for 5.020 (ii).

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 Metallurgical Engineering:*

Street, A. & Alexander, W. O. *Metals in the Service of Man.* Penguin.

PRINCIPAL REFERENCE BOOKS

For *Introduction to Materials II:*

Clark, D. S. & Varney, W. R. *Physical Metallurgy for Engineers.* Van Nostrand Reinhold.

For *Introduction to Engineering Construction:*

Pannell, A. N. *History of Civil Engineering.* Wiley.

Antill, J. M. & Ryan, P. W. S. *Civil Engineering Construction.* 4th ed. A. & R.

Peurifoy, R. L. *Construction Planning, Equipment and Methods.* 2nd ed. McGraw-Hill.

For *Introduction to Metallurgical Engineering:*

Aitchison, L. *A History of Metals.* Vols I & II. McDonald & Evans.

Dennis, W. H. *Extractive Metallurgy.* McGraw-Hill.

Guy, A. C. *Physical Metallurgy for Engineers.* Addison-Wesley.

Woodcock, J. T. ed. *The Australian Mining, Metallurgical and Mineral Industry. Vol. 3. Eighth Commonwealth Mining & Metallurgical Congress.* The Australasian Institute of Mining and Metallurgy.

GENERAL BIOLOGY

17.011 Biology of Mankind

Mankind evolving: primate evolution; background of early man. Evolution of technological man: biological problems associated with communication and tool-making; development of man as a hunting predator. Development of utilization of natural resources: development of man as a pastoralist and farmer; animal and plant domestication. Evolution of urban man, culture, society: reproductive biology and genetics of man; population growth, fluctuation, control; natural history of disease, background of medical and industrial microbiology. Effects of modern society: biology of social stress; effect of society in contemporary environments, planning and control.

TEXTBOOKS

Abercrombie, M. et al. *A Dictionary of Biology*. Penguin, 1967.
Boughey, A. S. *Man and the Environment*. Macmillan, 1971.
Cavalli-Sforza, L. L. *Elements of Human Genetics*. Addison-Wesley, 1973.

PRINCIPAL REFERENCE BOOKS

Bates, M. *Man in Nature*. Prentice-Hall, 1964.
Boughey, A. S. *Readings in Man, the Environment and Human Ecology*. Macmillan, 1973.
Carter, C. O. *Human Heredity*. Penguin, 1962.
Ehrlich, P. R., Ehrlich, A. H. O. & Holdren, J. P. *Human Ecology*. Freeman, 1973.
Greenwood, N. H. & Edwards, J. M. B. *Human Environments and Natural Systems*. Duxbury Press, 1973.
Heiser, G. B. *Seed to Civilisation*. Freeman, 1973.
Mulvaney, D. J. & Golson, G. eds. *Aboriginal Man and Environment in Australia*. A.N.U.P., 1973.
Nix, H. A. ed. *The City as a Life System*. Southwood, 1973.
Scientific American. *Biology and Culture in Modern Perspective*. Freeman, 1972.
Scientific American. *Science Conflict and Society*. Freeman, 1968.
Weiner, J. S. *Man's Natural History*. Weidenfeld & Nicolson, 1971.
Young, J. Z. *An Introduction to the Study of Man*. Clarendon, 1971.

17.021 Comparative Functional Biology

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, 1967.

Roberts, M. B. V. *Biology: A Functional Approach*. Nelson, 1971.

PRINCIPAL REFERENCE BOOKS

Coult, D. A. *The Working Plant*. Longman, 1973.

Grenville, H. W. *Biology of the Individual*. Longman, 1971.

Griffin, D. R. & Novick, A. 2nd ed. *Animal Structure and Function*. Holt, Rinehart & Winston, 1970.

Kramer, A. ed. *Topics in the Study of Life*. Harper & Row, 1971.

Ray, P. M. *The Living Plant*. 2nd ed. Holt, Rinehart & Winston, 1972.

Springthorpe, E. G. *An Introduction to Functional Systems in Animals*. Longman, 1973.

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

Evolution and environmental selection in the Australian continent: 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. *Fundamentals of Ecology*. Saunders, 1953.

Watt, K. E. F. *Principles of Environmental Science*. McGraw-Hill, 1973.

PRINCIPAL REFERENCE BOOKS

Ehrlich, P. R. & Ehrlich, A. H. *Population, Resources, Environment*. Freeman, 1972. Also in paperback.

Kershaw, K. A. *Quantitative and Dynamic Ecology*. Arnold, 1964.

Phillipson, J. *Ecological Energetics*. Arnold, 1966.

Solomon, M. E. *Population Dynamics*. Arnold, 1969.

Wagner, R. H. *Environment and Man*. Norton, 1971.

GEOGRAPHY

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

An introduction to the mechanism of the physical environment, with particular exemplification within the Sydney region. Geologic controls of landform development; fluvial, slope and coastal processes and landforms; cyclic and equilibrium approaches to landform studies. The global radiation budget and atmospheric circulation; weather and climatic controls in the Sydney region. The hydrologic cycle. Processes and factors of soil formation and the mature soil profile. Controls of vegetation in the Sydney region. The ecosystem.

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

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

PRINCIPAL REFERENCE BOOKS
Bird, E. F. C. *Coasts.* A.N.U.P.
Branagan, D. & Packham, G. *Field Geology of New South Wales.* Science
    Press.
Corbett, J. R. *The Living Soil.* Martindale.
Gentilli, J. *Sun, Climate and Life.* Jacaranda.
Ecological Society of Australia. *The City as a Life System.* Collected
    papers.
Twidale, C. R. *Geomorphology.* Nelson.
Twidale, C. R. & Foale, M. R. *Landforms Illustrated.* Nelson.

27.802 Introduction to Human Geography

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

*Hurst, M. E. *A Geography of Economic Behavior*. Duxbury Press.
Toyne, P. & Newby, P. T. *Techniques in Human Geography*. Macmillan.

PRINCIPAL REFERENCE BOOKS

Abler, R., Adams, J. S. & Gould, P. *Spatial Organisation*. Prentice-Hall.
Cox, K. R. *Man, Location and Behavior: An Introduction to Human Geography*. Wiley.
Demko, G. J., Rose, H. M. & Schnell, G. A. *Population Geography: A Reader*. McGraw-Hill.
*Ehrlich, P. R. & A. H. *Population, Resources, Environment*. Freeman.
English, P. W. & Mayfield, R. C. *Man, Space, Environment*. O.U.P.
*Haggett, P. *Geography: A Modern Synthesis*. Harper Int.
*Lloyd, P. E. & Dicken, P. *Location in Space: A Theoretical Approach to Economic Geography*. Harper Int.
Logan, M. I. & Missen, G. J. *New Viewpoints in Urban and Industrial Geography*. Reed Education.
McCarty, H. H. & Lindberg, J. B. *A Preface to Economic Geography*. Prentice-Hall.
*Morgan, W. B. & Munton, R. J. C. *Agricultural Geography*. Methuen.
Morrill, R. L. *The Spatial Organisation of Society*. 2nd ed. Wadsworth.
Powell, J. M. ed. *Urban and Industrial Australia: Readings in Human Geography*. Sorrett Publishing.
Powell, J. M. ed. *The Making of Rural Australia: Environment, Society and Economy*. Sorrett Publishing.

27.103 Climatology

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 U.P.

PRINCIPAL REFERENCE BOOKS

Bach, W. *Atmospheric Pollution*. McGraw-Hill.
Chang, Jen-Hu. *Climate and Agriculture*. Aldine.
Chorley, R. J. ed. *Water, Earth and Man*. Methuen.
Chow, Ven Te. ed. *Handbook of Applied Hydrology*. McGraw-Hill.
Gates, D. H. *Energy Exchange in the Biosphere*. Harper & Row.
Landsberg, H. E. ed. *World Survey of Climatology*. Vol. 2 *General Climatology*. Elsevier.

*Paperback.

Platt, R. B. & Griffiths, J. F. *Environmental Measurements and Interpretation.* Reinhold.
Rose, C. W. *Agricultural Physics.* Pergamon.
Slatyer, R. O. & McIlroy, I. C. *Practical Microclimatology.* CSIRO.
World Meteorological Organisation. *Guide to Meteorological Instrument and Observing Practices.* W.M.O. Secretariat.
World Meteorological Organisation. *Guide to Hydrometeorological Practices.* W.M.O. Secretariat.

27.203 Biogeography

Ecosystems, their structure and dynamics. Energy flow and biogeochemical cycles. Comparative photosynthetic capacity of plants. Productivity, exploitation, pollution, management and conservation of ecosystems. Man as an ecological agent. Quantitative sampling, measurement and description of vegetation. Spatial distribution (pattern) of individual species. Association between species. Ecology of tropical and sub-tropical regions with special reference to Australia. Floristic composition, structure and physiognomy of the 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 Ecology.* Arnold.
Odum, E. P. *Fundamentals of Ecology.* 3rd ed. Saunders, 1971.

PRINCIPAL REFERENCE BOOKS

Anderson, R. H. *The Trees of New South Wales.* N.S.W. Govt. Printer.
Barnard, C. *Grasses and Grasslands.* Macmillan, 1964.
Beadle, N. C. W., Evans, O. D. & Carolin, R. L. *Flora of the Sydney District.* Reed.
Curtis, J. T. *The Vegetation of Wisconsin: an Ordination of Plant Communities.* Madison.
Darlington, P. J. *Biogeography of the Southern End of the World.* Harvard U.P.
Elton, C. S. *The Ecology of Invasions by Animals and Plants.* Methuen.
Eyre, S. R. *Vegetation and Soils. A World Picture.* 2nd ed. Arnold, 1968.
Eyre, S. R. ed. *World Vegetation Types.* Macmillan, 1971.
Hutchinson, J. *The Families of Flowering Plants.* Vols. I and II. O.U.P.
Keast, A., Crocker, R. L. & Christian, C. S. eds. *Biogeography and Ecology in Australia.* Monographiae Biologicae. Vol. 8. W. Junk.
Lazarides, M. *The Grasses of Central Australia.* A.N.U. Press.
Leeper, G. W. *The Australian Environment.* M.U.P.
Lemee, G. *Precis de Biogeographie.* Masson, Paris.
Moore, R. M. ed. *Australian Grasslands.* A.N.U. Press.
Odum, E. P. *Ecology.* Holt, Rinehart & Winston.
Quezel, P. *La Vegetation du Sahara.* Fischer-Verlag. Stuttgart.
Richards, P. W. *The Tropical Rain Forest.* C.U.P.
Schnell, R. *Introduction a la Phytogeographie des Pays Tropicaux.* Vols I and II. Gautheir-Villars. Paris.
Slatyer, R. O. & Perry, R. A. eds. *Arid Lands of Australia.* A.N.U.P.
Udvardy, M. D. F. *Dynamic Zoogeography.* Van Nostrand Reinhold.
Walter, H. *Ecology of Tropical and Subtropical Vegetation.* Oliver & Boyd.
Walter, H. *Die Vegetation der Erde.* In Oko-Physiologisher Betrachtung. Vols I and II. Jena.
Watts, D. *Principles of Biogeography.* McGraw-Hill.

27.413 Geomorphology

Advanced work in selected areas of coastal and fluvial geomorphology. The characteristics of waves in deep and shallow water. Beaches and coastal barrier systems; lagoons and estuaries. Rock platforms. Quaternary sea-level changes. Drainage basin morphometry; hill-slope geometry and hydrology. Runoff and sediment yields and their controlling factors. Variations in geomorphic processes between regions; the impact of human activity. Field projects 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.

PRINCIPAL REFERENCE BOOKS

Carson, M. A. & Kirkby, M. J. *Hillslope Form and Process*. C.U.P.

Chorley, R. J. ed. *Spatial Analysis in Geomorphology*. Methuen.

Chorley, R. J. ed. *Water, Earth and Man*. Methuen.

Chorley, R. J. & Kennedy, B. *Physical Geography: A Systems Approach*. Methuen.

Doornkamp, J. C. & King, C. A. M. *Numerical Analysis in Geomorphology*. Arnold.

Gregory, K. J. & Walling, D. E. *Drainage Basin Form and Process*. C.U.P.

King, C. A. M. *Beaches and Coasts*. Arnold.

Leopold, L. B., Wolman, M. G. & Miller, J. P. *Fluvial Processes in Geomorphology*. Freeman.

*Morisawa, M. *Streams, their Dynamics and Morphology*. McGraw-Hill.

Pitty, A. *Introduction to Geomorphology*. Methuen.

Schumm, S. A. ed. *River Morphology*. Dowden, Hutchinson & Ross.

Young, A. *Slopes*. Oliver & Boyd.

27.423 Pedology

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 four days field tutorials are an essential part of the course.

TEXTBOOK

Bridges, E. M. *World Soils*. C.U.P.

Corbett, J. R. *The Living Soil*. Martindale.

PRINCIPAL REFERENCE BOOKS

Alexander, M. *Introduction to Soil Microbiology*. Wiley.

Baver, L. D. *Soil Physics*. Wiley.

Bear, F. E. ed. *The Chemistry of the Soil*. Arnold.

*Paperback.

Bear, F. E. *Soil in Relation to Crop Growth*. Reinhold.

Black, C. A. *Soil-Plant Relationships*. Wiley.

Buckman, H. O. & Brady, N. C. *The Nature and Properties of Soils*. Macmillan.

Clarke, G. C. & Beckitt, P. H. T. *The Study of the Soil in the Field*. O.U.P.

Northcote, K. H. *A Factual Key for the Recognition of Australian Soils*. Rellim.

Piper, C. S. *Soil and Plant Analysis*. Adelaide U.P.

Rose, C. W. *Agricultural Physics*. Pergamon.

Russell, E. W. *Soil Conditions and Plant Growth*. Longman.

Stace, G. T. et al. *A Handbook of Australian Soils*. Rellim.

GEOLOGY

FOR STUDENTS IN THE SCIENCE COURSE

Students may major in Geoscience in the Science course (see the 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 Geoscience will complete the following subjects:—

First year—25.111 Geoscience I (as for 25.001 Geology I in the Applied Geology degree course).

Second year—25.112A Geoscience IIA and 25.112B Geoscience B.

Third year—25.113A Geoscience IIIA and 25.113B Geoscience IIIB.

In addition, a first year course 25.151 Geoscience IA is offered as an alternative to 25.111 Geoscience 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 25.111 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 two third year Geology subjects and part-time students who have completed course requirements up to the end of the sixth year and whose programme includes the two 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 either Physics and Geology *or* Chemistry and Geology, may also be admitted to the course which would include some studies in Geophysics or Geochemistry respectively.

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.

25.111 Geoscience I

Physical Geology: The origins, structure and main surface features of the earth; geological cycle—processes of erosion, transportation, sedimentation and lithification. Surface and sub-surface water. Weathering, lakes, rivers, glacial phenomena. Vulcanism, earthquakes, orogenesis and 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. 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. Applied stereoscopic projection. Identification and description of common minerals and rocks in hand specimen. Recognition and description of examples of important fossil groups. Supplemented by three field tutorials, attendance at which is compulsory.

TEXTBOOKS

Black, R. M. *Elements of Palaeontology.* C.U.P., 1970.
Bickford, M. E. et al. *Geology Today.* CRM Books. California, 1973.
Rutley, F. *Rutley's Elements of Mineralogy.* Read, H. H. ed. Murby, London.
Tyrrell, G. W. *The Principles of Petrology.* Methuen.

25.112A Geoscience IIA

Mineralogy: Principles of optical crystallography; the construction and use of a polarizing microscope. Polymorphism; the crystal chemistry, crystallography and geological occurrence of the main groups of rock forming minerals. Description and recognition of common ore and rock forming minerals in both hand specimen and thin section.

Igneous Petrology: Occurrence, genesis and classification of the commoner igneous rocks. Crystallization of magma. Binary systems. The reaction series. Introduction to micropetrography.

Metamorphic Petrology: Principles, concepts and theories relating to the occurrence, origin and classification of metamorphic rocks. ACF and AKF diagrams. Metamorphic facies. Practical: megascopic and microscopic examination of selected metamorphic rocks. Field Work: at least one field trip to illustrate the above course.

Sedimentary Petrology: The influence of transportation, deposition and diagenesis on the composition, texture and structure of the sedimentary rocks. The classification of detrital sediments. The non-elastic sediments.

Structural Geology: Description of structures, mesoscopic-macroscopic, fractures, joints, faults, folds and their structural elements; foliation, lineation. Introduction to tectonics and plate tectonics. Practical: stereographic projection; analysis of fractures, faults folds and their structural elements; foliation, lineation, strain analysis and rotation problems. *Field Work:* at least one compulsory field trip to illustrate the above course.

TEXTBOOKS

Mineralogy

Bloss, F. D. *An Introduction to the Methods of Optical Crystallography.* Holt, Rinehart & Winston, 1967.

Heinrich, E. W. *Microscopic Identification of Minerals.* McGraw-Hill, 1965.

Petrology (Igneous, Metamorphic and Sedimentary)

Williams, H., Turner, F. J., & Gilbert, C. M. *Petrography.* Freeman, 1954.

Winkler, H. G. F. *Petrogenesis of Metamorphic Rocks.* 2nd ed. Springer, 1967.

Structural Geology

Ragan, D. M. *Structural Geology: An Introduction to Geometrical Techniques.* 2nd ed. Wiley, 1972.

Spencer, E. W. *Introduction to the Structure of the Earth.* McGraw-Hill, 1969.

25.112B Geoscience IIB

Palaeontology: Morphology and systematics of major fossil invertebrate phyla (Part 1) and their stratigraphic distribution. Practical: examination of representative fossils from each phylum.

Sedimentary Environments: Environments of deposition and sedimentary processes. Classification of sedimentary rocks.

Stratigraphy: Stratigraphic principles. Geosynclines and their evolution. Stratigraphy of selected provinces of Eastern Australia.

TEXTBOOKS

Palaeontology

Moore, R. C., Lalicker, C. G. & Fischer, A. G. *Invertebrate Fossils.* McGraw-Hill, 1952.

Sedimentary Environments and Stratigraphy

Blatt, H., Middleton, G. & Murray, R. *Origin of Sedimentary Rocks.* Prentice-Hall.

Dunbar, C. O. & Rodgers, J. *Principles of Stratigraphy.* Wiley, 1957.

Brown, D. A., Campbell, K. S. & Crook, K. A. W. *Geological Evolution of Australia and New Zealand.* Pergamon, 1968.

25.113A Geoscience IIIA

Economic Geology I: Principles and theories of ore formation. Magmatic, hydrothermal, submarine exhalative deposits. Sedimentary deposits including biogenetic alluvial and residual deposits. Metallic and non-metallic economic minerals. Hand specimen and elementary mineragraphic practical work.

X-ray Crystallography: Principles of X-ray diffraction; simple application of X-ray powder cameras and diffractometers. Elementary single crystal camera theory.

Mineralogical Techniques: Optical instrumentation; Berek Compensator, Refractometers, Universal Stage. Volume Distribution analysis. Laboratory methods of mineral separation.

Igneous Petrology: Magma types and differentiation trends. Ternary systems. Effects of load pressure and water vapour pressure on phase equilibria. Micro-petrography of a wide range of igneous rocks.

Metamorphic Petrology: Metamorphic mineral assemblages, fabric. Experimental petrology, metamorphic reactions. Facies and facies series. Metamorphic mapping. Metamorphic petrology of Australia. Practical: Megascopic and microscopic examination of classic metamorphic rock suites. Mineral assemblages and fabric studies. Field Work: At least one field trip to study structural and mineral problems in metamorphic terrain.

Tectonics: The geophysical, sedimentological, petrological and structural geological aspects of global geotectonics.

TEXTBOOKS

Economic Geology
Park, C. F. & MacDiarmid, R. A. *Ore Deposits.* 2nd ed. Freeman, 1970.
Stanton, R. *Ore Petrology.* McGraw-Hill, 1972.

X-ray Crystallography
Azaroff, L. V. & Donahue, R. J. *Laboratory Experiments in X-ray Crystallography.* McGraw-Hill, 1969.

Mineralogical Techniques
As for 25.112B Mineralogy, plus:
Zussman, J. ed. *Physical Methods in Determinative Mineralogy.* Academic, 1967.

Metamorphic Petrology
Joplin, G. *A Petrography of Australian Metamorphic Rocks.* A. & R., 1968.
Winkler, H. G. F. *Petrogenesis of Metamorphic Rocks.* 2nd ed. Springer, 1967.

Igneous Petrology
Deer, W. A., Howie, R. A. & Zussman, J. *Rock-forming Minerals.* Longmans, 1966.
Turner, F. J., & Verhoogen, J. *Igneous and Metamorphic Petrology.* McGraw-Hill, 1960.

Tectonics
Gaskell, T. F. *Physics of the Earth.* Thames & Hudson, 1970.

25.113B Geoscience IIIB

Stratigraphy: Advanced stratigraphic principles and techniques. Geochronology. Geosynclines and plate tectonics. Sedimentational and tectonic history of selected provinces in Australia. The theory of continental drift and its stratigraphic implications.

Biostratigraphy: Biostratigraphy and the use of selected fossil groups in stratigraphic correlation.

Geophysics: An introduction to the physics, shape, structure, constitution and dynamics of the earth: seismology, gravity, geodesy, geothermy, geomagnetism, palaeomagnetism. An introduction to main methods of geophysical exploration.

Palaeontology: Morphology and systematics of major fossil invertebrate phyla and their stratigraphic distribution. An introduction to evolution of vertebrates. Palaeobotany. Elements of palaeoecology and practical applications.

Field Work: Ten days' field camp, equivalent to two hours per week, is held out of session.

TEXTBOOKS
Stratigraphy and Biostratigraphy
    As for 25.112B Geoscience IIB, plus
Berry, W. B. N. *Growth of a Prehistoric Time Scale Based on Organic Evolution.* Freeman, 1968.
Krumbein, W. C. & Sloss, L. L. *Stratigraphy and Sedimentation.* 2nd ed. Freeman, 1963.
Lahee, F. H. *Field Geology.* McGraw-Hill, 1952.

Geophysics
Parasnis, D. S. *Principles of Applied Geophysics.* Chapman & Hall, 1972.

Palaeontology
    As for 25.112B Palaeontology.
Ager, D. V. *Principles of Palaeoecology.* McGraw-Hill, 1963.
Colbert, E. H. *Evolution of the Vertebrates.* Wiley.
Von Koenigswald, G. H. R. *The Evolution of Man.* Michigan U.P., 1962.

25.014 Geology IV (Honours)
TEXTBOOKS
Mining and Petroleum Geology
Lawrence, L. J. ed. *Exploration and Mining Geology.* Aust. Inst. Min. Met., Melbourne, 1965.

Geophysics
Dobrin, N. B. *Introduction to Geophysical Prospecting.* McGraw-Hill, 1960.
Grant, F. S. & West, G. F. *Interpretation Theory in Applied Geophysics.* McGraw-Hill, 1964.
Parasnis, D. S. *Principles of Applied Geophysics.* Methuen, 1962.

25.151 Geoscience IA
    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, but during Session 2 certain additional topics are presented, while others are treated in less depth than in 25.111 Geoscience. 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 Books, 1973.
Rutley, F. *Rutley's Elements of Mineralogy*. Read, H. H. ed. Murby.
Tyrrell, G. W. *The Principles of Petrology*. Methuen.

25.603A Geological Oceanography

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, 1972.

PRINCIPAL REFERENCE BOOKS

Emery, K. O. *The Sea off Southern California*. Wiley, 1960.
Ericson, D. B. & Wollin, G. *The Deep and the Past*. Knopf, 1964.
Gass, R. *Understanding the Earth*. Open University, 1971.
Loeblich, A R. & Tappan, H. *Foraminiferida*. Vol. C of the Treatise on
    Invertebrate Palaeontology. Geological Society of America, 1964.
Menard, H. *Marine Geology of the Pacific*. McGraw-Hill, 1964.
Reports of the Deep Sea Drilling Projects. Vols 1-30. National Science
    Foundation, 1970-.

SCHOOL OF 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 century, for example, the term "philosophy" included science. The principal aims of the History and Philosophy of Science courses in the Faculty of Science 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.

Three level II units, 62.012 The Origins of Modern Science, 62.022 The Social History of Nineteenth and Twentieth Century Science, and 62.032 The Scientific Theory, are offered, one in Session 1 and two in Session 2: the prerequisites for all three units are a pass in at least *two* of the following: 1.001, 1.011, 2.001, 10.001, 10.011, 10.021, 12.001, 17.011 and 17.021, 25.111, 27.801 and 27.802. Each unit has unit value 1, and requires six hours a week for one session, made up of lectures, tutorial and library work.

The following six level III units are offered in 1975: 62.013 History of the Philosophy of Science, 62.033 The Development of Theories of Matter, 62.043 The Historical Foundations of Experimental Biology, 62.053 The History of Theories of Generation and Heredity, 62.063 History and Philosophy of Cosmology, 62.073 Predicate Logic and the Foundations of Mathematics (offered by the School of Philosophy). The prerequisites for these are *either* 62.012 *or* 62.032, except for 62.073, entry into which requires permission of the Head of the School of History and Philosophy of Science. The units 62.033 and 62.043 are offered in Session 1; 62.053 and 62.063 in Session 2; 62.013 and 62.073 are two-session units. Each unit has unit value 1, and requires six hours a week for one session, made up of lectures, tutorial and library work, except for 62.013 and 62.073, each of which requires three hours a week for two sessions, made up in the case of the former of lectures, tutorial and library work and of the latter of lectures and library work.

An Honours year will be introduced in 1976. Students intending to major in History and Philosophy of Science should take all three level II units, and four level II 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 programme is well suited for intending science teachers. A major in History and Philosophy of Science in the Faculty of Science 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).

62.012 The Origins of Modern Science

An introductory course dealing with the Scientific Revolution of the seventeenth century, the philosophical issues beeng 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.

PRINCIPAL REFERENCE BOOKS

Bacon, F. Anderson, F. H. ed. *The New Organon and Related Writings*. Bobbs-Merrill.
Blake, R. M., Ducasse, C. J. & Madden, E. H. eds. *Theories of Scientific Method—The Renaissance through the Nineteenth Century*. Washington U.P.
Boas, M. *The Scientific Renaissance, 1450-1630*. Collins.
Descartes, R. *Discourse on Method and Other Writings*. Penguin.
Dijksterhuis, E. J. *The Mechanisation of the World Picture*. O.U.P.
Galilei, G. *Dialogue Concerning the Two Chief World Systems*. U. of Calif.
Galilei, G. Drake, S. ed. *Discoveries and Opinions of Galileo*. Doubleday.
Hall, A. R. *The Scientific Revolution 1500-1800*. Collins.
Harvey, W. *On the Motion of the Heart and Blood*. Everyman.
Hobbes, T. *Leviathan*. Pelican.
Kearney, H. *Science and Change 1500-1700*. World Univ. Lib.
Koyré, A. *From the Closed World to the Infinite Universe*. Johns Hopkins U.P.
Kuhn, T. S. *The Copernican Revolution*. Random House.
Mason, S. F. *A History of the Sciences*. Collier.
Thayer, H. *Newton's Philosophy of Nature*. Hafner.
Westfall, R. S. *Science and Religion in Seventeenth Century England*. Newhaven.
Wolf, A. *A History of Science, Technology and Philosophy in the Sixteenth and Seventeenth Centuries*. Harper.

62.022 The Social History of Nineteenth and Twentieth Century Science

The development of the scientific enterprise in its social and cultural context from the nineteenth century to the present. Topics: the nature and functions of modern scientific societies, the relations of science with the universities and other teaching institutions and with the professions of medicine and engineering, the effects of science on technology and of technology on science, and the relations between science and the State, with special reference to specific problems in the U.S.A., Britain, the Soviet Union, Germany and the developing nations.

TEXTBOOKS

No suitable textbooks are available. Reading lists, selections from primary sources, and other material will be issued during the course.

PRINCIPAL REFERENCE BOOKS

Argles, M. *South Kensington to Robbins: An Account of English Technical and Scientific Education since 1851.* Longman.
Armytage, W. H. G. *A Social History of Engineering.* Faber.
Artz, F. B. *The Development of Technical Education in France.* Society for the History of Technology, Cleveland.
Ashby, E. *Technology and the Academics.* Macmillan.
Barber, B. *Science and the Social Order.* Collier.
Beer, J. J. *The Emergence of the German Dye Industry.* Illinois U.P.
Ben-David, J. *The Scientist's Role in Society.* Prentice-Hall.
Bernal, J. D. *Science and Industry in the Nineteenth Century.* Routledge.
Buchanan, R. A. *Technology and Social Progress.* Pergamon.
Clapp, M. *The Modern University.* Cornell U.P.
Haberer, J. *Politics and the Community of Science.* Van Nostrand.
Haines, R. F. *German Influence upon English Education and Science, 1800-1866.* Connecticut College.
Kranzburg, M. & Pursell, C. W. *Technology in Western Civilization.* 2 vols. O.U.P.
Lilley, S. *Essays on the Social History of Science.* Centaurus.
Merz, J. T. *A History of European Thought in the Nineteenth Century.* Vol 1. Dover.
Paulsen, F. *The German Universities: Their Character and Historical Development.* Macmillan.
Price, D. J. *Little Science, Big Science.* Columbia U.P.
Roderick, G. W. *The Emergence of a Scientific Society in England, 1800-1965.* Macmillan.
Rose, H. & Rose, S. *Science and Society.* Penguin.
Sharlin, H. I. *The Making of the Electrical Age.* Abelard-Schuman.
Van Tassel, D. D. & Hall, M. G. *Science and Society in the United States.* Dorsey.
Vucinich, A. *Science in Russian Culture.* 2 vols. Owen.

62.032 The Scientific Theory

Session 2

The scientific theory—its origins, nature and nurture. With particular reference to selected historical examples chosen from both the physical and biological sciences, a number of philosophically interesting problems relating to scientific theories are subjected to analysis. Topics: 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 Origin of Species.* Penguin.
Hanson, N. R. *Observation and Explanation.* Allen & Unwin.
Hempel, C. G. *Philosophy of Natural Science.* Prentice-Hall.
Kuhn, T. S. *The Structure of Scientific Revolutions.* 2nd ed. Chicago U.P.
Losee, J. *A Historical Introduction to the Philosophy of Science.* O.U.P.
Popper, K. R. *The Logic of Scientific Discovery.* Harper Torchbook.

PRINCIPAL REFERENCE BOOKS

Barker, S. F. *Philosophy of Mathematics.* Prentice-Hall.

Basson, A. H. & O'Connor, D. J. *Introduction to Symbolic Logic.* University Tutorial Press. Or any similar textbook of logic.

Braithwaite, R. B. *Scientific Explanation.* Harper Torchbook.

Duhem, P. *The Aim and Structure of Physical Theory.* Princeton U.P.

Hanson, N. R. *Patterns of Discovery.* Cambridge U.P.

Hesse, M. B. *Forces and Fields.* Nelson.

Hesse, M. B. *Models and Analogies in Science.* Sheed & Ward.

Kant, I. *Prolegomena to Any Future Metaphysics.* Manchester U.P. or Library of Liberal Arts.

Lakatos, I. & Musgrove, A. eds. *Criticism and the Growth of Knowledge.* C.U.P.

Medawar, P. B. *Induction and Intuition in Scientific Thought.* Methuen.

Nagel, E. *The Structure of Science.* Routledge.

Nash, L. K. *The Nature of the Natural Sciences.* Little, Brown & Co.

Popper, K. R. *Conjectures and Refutations.* Routledge.

Toulmin, S. *The Philosophy of Science.* Harper Torchbook.

62.013 History of the Philosophy of Science

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.* O.U.P.

TEXTBOOKS

No suitable textbooks are available. Most of the editions of primary sources listed under "Principal Reference Books" below are reasonably priced. Students should buy some primary sources and will be advised in class re selection.

PRINCIPAL REFERENCE BOOKS

Primary Sources

Berkeley, G. *Berkeley's Philosophical Writings.* Armstrong, D. M. ed. Collier.

Duhem, P. *The Aim and Structure of Physical Theory.* Princeton U.P.

Herschel, J. F. W. *Preliminary Discourse on the Study of Natural Philosophy.* Johnson Reprint Corporation.

Hume, D. *A Treatise of Human Nature.* Penguin.

Kant, I. *Critique of Pure Reason.* Everyman.

Leibniz, G. W. *Leibniz Selections*. Wiener, P. P. ed. Scribners.
Locke, J. *An Essay Concerning Human Understanding*. Fontana.
Mill, J. S. *John Stuart Mill's Philosophy of Scientific Method*. Nagel, E. ed. Hafner.
Whewell, W. *William Whewell's Theory of Scientific Method*. Butts, R. E. ed. Pittsburgh U.P.

62.023 The Scientific Community*

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 stiucture 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

Review of early theories and the development of man's ideas about the nature of matter up to the mid-twentieth century. 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. ed. *The Science of Matter*. Penguin.
Toulmin, S. E. & Goodfield, J. *The Architecture of Matter*. Pelican.

PRINCIPAL REFERENCE BOOKS

Amaldi, A. *The Nature of Matter*. Allen & Unwin.
Hanson, N. B. *The Concept of the Positron. A Philosophical Analysis*. C.U.P.
Hughes, A. *History of Cytology*. Abelard-Schuman.
Jammer, M. *The Conceptual Development of Quantum Mechanics*. McGraw-Hill.
Knight, D. M. *Atoms and Elements. A Study of Theories of Matter in England in the Nineteenth Century*. Hutchinson.
Melsen, A. G. van. *From Atomos to Atom*. Harper & Row.
Nash, L. K. *The Atomic-Molecular Theory*. Harvard U.P.
Nye, M. J. *Molecular Reality. A Perspective on the Scientific Work of Jean Perrin*. McDonald & American Elsevier.
Russell, C. A. *The History of Valency*. Leicester U.P.
Schneer, C. J. *Mind and Matter. Man's Changing Concepts of the Material World*. Grove Press.
Sullivan, N. *The Message of the Genes*. Routledge & Kegan Paul.
Thackray, A. *Atoms and Powers*. O.U.P.

Further references, and copies of original source material, will be provided in class.

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*Not available in 1975.

62.043 The Historical Foundations of Experimental Biology

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 plant and animal physiology. Topics: 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 text.

PRINCIPAL REFERENCE BOOKS

Bernard, C. *Introduction to the Study of Experimental Medicine.* Collier.
Bodenheimer, F. S. *The History of Biology.* Dawson.
Crosland, M. P. ed. *The Science of Matter.* Penguin.
Gasking, E. B. *The Rise of Experimental Biology.* Random House.
Goodfield, G. J. *The Growth of Scientific Physiology.* Hutchinson.
Hales, S. *Statical Essays.* Hafner.
Harvey, W. *On the Motion of the Heart and Blood.* Everyman.
Hughes, A. *A History of Cytology.* Abelard Schuman.
Kuhn, T. S. *The Structure of Scientific Revolutions.* Chicago U.P.
Mendelsohn, E. *Heat and Life: The Development of the Theory of Animal Heat.* Harvard.
Olmsted, J. M. D. *François Magendie.* Schuman.
Pagel, W. *William Harvey's Biological Ideas.* Karger.
Rook, A. *The Origins and Growth of Biology.* Penguin.
Taylor, R. *The Science of Life.* Thames & Hudson.

62.053 The History of Theories of Generation and Heredity

The development of theories relating to generation and heredity, with special reference to the interplay of scientific, social and ideological factors. While earlier ideas are outlined, the course is largely concerned with the period from 1830 to 1930. Topics: the cell theory; sexual and asexual reproduction; embryology; the theory of spontaneous generation and its overthrow (including the explanation of fermentation and the germ theory of disease); 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 text.

PRINCIPAL REFERENCE BOOKS

Cole, F. J. *Early Theories of Sexual Generation.* Clarendon.
Conant, J. B. *Pasteur's Study of Fermentation.* Harvard.
Conant, J. B. *Pasteur's and Tyndall's Study of Spontaneous Generation.* Harvard.
Darwin, C. *The Descent of Man and Selection in Relation to Sex.* Murray.
Dunn, L. C. *A Short History of Genetics.* McGraw-Hill.
Freud, S. *New Introductory Lectures on Psychoanalysis.* Vol. 22. Hogarth.
Gasking, E. *Investigations into Generation, 1651-1828.* Hutchinson.
Harvey, W. *Collected Works.* Johnson Reprint.
Hughes, A. *A History of Cytology.* Abelard-Schuman.

Koestler, A. *The Case of the Midwife Toad.* Random House.
Kuhn, T. S. *The Structure of Scientific Revolutions.* Chicago U.P.
Mendel, G. *Experiments on Plant Hybridisation.* Harvard.
Needham, J. *A History of Embryology.* C.U.P.
Olby, R. C. *Origins of Mendelism.* Constable.

62.063 History and Philosophy of Cosmology

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

(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.

PRINCIPAL REFERENCE BOOK

Church, A. *Introduction to Mathematical Logic.* Princeton U.P.

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.

PRINCIPAL REFERENCE BOOKS

Benacerraf, P. & Putnam, H. *Philosophy of Mathematics.* Prentice-Hall.
Blanche, R. *Axiomatics.* Routledge.
Fraenkel, A. A. & Bar-Hilel, Y. *Foundations of Set Theory.* North-Holland.
Kleene, S. C. *An Introduction to Meta-mathematics.* Princeton U.P.
Korner, S. *The Philosophy of Mathematics.* Hutchinson.
Mendelson, E. *Mathematical Logic.* Van Nostrand.
Nagel, E. & Newman, J. R. *Gödel's Proof.* N.Y.U.P. or Routledge.

62.144 History and Philosophy of Biology

Available as an advanced elective in General Studies to the Fourth Year Honours students of the Faculty of Biological Sciences with the permission of the Head of the School of History and Philosophy of Science.

History of Biology

Main themes in the development of biology as a science, with emphasis upon the nineteenth century.

TEXTBOOK

Coleman, W. *Biology in the Nineteenth Century.* Wiley.

PRINCIPAL REFERENCE BOOKS

Bernard, C. *An Introduction to the Study of Experimental Medicine.* Collier.

Darwin, C. *The Origin of Species.* Penguin.

De Beer, G. *Charles Darwin, Evolution by Natural Selection.* Nelson.

Dunn, L. C. *A Short History of Genetics.* McGraw-Hill.

Florkin, M. *A History of Biochemistry. Comprehensive Biochemistry.* Vol. 30. Elsevier.

Gasking, E. B. *The Rise of Experimental Biology.* Random House.

Needham, J. *A History of Embryology.* C.U.P.

Nordenskijold, E. *The History of Biology.* Tudor.

Olmsted, J. M. D. *François Magendie.* Schuman.

Philosophy of Biology

Some problems of the philosophy of science which are of major relevance to contemporary biological sciences. Topics: theory construction, structure and establishment, the logic of taxonomic systems; scientific explanation; inter-theory relations in the biological sciences; the structure of scientific revolutions and the dynamics of theory change; the reduction of biological theory to chemistry and physics. Historical examples, selected predominantly from material presented in first session, are employed to illustrate the philosophical discussion.

TEXTBOOKS

Hempel, C. G. *Philosophy of Natural Science.* Prentice-Hall.

Hull, D. *Philosophy of Biological Science.* Prentice-Hall.

Kuhn, T. S. *The Structure of Scientific Revolutions.* Chicago U.P.

Ruse, M. *The Philosophy of Biology.* Hutchinson.

PRINCIPAL REFERENCE BOOKS

Beckner, M. *The Biological Way of Thought.* California U.P.

Greene, M. ed. *Interpretations of Life and Mind.* Routledge.

Hanson, N. R. *Observation and Explanation.* Allen & Unwin.

Koestler, A. *The Case of the Midwife Toad.* Random House.

Koestler, A. & Smythies, J. R. eds. *Beyond Reductionism.* Hutchinson.

Lakatos, I. & Musgrave, A. eds. *Criticism and the Growth of Knowledge.* C.U.P.

Nagel, E. *The Structure of Science.* Routledge.

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

Whyte, L. L., Wilson, A. G. & Wilson, D. eds. *Hierarchical Structures.* Elsevier.

Woodger, J. H. *Biological Principles.* Routledge.

SCHOOL OF COMMUNITY MEDICINE

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.

78.201 Population Genetics Theory

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 non-overlapping 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, 1970.

PRINCIPAL REFERENCE BOOKS
Cavalli-Sforza, L. L. & Bodmer, W. F. *The Genetics of Human Populations.* Freeman, 1971.

Jacquard, A. *The Genetic Structure of Populations.* Springer-Verlag, 1974.

Kimura, M. & Ohta, T. *Theoretical Aspects of Populations Genetics.* Princeton U.P., 1971.

LeCam, L. M., Neymann, J. & Scott, E. L. eds. *Proceedings of the Sixth Berkeley Symposium on Mathematical Statistics and Probability. Vol. V. Darwinian, Neo-Darwinian and Non-Darwinian Evolution.* Univ. of Calif. Press, 1972.

SCHOOL OF MATHEMATICS

Traditionally, mathematics is classified into Pure Mathematics, Applied Mathematics and Statistics. The classification is not a very sharp one and there is considerable overlap and interaction between the three branches.

The Pure Mathematician 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. In the Department of Applied Mathematics at this University there are strong interests in modern theoretical physics, with an emphasis on quantum mechanics, nuclear theory and statistical mechanics. The Department of Theoretical and Applied Mechanics is interested in applications of mathematics to environmental problems, with special reference to fluid mechanics, oceanography and meteorology. However, the courses offered include all branches of Applied Mathematics and Theoretical Mechanics, and specialization need not occur until the honours year.

Statistics is concerned with the evaluation of factual material as a basis for inference 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.

THE COURSES AND SUBJECTS PROVIDED BY THE SCHOOL

The School of Mathematics provides courses at the Pass and Honours levels in Pure Mathematics, Applied Mathematics, Theoretical Mechanics and Theory of Statistics. Full details of the subjects and their relations with other subjects in the Science Course appear in the University Calendar. Any student who feels that he does not understand the situation should consult one of the enrolment officers of the School.

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 contemporary 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 (e.g. 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 student 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 wish to specialize and major in Pure Mathematics, Applied Mathematics, Theoretical Mechanics or Theory of Statistics, the following minimum courses are suggested.

(i) *Pure Mathematics Majors*

In order to major in Pure Mathematics at the ordinary level, a student should pass in seven at least of the following units:

10.211A Applied Mathematics II;
10.111A, 10.111B, 10.111C Pure Mathematics II;
10.112A, 10.112B, 10.112C, 10.112D, 10.112E Pure Mathematics III.

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

(ii) *Applied Mathematics and Theoretical Mechanics Majors*

In second year the student should take the level II units 10.211A, 10.211B and 10.211C Applied Mathematics, together with the units 10.111A and 10.111B Pure Mathematics. In third year the student should take at least four of the level III units 10.212A, 10.212D, 10.212L Applied Mathematics and 10.412A, 10.412B Theoretical Mechanics. Complementary units should be chosen in accordance with Faculty rules.

(iii) *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 he will be expected to take some level III Mathematics units in third year, he should take the level II units 10.111A and 10.111B Pure Mathematics and 10.211A Applied Mathematics.

In third year he should take the level III Theory of Statistics units 10.312A, 10.312B, 10.312C and 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 and mathematical physicists or applied mathematicians, but will prove of interest also to intending specialists in fields such as theoretical physics, engineering and all other theoretical sciences. 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.

(i) *Honours Course in Pure Mathematics*

In the Faculty of Science 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.

(ii) *Honours Course in Applied Mathematics*

In the Faculty of Science in second year the student should attempt 10.221A, 10.221B and 10.221C Higher Applied Mathematics II, 10.121A and 10.121B Higher Pure Mathematics II. The student should also regard the inclusion of 1.122C Thermodynamics and Mechanics as desirable. Students intending to take mathematical physics options in later years of Applied Mathematics are advised to take at least one further level II Higher Physics unit.

In third year, students should attempt 10.222A, 10.222C, 10.222F and 10.222D Higher Applied Mathematics III; and 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.

(iii) *Honours Course in Theoretical Mechanics*

In the Faculty of Science 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.

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.

(iv) *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 he should take the level III Units 10.322A, 10.322B, 10.322C and 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 wishing 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 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 second level or third level units in Pure and Applied Mathematics, 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

There is no doubt that in order to be well qualified as a high school teacher of mathematics it is desirable that the student should have completed a sequence of Mathematics units similar to that outlined under Pure Mathematics majors at Pass level and that other units should be selected from the Theory of Statistics or 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.

The units 10.111C, 10.112A and 10.112D offered by the Department of Pure Mathematics should be of interest to schoolteachers.

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 1975.

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 (e.g., 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.

SUBJECTS SUBSIDIARY TO MATHEMATICS

As mentioned above, a student wishing to major in Mathematics must pass other Science subjects in accordance with Science Course regulations. In this connection it is worth noting that the Applied Mathematics and Theoretical Mechanics Courses have a considerable content of mathematical physics and there is no doubt that Physics I and/or Physics II would assist the student.

Mathematics Prizes

There are prizes available for certain courses 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.

MATHEMATICS

10.001 Mathematics I

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.* O.U.P.
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.

PRINCIPAL REFERENCE BOOKS

Campbell, H. F. *Matrices with Applications.* Appleton-Century-Crofts.

Cohn, P. M. *Solid Geometry.* Routledge.

Kaplan, W. & Lewis, D. J. *Calculus and Linear Algebra.* Vols. 1 & 2. Wiley.

Kelly, G. M. *Introduction to Linear Algebra and Vector Geometry.* Reed Education, Sydney, 1971.

Lange, I. H. *Elementary Linear Algebra.* Wiley.

Pedoe, D. *A Geometric Introduction to Linear Algebra.* Wiley.

Purcell, E. J. *Calculus with Analytic Geometry.* Appleton-Century-Crofts.

Smith, W. K. *Limits and Continuity.* Collier-Macmillan.

Tetra, B. C. *Basic Linear Algebra.* Harper & Row.

Zelinsky, D. *A First Course in Linear Algebra.* Academic.

10.011 Higher Mathematics I

Calculus, analytic geometry, linear algebra, an introduction to abstract algebra, elementary computing.

PRELIMINARY READING LIST

As for 10.001 plus:

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.).

Shields, P. C. *Elementary Linear Algebra.* 2nd ed. Worth.

Spivak, M. *Calculus.* Benjamin.

PRINCIPAL REFERENCE BOOKS

As for 10.001 plus:

Abraham, R. *Linear and Multilinear Algebra.* Benjamin.

Bellman, R. & Cooke, K. L. *Modern Elementary Differential Equations.* 2nd ed. Addison-Wesley.

Brauer, F. & Nohel, J. *Ordinary Differential Equations.* Benjamin.

Burkhill, J. C. *A First Course in Mathematical Analysis.* C.U.P.

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

Hochstadt, H. *Differential Equations.* Holt, Rinehart & Winston.

Lang, S. *Linear Algebra.* Addison-Wesley.

Murdoch, D. C. *Linear Algebra for Undergraduates.* Wiley.

Spivak, M. *Calculus on Manifolds.* Benjamin.

10.021 Mathematics IT

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

TEXTBOOKS

Blatt, J. M. *Basic Fortran IV Programming. Miditran Version.* Computer Systems (Aust.).

Greening, M. G. *First Year General Mathematics.* N.S.W.U.P.

Youse, B. K. & Stalnaker, A. W. *Calculus for the Social and Natural Sciences.* International Textbook Co.

PRINCIPAL REFERENCE BOOKS

Burford, R. L. *Introduction to Finite Probability.* Merrill.

Christian, R. C. *Logic and Sets.* Blaisdell.

Hoyt, J. P. *A Brief Introduction to Probability Theory.* International Text Book Co.

Johnson, W. G. & Zaccaro, L. N. *Modern Introductory Mathematics.* McGraw-Hill.

10.031 Mathematics (one level II unit)*

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.

TEXTBOOKS

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

Keane, A. & Senior, S. A. eds. *Mathematical Methods.* 2nd ed. Science Press.

PRINCIPAL REFERENCE BOOKS

Grove, W. E. *Brief Numerical Methods.* Prentice-Hall.

Hildebrand, F. B. *Advanced Calculus for Applications.* Prentice-Hall.

Pipes, L. A. & Harvill, L. R. *Applied Mathematics for Engineers and Physicists.* 3rd ed. McGraw-Hill.

Spiegel, M. R. *Advanced Mathematics for Engineers and Scientists.* McGraw-Hill.

Wylie, C. R. *Advanced Engineering Mathematics.* 3rd ed. McGraw-Hill.

10.032 Mathematics (one level III unit)*

Vector Calculus; special functions; convolution theorem and applications; complex variable theory; Fourier integrals; Laplace transforms with application to ordinary and partial differential equations.

TEXTBOOK

Jeffreys, G. V. & Jenson, V. G. *Mathematical Methods in Chemical Engineering.* Academic.

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* 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.

PRINCIPAL REFERENCE BOOKS
Churchill, R. E. *Operational Mathematics*. McGraw-Hill.
Giles, E., Pretorius, W. J. & Prokhovnik, S. J. *Supplement to Mathematical Methods*. Science Press.
Hildebrand, F. B. *Advanced Calculus for Applications*. Prentice-Hall.
Keane, A. & Senior, S. A. eds. *Mathematical Methods*. 2nd ed. Science Press.
Kreyszig, E. *Advanced Engineering Mathematics*. Wiley.

10.041 Introduction to Applied Mathematics

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

PRINCIPAL REFERENCE BOOKS
Eisen, M. *Elementary Combinatorial Analysis*. Gordon & Breach.
Giles, R. V. *Fluid Mechanics and Hydraulics*. Schaum.
Goldberg, S. *Introduction to Difference Equations*. Dover.
Riordan, J. *Introduction to Combinatorial Analysis*. Wiley.

10.111A Pure Mathematics II—Linear Algebra

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

TEXTBOOKS
SESSION 1

Tropper, A. M. *Linear Algebra*. Nelson. Paperback.

SESSION 2

Gass, H. *Linear Programming*. I.S.E. McGraw-Hill.
Tropper, A. M. *Linear Algebra*. Nelson Paperback.

PRINCIPAL REFERENCE BOOKS

Hoffman, K. & Kunze, R. *Linear Algebra*. Prentice-Hall.
Lang, S. *Linear Algebra*. Addison-Wesley.
Lipschutz, S. *Linear Algebra*. Schaum.

10.111B Pure Mathematics II—Analysis

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

TEXTBOOKS
SESSION 1

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

SESSION 2

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

PRINCIPAL REFERENCE BOOKS

Hilton, P. J. *Partial Derivatives*. Routledge.
Thomas, G. B. *Calculus and Analytic Geometry*. 4th ed. Addison-Wesley

10.111C Pure Mathematics II—Algebra and Geometry

Abstract Algebra: Euclidean algorithm, unique factorization theorem, mathematical systems, groups, determination of small groups, homomorphisms and normal subgroups. Geometry: elementary concepts of Euclidean, projective and affine geometries.

TEXTBOOKS
SESSION 1
Green, J. A. *Sets and Groups*. Routledge.

SESSION 2
Gans, D. *Transformations and Geometries*. Appleton-Century-Crofts.

PRINCIPAL REFERENCE BOOKS
Coxeter, H. S. M. *Introduction to Geometry*. Wiley.
Dean, R. A. *Elements of Abstract Algebra*. Wiley.
Jeger, M. *Transformation Geometry*. Allen & Unwin.

10.121A Higher Pure Mathematics II—Algebra

Linear Algebra: vector spaces, commutative rings, polynomials, modules, linear transformations, eigenvectors, invariant subspaces, canonical forms, linear functions, bilinear and multi-linear algebra. Group Theory: subgroups, quotient groups, isomorphisms, Lagrange's theorem, Sylow's theorem.

TEXTBOOKS
Clark, A. *Elements of Abstract Algebra*. Wadsworth, 1971.
Hoffman, K. & Kunze, R. *Linear Algebra*. Prentice-Hall.

PRINCIPAL REFERENCE BOOKS
Green, J. A. *Sets and Groups*. Macmillan.
Hall, M. *The Theory of Groups*. Macmillan.
Hartley, B. & Hawkes, T. O. *Rings, Modules and Linear Algebra*. Chapman & Hall.
Herstein, I. M. *Topics in Algebra*. Blaisdell.
Lang, S. *Linear Algebra*. W.S.S. Addison-Wesley.
Ledermann, W. *The Theory of Finite Groups*. Oliver & Boyd.

10.121B Higher Pure Mathematics II—Real and Complex Analysis

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

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

SESSION 2
Jamieson, G. J. D. *A First Course on Complex Functions*. Chapman & Hall.

PRINCIPAL REFERENCE BOOKS
Derrick, W. *Introductory Complex Analysis*. Academic.
Goldberg, R. R. *Methods of Real Analysis*. Blaisdell.
Knopp, K. *Elements of the Theory of Functions*. Dover.
Lang, S. *Calculus of Several Variables*. Addison-Wesley.
Spivak, M. *Calculus*. Benjamin.

10.121C Higher Pure Mathematics II—Number Theory and Geometry

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

TEXTBOOK
Niven, I. & Zuckerman, H. S. *Introduction to the Theory of Numbers*. Wiley.

PRINCIPAL REFERENCE BOOK
Hardy, G. H. & Wright, E. M. *The Theory of Numbers*. O.U.P.

10.112A Pure Mathematics III—Number Theory and Algebra

Euclidean algorithm, congruences, sums of squares, diophantine equations, rings, polynomials, fields.

TEXTBOOKS
SESSION 1
Griffin, H. *Elementary Theory of Numbers*. McGraw-Hill.
Mack, J. M. *Number Theory Notes*. Dept. Pure Maths, Univ. of Sydney.
SESSION 2
Dean, R. A. *Elements of Abstract Algebra*. Wiley.

PRINCIPAL REFERENCE BOOKS
Birkhoff, G. & MacLane, S. *A Survey of Modern Algebra*. Macmillan.
Hardy, G. H. & Wright, E. M. *Introduction to the Theory of Numbers*. O.U.P.

10.112B Pure Mathematics III—Real Analysis

Convergence of sequences; Cauchy sequences; lim sup and lim inf; convergence tests for series; sequences and series of functions; uniform convergence; Taylor and Fourier series; evaluation of integrals and solutions of differential equations via series; metric spaces; contraction mapping principle and its applications.

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

PRINCIPAL REFERENCE BOOKS
Goffman, C. *Introduction to Real Analysis*. Harper.
Spivak, M. *Calculus*. Benjamin.

10.112C Pure Mathematics III—Differential Geometry
Curves and surfaces in space. Differential forms. Curvature.

TEXTBOOK
O'Neill, B. *Elementary Differential Geometry*. Academic.

PRINCIPAL REFERENCE BOOK
Willmore, T. *Differential Geometry*. O.U.P.

10.112D Pure Mathematics III—Topology and Set Theory
Cardinal and ordinal numbers. Elementary topology of surfaces.

TEXTBOOKS
SESSION 1
Gray, J. D. *Lecture Notes on Set Theory and Transfinite Arithmetic*. Author, 1973.
Kamke, E. *Theory of Sets*. Dover.

SESSION 2
Frechet, M. & Fan, K. *Initiation to Combinatorial Topology*. Prindle, Weber & Schmidt.

PRINCIPAL REFERENCE BOOKS
Blackett, D. W. *Elementary Topology: A Combinatorial and Algebraic Approach*. Academic Press.
Wilder, R. L. *Introduction to the Foundations of Mathematics*. Wiley.

10.112E Pure Mathematics III—Complex Analysis and Differential Equations
Complex analysis and ordinary differential equations.

TEXTBOOKS
SESSION 1
Churchill, R. V. *Complex Variables and Applications*. I.S.E. McGraw-Hill.

SESSION 2
Roxin, E. O. *Ordinary Differential Equations*. Wadsworth.

10.122A Higher Pure Mathematics III—Algebra
Field theory and theory of rings and modules.

TEXTBOOK
Stewart, I. *Galois Theory*. Chapman & Hall.

PRINCIPAL REFERENCE BOOK
Lang, S. *Algebra*. Addison-Wesley.

10.122B Higher Pure Mathematics III—Integration and Functional Analysis

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

TEXTBOOK
Epstein, B. *Linear Functional Analysis*. Saunders.

10.122C Higher Pure Mathematics III—Topology and Differential Geometry

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

TEXTBOOK
Dugundji, J. *Topology*. Allyn & Bacon.

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

Analytic continuation; entire and meromorphic functions; elliptic functions; normal families and further advanced topics in complex analysis. Existence and uniqueness theorems for ordinary differential equations; linear systems; qualitative theory of autonomous systems; equations on manifolds.

TEXTBOOKS
Knopp, K. *Theory of Functions. Part II*. Dover.
Roxin, E. O. *Ordinary Differential Equations*. Wadsworth.

PRINCIPAL REFERENCE BOOK
Cartan, H. *Elementary Theory of Analytic Functions of One or Several Complex Variables*. Addison-Wesley.

10.123 Pure Mathematics IV

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

For textbooks, see lecturers concerned.

10.211A Applied Mathematics II—Mathematical Methods

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.

PRINCIPAL REFERENCE BOOKS

Betz, H., Burcham, P. B. & Ewing, G. M. *Differential Equations with Applications*. I.S.R. Harper.

Dettman, J. W. *Mathematical Methods in Physics and Engineering*. McGraw-Hill.

Smith, G. D. *Vector Analysis Including the Dynamics of a Rigid Body*. O.U.P.

10.211B Applied Mathematics II—Analytical Dynamics

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.

PRINCIPAL REFERENCE BOOK

Lawden, D. F. *A Course in Applied Mathematics*. Vol. I. English U.P.

10.211C Applied Mathematics II—Hydrodynamics

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

Brenkert, K. Jr. *Elementary Theoretical Fluid Mechanics*. Wiley.

10.221A Higher Applied Mathematics II—Mathematical Methods

As for 10.211A but in greater depth.

TEXTBOOK

Rabenstein, A. L. *Introduction to Ordinary Differential Equations*. Academic. Int. ed.

PRINCIPAL REFERENCE BOOKS

Blatt, J. M. *Basic Fortran IV Programming. Miditran Version*. Computer Systems (Aust.).

Dettman, J. W. *Mathematical Methods in Physics and Engineering*. McGraw-Hill.

Queen, N. M. *Vector Analysis*. McGraw-Hill, 1967.

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

10.221B Higher Applied Mathematics II—Analytical Dynamics

As for 10.211B but in greater depth.

TEXTBOOK

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

PRINCIPAL REFERENCE BOOKS

Goldstein, H. *Classical Mechanics*. Addison-Wesley.

Lawden, D. F. *A Course in Applied Mathematics*. Vol I. English U.P.

10.221C Higher Applied Mathematics II—Hydrodynamics

As for 10.211C but in greater depth.

PRINCIPAL REFERENCE BOOKS

Batchelor, G. K. *An Introduction to Fluid Dynamics.* C.U.P.
Curle, N. & Davies, H. J. *Modern Fluid Dynamics.* Vol. 1. Van Nostrand.

10.212A Applied Mathematics III—Numerical Analysis

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. A knowledge of FORTRAN programming is essential.

TEXTBOOK

Conte, S. D. & de Boor, C. *Elementary Numerical Analysis.* 2nd ed. Mc-Graw-Hill.

PRINCIPAL REFERENCE BOOKS

Fike, C. T. *Computer Evaluation of Mathematical Functions.* Prentice-Hall.
Fox, L. & Mayers, D. F. *Computing Methods for Scientists & Engineers.* O.U.P.
Ralston, A. *A First Course in Numerical Analysis.* McGraw-Hill.

10.212D Applied Mathematics III—Mathematical Methods

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. Paperback.

PRINCIPAL REFERENCE BOOKS

Birkhoff, G. & Rota, G. *Ordinary Differential Equations.* Ginn & Co.
Carslaw, H. S. & Jaeger, J. C. *Operational Methods in Applied Mathematics.* Dover.
Raven, F. H. *Mathematics of Engineering Systems.* McGraw-Hill.
Schelkunoff, S. A. *Applied Mathematics for Engineers and Scientists.* Van Nostrand.

10.212L Applied Mathematics III—Optimization Techniques

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

Box, M. J. et al. *Nonlinear Optimization Techniques.* Oliver & Boyd, 1969.

10.222A Higher Applied Mathematics III—Numerical Analysis

As for 10.212A but in greater depth.

PRINCIPAL REFERENCE BOOKS

As for 10.212A, plus:

Hildebrand, F. B. *Introduction to Numerical Analysis*. 2nd ed. McGraw-Hill.

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

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.

PRINCIPAL REFERENCE BOOKS

Argence, E. & Kahan, T. *Theory of Waveguides & Resonators*. Blackie.
Becker, R. *Electromagnetic Fields and Interactions*. Vol I. Blackie.
Einstein, A. et al. *The Principle of Relativity*. Dover.
Moller, C. *The Theory of Relativity*. O.U.P.
Panofsky, W. K. H. & Phillips, M. *Classical Electricity and Magnetism*. Addison-Wesley.
Pauli, W. *Theory of Relativity*. Pergamon.

10.222D Higher Applied Mathematics III—Mathematical Methods

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

PRINCIPAL REFERENCE BOOKS

Carrier, G. F., Krook, M. & Pearson, C. E. *Functions of a Complex Variable: Theory and Technique*. McGraw-Hill.
Courant, R. & Hilbert, D. *Methods of Mathematical Physics*. Vol. 1. Interscience.
Lighthill, M. J. *Fourier Analysis and Generalised Functions*. C.U.P. Paperback.
Whittaker, E. T. & Watson, G. N. *A Course in Modern Analysis*. C.U.P.

10.222F Higher Applied Mathematics III—Quantum Mechanics

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.

PRINCIPAL REFERENCE BOOKS
Landau, L. D. & Lifshitz, E. M. *Quantum Mechanics.* Pergamon.
Messiah, A. *Quantum Mechanics.* Vols. 1 & 2. North-Holland.
Schiff, L. I. *Quantum Mechanics.* 3rd ed. I.S.E. McGraw-Hill.

10.222L Higher Applied Mathematics III—Optimization Techniques
As for 10.212L but in greater depth.

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

PRINCIPAL REFERENCE BOOK
Box, M. J. et al. *Nonlinear Optimization Techniques.* Oliver & Boyd.

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

TEXTBOOK
No set text.

10.311A Theory of Statistics II—Probability and Random Variables
An introduction to an 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.
Tanur, J. M. ed. *Statistics: A Guide to the Unknown.* Holden-Day.

TEXTBOOKS
Larson, H. J. *Introduction to Probability and Statistical Inference.* 2nd ed. Wiley.
Statistical Tables

PRINCIPAL REFERENCE BOOKS
Hartley, H. O. & Pearson, E. S. *Biometrika Tables for Statisticians.* C.U.P.
Parzen, E. *Modern Probability Theory and its Applications.* Wiley.

10.311B Theory of Statistics II—Statistical Inference
Point estimation (moments, maximum likelihood, minimum X^2, etc.)
Confidence interval estimation, exact and approximate. Elementary Neyman-Pearson theory of tests of significance, standard significance tests. Regression (including curvilinear) on a single fixed variable.

TEXTBOOKS

Larson, H. J. *Introduction to Probability and Statistical Inference.* 2nd ed. Wiley.

Mood, A. M., Graybill, F. A. and Boes, D. C. *Introduction to the Theory of Statistics.* 3rd ed. McGraw-Hill.

Statistical Tables.

·PRINCIPAL REFERENCE BOOKS

Anderson, R. L. & Bancroft, T. A. *Statistical Theory in Research.* McGraw-Hill.

Hartley, H. O. & Pearson, E. S. *Biometrika Tables for Statisticians.* C.U.P.

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

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.

Statistical Tables.

PRINCIPAL REFERENCE BOOKS

As for 10.311A, plus:

Lukacs, E. *Probability and Mathematical Statistics.* Academic.

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.

Mood, A. M., Graybill, F. A. & Boes, D. C. *Introduction to the Theory of Statistics.* 3rd ed. McGraw-Hill.

Statistical Tables.

PRINCIPAL REFERENCE BOOKS

As for 10.311B.

10.312A Theory of Statistics III—Stochastic Processes and Applications

Conditional expectations, generating functions, branching processes, finite Markov chains, introduction to finite-state space Markov processes in continuous time, applications of stochastic processes in genetics.

TEXTBOOK
Bailey, N. J. T. *Elements of Stochastic Processes with Applications to the Natural Sciences.* Wiley.

PRINCIPAL REFERENCE BOOKS
Feller, W. *An Introduction to Probability Theory and its Applications.* Vol I. Wiley.
Ross, S. M. *Introduction to Probability Models.* Academic.

10.312B Theory of Statistics III—Experimental Design (Applications) and Sampling

Principles of good experimental design, analyses of fully randomized and randomized block designs, factorial treatment structure, components of variance, multiple comparisons; finite populations, simple random sampling, stratified random sampling, optimum allocation, estimation of sample size.

PRINCIPAL REFERENCE BOOKS
Brownlee, K. A. *Statistical Theory & Methodology in Science & Engineering.* 2nd ed. Wiley.
Cochran, W. G. *Sampling Techniques.* Wiley.
Cochran, W. G. & Cox, G. M. *Experimental Designs.* I. S. E. Wiley.
Cox, D. R. *Planning of Experiments.* Wiley.
Davies, O. L. Ed. *Design and Analysis of Industrial Experiments.* 2nd ed. Oliver & Boyd.

10.312C Theory of Statistics III—Experimental Design (Theory) and Project

Multivariate normal distribution, quadratic forms, multiple regression, theory of the general linear hypothesis and its application to experimental designs.

TEXTBOOK
Graybill, F. A. *An Introduction to Linear Statistical Models.* McGraw-Hill.

PRINCIPAL REFERENCE BOOK
Anderson, T. W. *An Introduction to Multivariate Statistical Analysis.* Wiley.

10.312D Theory of Statistics III—Probability Theory and Contingency Tables

Characteristic functions, convergence of probability distributions, the central limit theorem, expansions related to the normal distributions, extreme value distributions; general theory of the 2×2 contingency table, χ^2 test and exact test, $m \times n$ contingency table, subdivision of χ^2.

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

PRINCIPAL REFERENCE BOOKS
Kendall, M. G. & Stuart, A. *The Advanced Theory of Statistics.* Vol. II. 2nd ed. Griffin.
Lamperti, J. *Probability.* Benjamin.

10.322A Higher Theory of Statistics III

As for 10.312A but in greater depth.

TEXTBOOKS

Cox, D. R. & Miller, H. D. *The Theory of Stochastic Processes.* Methuen.
Karlin, S. A. *A First Course in Stochastic Processes.* Academic.

PRINCIPAL REFERENCE BOOKS

As for 10.312A, plus:

Bailey, N. J. T. *Elements of Stochastic Processes with Applications to the Natural Sciences.* Wiley.

10.322B Higher Theory of Statistics III

As for 10.312B but in greater depth.

TEXTBOOKS

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

PRINCIPAL REFERENCE BOOKS

Brownlee, K. A. *Statistical Theory and Methodology in Science & Engineering.* 2nd ed. Wiley.
Cochran, W. G. *Sampling Techniques.* Wiley.
Cox, D. R. *Planning of Experiments.* Wiley.
Davies, O. L. Ed. *Design and Analysis of Industrial Experiments.* 2nd ed. Oliver & Boyd.

10.322C Higher Theory of Statistics III

As for 10.312C but in greater depth.

TEXTBOOK

As for 10.312C.

PRINCIPAL REFERENCE BOOKS

As for 10.312C *plus:*

Rao, C. R. *Linear Statistical Inference and its Applications.* 2nd ed. Wiley.

10.322D Higher Theory of Statistics III

As for 10.312D but in greater depth.

TEXTBOOK

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

PRINCIPAL REFERENCE BOOKS

As for 10.312D, plus:

Chung, K. L. *A Course in Probability Theory.* Harcourt, Brace & World.

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.

TEXTBOOKS

Anderson, T. W. *Multivariate Statistical Analysis*. Wiley.

Box, G. E. P. & Jenkins, G. *Time Series Analysis, Forecasting and Control*. Holden-Day.

Cox, D. R. & Smith, W. *Queues*. Methuen.

Cramer, H. & Leadbetter, M. R. *Stationary and Related Stochastic Processes*. Wiley.

Feller, W. *An Introduction to Probability Theory and its Applications*. Vol. 2. Wiley.

Fisher, R. A. *Statistical Methods and Scientific Inference*. Oliver & Boyd.

Graybill, F. A. *An Introduction to Linear Statistical Models*. McGraw-Hill.

Hartley, H. O. & Pearson, E. S. *Biometrika Tables for Statisticians*. Vol. I. C.U.P

Jenkins, G. M. & Watts, D. G. *Spectral Analysis and its Applications*. Holden-Day.

John, P. W. M. *Statistical Design and Analysis of Experiments*. Macmillan.

Kempthorne, O. *The Design and Analysis of Experiment*. Wiley.

Searle, S. R. *Linear Models*. Wiley.

Wald, A. *Sequential Analysis*. Wiley.

PRINCIPAL REFERENCE BOOKS

Bradley, J. V. *Distribution-free Statistical Tests*. Prentice-Hall.

Cochran, W. G. & Cox, G. M. *Experimental Designs*. Wiley.

Cochran, W. G. *Sampling Techniques*. Wiley.

Ferguson, T. S. *Mathematical Statistics—A Decision Theoretic Approach*. Academic.

Fraser, D. A. S. *The Structure of Inference*. Wiley.

Ghosh, B. K. *Sequential Tests of Statistical Hypotheses*. Addison-Wesley.

Godambe, V. P. & Sprott, D. A. *Foundations of Statistical Inference*. Holt, Rinehart & Winston.

Kendall, M. G. & Stuart, A. *The Advanced Theory of Statistics*. Vol. II. 2nd ed. Griffin.

Lancaster, H. O. *The Chi-squared Distribution*. Wiley.

Lehmann, E. L. *Testing Statistical Hypotheses*. Wiley.

Moran, P. A. P. *An Introduction to Probability Theory*. O.U.P.

Noether, G. E. *Elements of Non-parametric Statistics*. Wiley.

Raiffa, H. & Schlaifer, R. *Applied Statistical Decision Theory*. M.I.T.

Rao, C. R. *Advanced Statistical Methods in Biometric Research*. Wiley.

Seal, H. *Multivariate Statistical Analysis for Biologists*. Methuen.

Sarhan, A. E. & Greenberg, B. G. *Contributions to Order Statistics*. Wiley.

Scheffe, H. *The Analysis of Variance*. Wiley.

Wald, A. *Statistical Decision Functions*. Wiley.

Wetherill, G. B. *Sequential Methods in Statistics*. Methuen.

Yaglom, A. M. *An Introduction to the Theory of Stationary Random Functions*. Prentice-Hall.

10.331 Statistics SS

An introduction to the theory of probability, with finite, discrete and continuous sample spaces. The standard elementary univariate distributions: binomial, Poisson and normal; an introduction to multivariate distributions. Standard sampling distributions, including those of 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.
Statistical Tables.

PRINCIPAL REFERENCE BOOKS
Bennett, C. A. & Franklin, N. L. *Statistical Analysis in Chemistry and the Chemical Industry*. Wiley.
Davies, O. L. *Statistical Methods in Research and Production*. Oliver & Boyd.
Steel, R. G. D. & Torrie, J. H. *Principles and Procedures of Statistics*. McGraw-Hill.

10.412A Theoretical Mechanics III—Dynamical and Physical Oceanography

(a) The physical properties of the oceans and their measurement, including: salinity, temperature, density, dynamic heights. Currents, waves and tides. (b) Theoretical models of current and waves.

Up to seven days field/laboratory work per year.

PRINCIPAL REFERENCE BOOKS
Defant, A. *Physical Oceanography*. Vols I & II. Pergamon Press, 1960.
Neumann, G. & Pierson, W. J. *Principles of Physical Oceanography*. Prentice-Hall.
Pickard, G. L. *Descriptive Physical Oceanography*. Pergamon.

10.412B Theoretical Mechanics III—Continuum Mechanics

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).

PRINCIPAL REFERENCE BOOKS
Long, R. L. *Mechanics of Solids and Fluids*. Prentice-Hall.
Mase, G. E. *Continuum Mechanics*. Schaum.

10.422A Higher Theoretical Mechanics III—Fluid Dynamics

This course continues on from 10.221C. Topics: compressible flow, viscous flow, boundary layers, hydrodynamic stability, simple wave motions in fluids.

TEXTBOOK
Batchelor, G. K. *An Introduction to Fluid Dynamics*. C.U.P. Paperback.

PRINCIPAL REFERENCE BOOK
Landau, L. D. & Lifshitz, E. M. *Fluid Mechanics*. Pergamon.

10.422B Higher Theoretical Mechanics III—Mechanics of Solids

As for 10.412B but in greater depth.

PRINCIPAL REFERENCE BOOKS
Fung, Y. C. *A First Course in Continuum Mechanics*. Prentice-Hall.
Landau, L. D. & Lifshitz, E. M. *Theory of Elasticity*. Pergamon.

10.423 Theoretical Mechanics IV

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

TEXTBOOK
No set text.

SCHOOL OF 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 micro-organisms 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 43.102D Mycology (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 41.102 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 page 84.

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.

Students undertaking an honours programme must choose units from the following table to a total of *five* credit points. Individual programmes 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.

Postgraduate 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 programmes 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 Programme in Microbiology

All candidates will be required to take the course designated as Microbiology II (Honours). Individual programmes 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 Programme 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.

44.101 Introductory Microbiology

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, 1974.
or

Pelczar, M. J. & Reid, R. D. *Microbiology*. 3rd ed. McGraw-Hill, 1972.
or

Stanier, R. Y., Doudoroff, M. & Adelberg, E. A. *General Microbiology*. 3rd ed. Macmillan, 1971. (Also published as *The Microbial World*. 3rd ed. Prentice-Hall, 1970.)

or

Hawker, L. E. & Linton, A. H. eds. *Micro-organisms: Function, Form and Environment*. Arnold, 1971.

Note: Hawker and Linton is recommended for students wishing to major in Microbiology in the following year.

44.102 General Microbiology

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, 1971.
Davis, B. D., Dulbeco, R., Eisen, H. N., Ginsberg, H. S. & Wood, W. B. *Microbiology*. Complete 2nd ed. Harper & Row, 1974.

44.112 Applied Microbiology

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 manu-

facture, preservation and spoilage of food and dairy products. The nature of bacterial and fungal diseases of man, their cultural and serological diagnosis, epidemiology, treatment and prevention will be discussed in some detail.

TEXTBOOKS
   As for 44.102.

44.122 Immunology

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.

TEXTBOOKS
Roitt, I. *Essential Immunology*. Blackwell Scientific Publications, 1972.

44.132 Virology

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, 1970.
and
As for 44.102.

44.111 Microbiology

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 content of the course is similar to that of 44.101.

TEXTBOOKS
Mitchell, R. *Introduction to Environmental Microbiology*. Prentice-Hall, 1974.
Brock, T. D. *Biology of Microorganisms*. 2nd ed. Prentice-Hall, 1974.
or
Pelczar, M. J. & Reid, R. D. *Microbiology*. 3rd ed. McGraw-Hill, 1972.

44.513 General Microbiology

Microbial taxonomy, structure and function, physiology, ecology and genetics.

44.523 Applied Microbiology

Selected aspects of industrial microbiology including fermentation processes, food production and food spoilage, soil microbiology; pathogenesis of microorganisms and host resistance; diagnostic medical microbiology; chemotherapy, disinfection and sterilization.

44.533 Immunology

Phylogeny and ontogeny of the immune response, non-specific and specific immune mechanisms; hypersensitivity reactions; immunochemistry; diagnostic serology, immunoprophylaxis and therapy.

44.543 Virology

A detailed study of virus-host interactions based on examples of bacterial and animal viruses; virus genetics; epidemiology of virus diseases; diagnostic virology.

44.553 Electron Microscopy

The principles and practice of electron microscopic techniques.

44.563 Microbiology Project I

A supervised laboratory project of 150 hours duration designed to provide experience in a wide range of microbiological and immunological techniques and to introduce students to the general principles of research methodology, particularly at an applied level.

44.573 Microbiology Project II

A supervised laboratory project of 300 hours duration. While considerable emphasis will be given to acquiring technical competence in many microbiological or immunological techniques, the projects in this unit will provide greater scope for training in research methodology.

44.583 Microbiology Project III

A supervised laboratory project of 500 hours minimum duration. These projects provide training in research in fundamental aspects of microbiology or immunology, with special emphasis on the development and use of specialized techniques relevant to the particular field of study.

SCHOOL OF 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.

The Philosophy units offered at Level I, Introductory Philosophy A and Introductory Philosophy B, are normally taken in a single year, and the first is regarded as co-requisite to the second. These two units give a broad introduction to the subject for those who have no previous acquaintance with it.

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, either at Level I or at Level II, 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 Upper Level.

The half-units available in Session I having no prerequisite apart from Introductory Philosophy A or B 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.

The half-units in political philosophy offered are: Introduction to Political Philosophy, Ethics of Politics, Philosophical Foundations of Marx's Thought, and Twentieth Century Marxist Philosophy.

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.

52.101 Introductory Philosophy A

SESSION 1

A first course for students new to the subject. The course divides into two parts.

1. *Plato.* 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.

PRINCIPAL REFERENCE BOOKS

Passmore, J. *Philosophical Reasoning.* Duckworth.
Vlastos, G. ed. *The Philosophy of Socrates.* Macmillan.
Vlastos, G. ed. *Plato: I. Metaphysics and Epistemology.* Macmillan.

2. *Informal Logic.* 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.

PRINCIPAL REFERENCE BOOKS

Hamblin, C. L. *Elementary Formal Logic—A Programmed Course.* Hicks Smith *and* University Paperbacks.
Hospers, J. *Introduction to Philosophical Analysis.* 2nd ed. Prentice-Hall *or* Routledge, 1967.
Taylor, D. M. *Explanation and Meaning.* C.U.P.

52.102 Introductory Philosophy B
SESSION 2

Co-requisite: 52.101 or, with permission of the School, a suitable record in other units.

A continuation of the Session 1 introductory course. The course again divides into two parts:

1. *Hume.* 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.

PRINCIPAL REFERENCE BOOKS

Ayer, A. J. *The Concept of a Person.* Macmillan.
Berofsky, B. *Free Will and Determinism.* Harper & Row.
Flew, A. *Hume's Philosophy of Belief.* Routledge.
Flew, A. *Body, Mind and Death.* Macmillan.
Hick, J. *The Existence of God.* Macmillan.
Sesonske, A. *Human Understanding.* Wadsworth.
Smart, N. *Philosophers and Religious Truth.* S.C.M.
Taylor, D. M. *Explanation and Meaning.* C.U.P.

2. *Formal Logic.* 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.

52.153 Predicate Logic
SESSION 1
Prerequisite: 52.102.

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.

PRINCIPAL REFERENCE BOOK

Church, A. *Introduction to Mathematical Logic.* Princeton.

52.163 Descartes

SESSION 1

Prerequisite: 52.102.

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.

PRINCIPAL REFERENCE BOOKS

Beck, L. J. *The Metaphysics of Descartes.* Clarendon.
Butler, R. J. ed. *Cartesian Studies.* Blackwell.
Copleston, F. *A History of Philosophy.* Vol. 4. Doubleday.
Doney, W. ed. *Descartes: A Collection of Critical Essays.* Doubleday.
Keeling, S. V. *Descartes.* O.U.P.
Kenny, A. *Descartes: A Study of His Philosophy.* Random House.
Magnus, B. & Wilbur, J. B. eds. *Cartesian Essays,* Nijhoff.

52.173 British Empiricism

SESSION 1

Prerequisite: 52.102.

The empiricist tradition with special concentration on Locke and Berkeley.

TEXTBOOKS

Armstrong, D. M. *Berkeley's Philosophical Writings.* Collier. Paperback.
Locke, J. *An Essay Concerning Human Understanding.* Fontana.

PRINCIPAL REFERENCE BOOKS

References are given in lectures.

52.183 Greek Philosophy: Thales to Plato

SESSION 1

Prerequisites: 52.101 and 52.102.

The leading ideas of the Greek philosophers from Thales to Plato, with special reference to the Pre-Socratics.

PRINCIPAL REFERENCE BOOKS

Guthrie, W. K. C. *A History of Greek Philosophy.* Vols. I & II. C.U.P.
Aristotle. *The Works of Aristotle Translated into English.* Vol. VIII. Metaphysics. O.U.P.
Burnet, J. *Early Greek Philosophy.* Black.
Cornford, F. M. *From Religion to Philosophy.* Harper.
Furley, D. J. & Allen, R. E. eds. *Studies in Presocratic Philosophy.* Vol. I. Routledge.
Kahn, C. H. *Anaximander and the Origins of Greek Cosmology.* Columbia U.P.
Kirk G. S. & Raven, G. E. *The Pre-Socratic Philosophers.* C.U.P.

52.193 Scientific Method*

SESSION 1

Prerequisite: 52.102.

The nature of empirical knowledge as exemplified in the physical and social sciences and in history, with emphasis on the concept of explanation, the nature of induction and scientific laws, counterfactual statements, and the paradoxes of confirmation.

TEXTBOOKS

Hempel, C. G. *Philosophy of Natural Science*. Prentice-Hall.
Ryan, A. ed. *Philosophy of Social Explanation*. O.U.P.

PRINCIPAL REFERENCE BOOKS

Hempel, C. G. *Aspects of Scientific Explanation*. Free Press.
Kuhn, T. S. *The Structure of Scientific Revolutions*. Chic. U.P.
Nagel, E. *The Structure of Science*. Routledge.
Popper, K. R. *The Logic of Scientific Discovery*. Hutchinson.
Ryan, A. *The Philosophy of the Social Sciences*. Macmillan.
Scheffler, I. *The Anatomy of Inquiry*. Knopf.

52.203 Introduction to Political Philosophy

SESSION 1

Prerequisite: 52.102.

The main themes of modern political and social thought with special emphasis on philosophical issues.

PRINCIPAL REFERENCE BOOKS

Bottomore, T. B. & Rubel, M. eds. *Karl Marx, Selected Writings in Sociology and Social Philosophy*. Penguin, 1963.
Burke, E. *Reflections on the Revolution in France* (any ed.).
Friedrich, C. J. *The Philosophy of Law in Historical Perspective*. Chic. U.P., 1963.
Hobbes, T. *The Leviathan*. Penguin, 1972.
Locke, J. *The Second Treatise on Government* (any ed.).
McDonald, L. C. *Western Political Theory*. Harcourt, Brace & World, 1968.
McFarlane, L. J. *Modern Political Thought*. Nelson, 1970.
Mill, J. S. *On Liberty* (any ed.).
Mill, J. S. *Utilitarianism, Liberty and Representative Government*. Dent, 1964.
Parekh, B. ed. *Bentham's Political Thought*. Crook Helm, 1973.
Plamenatz, J. *Man and Society*. Vols. 1 & 2. Longman, 1963.
Rousseau, J. J. *The Social Contract* (any ed.).
Thomson, D. ed. *Political Ideas*. Watts, 1966.

52.213 Sartre

SESSION 1

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 Philosophic Study*. Athlone Press.

* Not offered in 1975.

PRINCIPAL REFERENCE BOOKS

Desan, W. *The Tragic Finale*. Harper & Row.

Molina, F. *Existentialism as Philosophy*. Prentice-Hall.

Murdock, I. *Sartre*. Bowes & Bowes.

Sartre, J.-P. *Being and Nothingness*. (any ed.).

Sartre, J.-P. *The Transcendance of the Ego*. Williams, F. & Kirkpatrick, R. trans. Noonday Press.

Sartre, J.-P. *The Problem of Method*. Methuen.

Sartre, J.-P. *Saint Genet*. Braziller, 1971.

Sartre, J.-P. *Imagination: A Psychological Critique*. Williams, F. trans. Mich. U.P.

Sartre, J.-P. *Nausea*. Baldick, R. trans. Penguin.

Sartre, J.-P. *Sketch for a Theory of the Emotions*. Mairet, P. trans. Methuen.

Sartre, J.-P. *Intimacy*. Alexander, L. trans. Panther Books.

Sartre, J.-P. *The Psychology of the Imagination*. Frechtman, B. trans. Rider.

Sartre, J.-P. *Two Plays. (The Flies, In Camera)*. Gilbert, S. trans. Hamish Hamilton.

Sartre, J.-P. *Three Plays*. Hamish Hamilton.

Sartre, J.-P. *Literary and Philosophical Essays*. Michielson, A. trans. Rider.

Sartre, J.-P. *Portrait of an Anti-Semite*. de Mauny, E. trans. Secker & Warburg.

Warnock, M. *The Philosophy of Sartre*. Hutchinson Univ. Library.

52.223 Foundations of Mathematics

SESSION 2

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, Gödel's incompleteness result.

TEXTBOOK

Wilder, R. S. *An Introduction to the Foundations of Mathematics*. Wiley.

PRINCIPAL REFERENCE BOOKS

Benacerraf, P. & Putnam, H. *Philosophy of Mathematics*. Prentice-Hall.

Blanche, R. *Axiomatics*. Routledge.

Fraenkel, A. A. & Bar-Hillel, Y. *Foundations of Set Theory*. North-Holland.

Kleene, S. C. *An Introduction to Meta-mathematics*. Princeton U.P.

Korner, S. *The Philosophy of Mathematics*. Hutchinson.

Mendelson, E. *Mathematical Logic*. Van Nostrand.

Nagel, E. & Newman, J. R. *Gödel's Proof*. N.Y.U.P. *or* Routledge.

52.233 Argument

SESSION 2

Prerequisite: 52.102.

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.

PRINCIPAL REFERENCE BOOKS
Edgley, R. *Reason in Theory and Practice*. Hutchinson, 1969.
Hamblin, C. L. *Fallacies*. Methuen.
Passmore, J. A. *Philosophical Reasoning*. Duckworth.
Perelman, C. & Olbrechts-Tyteca, L. *The New Rhetoric. A Treatise on Argumentation*. Notre Dame U.P., 1969.
Quine, W. V. O. & Ullian, J. S. *The Web of Belief*. Random House, 1970.

52.243 Logical Atomism

SESSION 2

Prerequisite: 52.102.

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.

PRINCIPAL REFERENCE BOOKS

References are given in lectures.

52.253 Philosophy of Biology

SESSION 2

Prerequisites: 52.101 and 52.102 .

Some of the problems associated with the philosophy of biology. Main consideration is the autonomy of biology; i.e., 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.

PRINCIPAL REFERENCE BOOKS

Agar, W. E. *A Contribution to the Theory of Living Organisms*. M.U.P. and C.U.P.
Beckner, M. *The Biological Way of Thought*. Columbia U.P.
Bertalanffy, L. von. *Problems of Life*. Watts & Co.
Bertalanffy, L. von. *Modern Theories of Development*. O.U.P.
Braithwaite, R. B. *Scientific Explanation*. C.U.P.
Haldane, J. S. *Mechanism, Life and Personality*. Murray.
Haldane, J. S. *The Philosophical Basis of Biology*. Hodder & Stoughton.
Lillie, R. S. *General Biology and Philosophy of Organism*. Chic. U.P.
Schubert-Soldern, R. *Mechanism and Vitalism: Philosophical Aspects of Biology*. Notre Dame U.P.
Russell, E. S. *The Directiveness of Organic Activities*. C.U.P.
Sommerhoff, G. *Analytical Biology*. O.U.P.
Tinbergen, N. *The Study of Instinct*. O.U.P.
Woodger, J. H. *Biological Principles*. Routledge.
Woodger, J. H. *Biology and Language*. C.U.P.

52.263 Philosophy of Psychology*
SESSION 2
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, 1968.

52.273 Aesthetics*
SESSION 2
Prerequisite: 52.102.

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.

PRINCIPAL REFERENCE BOOKS
Coleman, F. J. ed. *Contemporary Studies in Aesthetics*. McGraw-Hill.
Elton, W. ed. *Aesthetics and Language*. O.U.P.
Gombrich, E. H. *Art and Illusion*. Phaidon.
Langer, S. K. *Problems of Art*. Scribners.
Tillman, F. & Cahn, S. eds. *Philosophy of Art and Aesthetics*. Harper & Row.
Wollheim, R. *Art and Its Objects*. Harper & Row.

52.283 Oppression and Liberation
SESSION 2
Prerequisite: 52.102.

Oppression and liberation, both in general and with special reference to the oppression of women and its ideology.

PRINCIPAL REFERENCE BOOKS
Bateson, G. *Steps to an Ecology of Mind*. Ballantine Books, 1972.
Cooper, D. ed. *The Dialectics of Liberation*. Penguin, 1969.
de Beauvoir, S. *The Second Sex*. Penguin, 1972.
Firestone, S. *The Dialectic of Sex*. Paladin, 1972.
Freire, P. *Cultural Action for Freedom*. Penguin, 1969.
Freire, P. *Pedagogy of the Oppressed*. Penguin, 1970.
Freud, S. *Fragment of an Analysis of a Case of Hysteria*. Standard ed. of complete psychological works, Vol. 7. Hogarth, 1953-66.
Freud, S. *On the Sexual Theories of Children*. Standard ed. Vol. 9. Hogarth, 1953-66.
Freud, S. *Some Psychical Consequences of the Anatomical Distinction between Sexes*. Standard ed. Vol. 19. Hogarth, 1953-66.
Freud, S. *The Ego and the Id*. Standard ed. Vol. 19. Hogarth, 1953-66.
Freud, S. *Repression*. Standard ed. Vol. 14. Hogarth, 1953-66.
Freud, S. *The Unconscious*. Standard ed. Vol. 14. Hogarth, 1953-66.
Freud, S. *Three Essays on the Theory of Sexuality*. Standard ed. Vol. 7. Hogarth, 1953-66.

* Not offered in 1975.

Friedan, B. *The Feminine Mystique.* Penguin, 1972.
Hegel, G. W. F. *The Phenomenology of Mind.* Allen & Unwin, 1967.
Jenness, L. ed. *Feminism and Socialism.* Pathfinder Press, 1972.
Koedt, A. ed. *Radical Feminism.* Quadrangle, 1973.
Kollontai, A. *Communism and the Family.* Pluto Press, 1971.
Laing, R. D. *The Politics of the Family.* Tavistock, 1971.
Laing, R. D. & Cooper, D. *Reason and Violence.* Tavistock, 1964. Paperback.
Lefebvre, H. *The Sociology of Marx.* Penguin, 1972.
Marcuse, H. *Five Lectures.* Beacon Press, 1970.
Marx, K. *Capital.* Vol. 1. Moscow, 1958.
Marx, K. & Engels, F. *The German Ideology.* Progress Publishers, Moscow, 1964.
Marx, K. & Engels, F. *Selected Works.* Lawrence & Wishart, 1970.
Millett, K. *Sexual Politics.* Doubleday, 1970.
Mitchell, J. *Woman's Estate.* Penguin, 1971.
Mitchell, J. *Psychoanalysis and Feminism.* Allen Lane, 1974.
Rieff, P. *Freud.* Gollancz, 1959.
Rowbotham, S. *Women, Resistance and Revolution.* Allen Lane, 1972.
Sartre, J.-P. *The Problem of Method.* Methuen.
Sartre, J.-P. *Saint Genet. Actor and Martyr.* Braziller, 1971.
Salper, R. ed. *Female Liberation.* Knopf, 1973.
Szasz, T. *The Myth of Mental Illness.* Paladin, 1972.
Tanner, L. B. ed. *Voices from Women's Liberation.* Signet, 1971.
Wandor, M. ed. *The Body Politic.* Stage 1. Lond. U.P., 1972.

52.293 Plato

SESSION 2

Prerequisite: 52.183.

Some of the later dialogues of Plato *(Parmenides, Theaetetus, Sophist).*

TEXTBOOK

Plato. *Parmenides and Other Dialogues.* Everyman.

PRINCIPAL REFERENCE BOOKS

Allen, R. E. *Studies in Plato's Metaphysics.* Routledge.
Cornford, F. M. *Plato's Theory of Knowledge.* Routledge.
Mathews, G. *Plato's Epistemology.* Faber.
Vlastos, G. ed. *Plato. Vol. I. Metaphysics and Epistemology.* Macmillan.

52.303 Spinoza and Leibniz*

SESSION 2

Prerequisite: 52.163.

The main issues raised in the philosophy of the two great seventeenth century rationalists, with emphasis on the development of their meta-physical 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.

* Not offered in 1975.

PRINCIPAL REFERENCE BOOKS

Alexander, H. G. ed. *The Leibniz-Clarke Correspondence*. Manc. U.P.
Copleston, F. *A History of Philosophy*. Vol. 4. Doubleday.
Curley, E. M. *Spinoza's Metaphysics: An Essay in Interpretation*. Harv. U.P.
Frankfurt, H. G. ed. *Leibniz: A Collection of Critical Essays*. Doubleday.
Hampshire, S. *Spinoza*. Pelican.
Kashap, S. P. ed. *Studies in Spinoza*. Calif. U.P.

52.313 Ethics of Politics

SESSION 1

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

SESSION 1

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.

PRINCIPAL REFERENCE BOOKS

Bernays, P. & Fraenkel, A. A. *Axiomatic Set Theory*. North Holland.
Fraenkel, A. A. *Abstract Set Theory*. North Holland.
Fraenkel, A. A. & Bar-Hillel, Y. *Foundations of Set Theory*. North Holland.
Halmos, P. *Naive Set Theory*. Van Nostrand.
Kalish, D. & Montague, R. *Logic: Techniques of Formal Reasoning*. Harcourt, Brace & World.
Quine, W. V. *Set Theory and Its Logic*. Harv. U.P.
Russell, B. *Introduction to Mathematical Philosophy*. Allen & Unwin.
Sierpinski, W. *Cardinal and Ordinal Numbers*. Polish Scientific Publishers.

52.333 Philosophy of Perception*

SESSION 1

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 no set text, but each student should, in consultation with the lecturer, select at least one of the principal reference books for especially close reading.

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* Not offered in 1975.

PRINCIPAL REFERENCE BOOKS

Armstrong, D. M. *Perception and the Physical World.* Routledge.

Austin, J. L. *Sense and Sensibilia.* O.U.P.

Ayer, A. J. *The Foundations of Empirical Knowledge.* Macmillan.

Hirst, R. J. *The Problems of Perception.* Allen & Unwin.

Mill, J. S. *An Examination of Sir William Hamilton's Philosophy.* Longmans.

Moore, G. E. *Some Main Problems of Philosophy.* Allen & Unwin.

Price, H. H. *Perception.* Methuen.

Schilpp, P. A. *The Philosophy of G. E. Moore.* Northwestern U.P.

Warnock, G. J. *The Philosophy of Perception.* O.U.P.

52.343 Privacy and Other Minds

SESSION 2

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.

PRINCIPAL REFERENCE BOOKS

Armstrong, D. M. *The Materialist Theory of Mind.* Routledge.

Ayer, A. *The Concept of a Person.* Macmillan.

Castaneda, H. N. ed. *Intentionality, Minds and Perception.* Wayne State U.P., 1967.

Chisholm, R. M. *Realism and the Background of Phenomenology.* Free Press.

Dennett, D. C. *Content and Consciousness.* Routledge.

Malcolm, N. *Knowledge and Certainty: Essays and Lectures.* Prentice-Hall.

Pitcher, G. ed. *Wittgenstein: The Philosophical Investigations.* Doubleday.

Presley, C. F. *The Identity Theory of Mind.* Q'ld. U.P.

Royal Institute of Philosophy Lectures. Vol. I. 1966-67. *The Human Agent.* Macmillan.

Shoemaker, S. *Self-knowledge and Self-Identity.* Ithaca.

Strawson, P. F. *Individuals: An Essay in Descriptive Metaphysics.* Methuen.

Taylor, C. *The Explanation of Behaviour.* Routledge.

White, A. R. *Philosophy of Action.* O.U.P.

Wisdom, J. *Other Minds.* Blackwell.

Wittgenstein, L. *Philosophical Investigations.* Blackwell.

Wittgenstein, L. *The Blue and Brown Books.* Blackwell.

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* Paperback.

52.353 History of Modern Logic

SESSION 1

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.* O.U.P.

52.363 Wittgenstein

SESSION 1

Prerequisite: 52.243.

Some themes in the later philosophy of Wittgenstein.

TEXTBOOKS

Coope, C. et al. *A Wittgenstein Workbook.* Blackwell, 1970.
Wittgenstein, L. *Philosophical Investigations.* Blackwell.

PRINCIPAL REFERENCE BOOKS

References are given in lectures.

52.373 Philosophical Foundations of Marx's Thought*

SESSION 2

Prerequisite: 52.203 (may be waived, with permission, for students who have already studied political philosophy).

Marx's thought with special reference to philosophical issues, and philosophical origins.

PRINCIPAL REFERENCE BOOKS

References are given in lectures.

52.383 Twentieth Century Marxist Philosophy

SESSION 2

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.

PRINCIPAL REFERENCE BOOKS

References are given in lectures.

52.393 History of Traditional Logic

SESSION 2

Prerequisite: 52.353.

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.

* Not offered in 1975.

TEXTBOOK

Kneale, W. & M. *The Development of Logic*. O.U.P.

PRINCIPAL REFERENCE BOOKS

Aristotle. *Works of Aristotle Translated into English*. Ross, Sir David. ed. O.U.P.

Bochenski, V. M. *A History of Formal Logic*. Thomas, I. trans. Notre Dame U.P.

Copi, I. M. & Gould, J. A. eds. *Readings in Logic*. Collier.

Gautama. *Nyayasutras*. Jha, G. ed. Poona Oriental Book Agency.

Hamblin, C. L. *Fallacies*. Methuen.

Kretzmann, N. trans. *William of Sherwood's "Syncategorematic Words"*. Minnesota U.P.

52.403 Model Theory

SESSION 2

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.

PRINCIPAL REFERENCE BOOKS

Church, A. *Introduction to Mathematical Logic*. Princeton U.P.

Kleene, S. C. *Introduction to Metamathematics*. Princeton U.P.

Quine, W. V. *Mathematical Logic*. Harv. U.P.

Suppes, P. *Axiomatic Set Theory*. Van Nostrand.

Tarski, A. *Logic, Semantics, Metamathematics*. O.U.P.

52.413 Reading Option

Either session

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

Session 2

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

Session 1

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.

SCHOOL OF 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; 1.122 A, B and C; 1.123 A, B, C and D. However, students with a very good record in Physics 1.001 or in 1.112 A, 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.

The following show typical programmes 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

	Level	No. Units
Physics	II	3
Pure Mathematics	II	2
Applied Mathematics	II	1
Geoscience	I	2

THIRD YEAR

Physics	III	4
Chemistry	II	3
Other Units	II/III	1

OR

B. Pass Course Majoring in Physics

Level No. Units

FIRST YEAR

*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

C. Leading to Honours in Physics

Level No. Units

FIRST YEAR

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	III	4
Applied Mathematics	III	1
Physics Electives	III	1
Or other Units	III	3

For footnotes, see overleaf.

* 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.

† Students must note that certain Applied Mathematics level III units cannot be counted with certain Physics level III units.

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.

1.001 Physics I

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
Bueche, P. *Introduction to Physics for Scientists and Engineers.* McGraw-Hill.

PRINCIPAL REFERENCE BOOKS
Ference, M., Lemon, H. & Stephenson, R. J. *Analytical Experimental Physics.* Chicago U.P.
Halliday, D. & Resnick, R. *Physics for Students of Science and Engineering.* Vols. I & II. Wiley.
Wiedner, R. T. V. & Sells, R. L. *Elementary Classical Physics.* Vols. I and II. Allyn & Bacon.

1.011 Higher Physics I

Kinematics—Non-uniformly accelerated systems. Centripetal acceleration. Laws of motion. Momentum. Impulse. Potential and kinetic energy. Power. Conditions of equilibrium. Elasticity. Young's bulk and shear moduli. Poisson's ratio. Strain energy. Hydrodynamics. Bernouilli's equation. Motion in resistive medium. Moments of inertia. Rotational dynamics. Simple harmonic motion. Pendulums. Motion about free axis. Progressive and stationary waves. Energy current. Superposition of waves. Doppler effect. Resonance. Huygen's principle. Reflection, refraction, interference and diffraction of waves. Electromagnetic spectrum. Polarization.

Electrostatics—Gauss' theorem. Electric intensity. Capacitance. Electromagnetism. Biot-Savart and Ampere's circuital laws. Force on moving charge and on conductor. Torque on coil. D.C. instruments. Electromagnetic induction. Faraday's and Lenz's laws. Self and mutual inductance. D.C. circuits. Kirchoff's rules and Thevenin's theorem. Growth and decay of current. A.C. circuits. Resonance. Diode. Triode. Amplifiers and oscillators. Electronic measuring instruments.

TEXTBOOKS

Halliday, D. & Resnick, R. *Physics for Students of Science and Engineering.* Vols. I & II, or combined volume. Wiley.
Russell, G. J. & Mann, K. *Alternating Current Circuit Theory.* N.S.W.U.P.
Spiegel, M. R. *Theory and Problems of Theoretical Mechanics.* Schaum.

PRINCIPAL REFERENCE BOOKS

Brophy, J. J. *Basic Electronics for Scientists.* McGraw-Hill. Paperback.
Feynman, R. P., Leighton, R. B. & Sands, M. *The Feynman Lectures on Physics.* Vols. I & II. Addison-Wesley.
Tomboulian, D. H. *Electric and Magnetic Fields.* Harcourt, Brace & World, 1965.

Physics Level II Units

1.112A Electromagnetism

Electrostatics in vacuum and in dielectrics. Magnetostatics in vacuum and in magnetic materials. Maxwell's equations and simple applications.

TEXTBOOK

Reitz, J. R. & Milford, F. J. *Foundation of Electromagnetic Theory.* 2nd ed. Addison-Wesley.

PRINCIPAL REFERENCE BOOKS

Whitmer, R. M. *Electromagnetics.* 2nd ed. Prentice-Hall, 1963.
Schwarz, W. M. *Intermediate Electromagnetic Theory.* Wiley, 1964.

1.112B Modern Physics

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

TEXTBOOK .
Beiser, A. *Perspectives of Modern Physics.* McGraw-Hill.

PRINCIPAL REFERENCE BOOKS
Arya, A. P. *Elementary Modern Physics.* Addison-Wesley.
Eisberg, R. M. *Fundamentals of Modern Physics.* Wiley.
Mermin, N. D. *Space Time and Relativity.* McGraw-Hill.

1.112C Thermodynamics and Mechanics

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, 1971.
Mandl, F. *Statistical Physics.* Wiley, 1971.
Stephenson, R. J. *Mechanics and Properties of Matter.* Wiley, 1969.

PRINCIPAL REFERENCE BOOKS
Pain, H. G. *Physics of Vibrations and Waves.* Wiley, 1968.
Spiegel, M. R. *Theoretical Mechanics.* Shaum.
Symon, K. R. *Mechanics.* Addison-Wesley, 1960.

Higher Physics Level II Units

1.122A Electromagnetism

Further electrostatics. Poisson's and Laplace's equations. Ferro-magnetism. Maxwell's equations and application to waves in isotropic dielectrics. Poynting vector.

TEXTBOOK
Lorrain, P. & Corson, D. *Electromagnetic Fields and Waves.* 2nd ed. Freeman.

1.122B Quantum Physics

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, 1961.

PRINCIPAL REFERENCE BOOKS
Mermin, N. D. *Space and Time in Relativity.* McGraw-Hill, 1968.
Resnick, R. *Introduction to Special Relativity.* Wiley, 1968.

1.122C Thermodynamics and Mechanics

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.

Note: 1.122A, B and C are units of Higher Physics II and the prerequisite is normally 1.011 Physics.

TEXTBOOKS

Mandl, F. *Statistical Physics.* Wiley.
Symon, K. R. *Mechanics.* 2nd ed. Addison-Wesley, 1965.

PRINCIPAL REFERENCE BOOKS

Crawford, F. S. *Waves.* (Berkley Physics. Vol. III). McGraw-Hill.
Goldstein, H. *Classical Mechanics.* Addison-Wesley.
Reif, F. *Fundamentals of Statistical and Thermal Physics.* McGraw-Hill.
Speigel, M. R. *Theoretical Physics.* Schaum.

1.212 Physics IIT

Any two of the following half-units: 1.212A, 1.212B, 1.212C.

1.212A Geometrical Optics

Reflection, Refraction. Thin and thick lenses and lens systems. Instruments and their aberrations. Photometry.

TEXTBOOK

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

1.212B Electronics

Vacuum tubes and applications. Conduction in solids; solid state diodes, transistors, amplifiers, feed back.

TEXTBOOK

Smith, R. J. *Circuits, Devices and Systems.* 2nd ed. Wiley, 1972.

1.212C Introduction to Solids

Introductory quantum mechanics and atomic physics; crystal structure; point and line defects; introductory band theory; conductors, semiconductor and insulators; energy level diagrams.

TEXTBOOK

Rudden, M. N. & Wilson, J. *A Simplified Approach to Solid State Physics.* Butterworths, 1971.

Physics Level III Units

1.113A Wave Mechanics and Spectroscopy

Concepts, harmonic oscillator, uncertainty principle, the free particle, barriers, the hydrogen atom, many electron atoms, removal of degeneracy, spectroscopy, molecules, periodic potentials, band structure, perturbations.

TEXTBOOK

Beiser, A. *Perspectives of Modern Physics*. McGraw-Hill.

1.113B Electromagnetic Fields and Physical Optics

Wave equation; propagation in dielectrics and ionized media; reflection and transmission; guided waves; coherence of radiation; interaction of radiation with matter; stimulated emission; laser oscillators; properties of laserlight; interferometry; diffraction; convolution theorem X-ray and neutron diffraction.

TEXTBOOK

Lipson, H. & S. S. *Optical Physics*. C.U.P., 1969.

1.113C Statistical Mechanics and Solid State

Thermodynamic potentials, ensembles and partition functions, lattice vibrations, the grand canonical ensemble, Pauli exclusion principle, Bose-Einstein and Fermi-Dirac distributions.

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

TEXTBOOKS

Blakemore, J. S. *Solid State Physics*. Saunders, 1969.
Jackson, E. A. *Equilibrium Statistical Mechanics*. Prentice-Hall, 1968.
Mandl, F. *Statistical Physics*. Wiley, 1971.

1.113D Astrophysics and Nuclear Physics

The observational environment, optical astronomy, radio astronomy, X-ray astronomy, stellar evolution, radio sources, the sun.

Detecting instruments and accelerators for nuclear particles, 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

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

Schiff, L. I. *Quantum Mechanics.* 3rd ed. McGraw-Hill.

1.123B Electromagnetic Theory and Statistical Mechanics

Metallic boundary conditions, eigenfunctions and eigenvalues, cavities, wave guides, scattering by a conductor, wave equation for potentials, radiation fields, Hertz potential, dipole and 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, 1965.

PRINCIPAL REFERENCE BOOK

Knox, J. H. *Molecular Thermodynamics.* Wiley.

1.123C Solid State and Nuclear Physics

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.* Longmans, 1963.
Kittel, C. *Introduction to Solid State Physics.* 4th ed. Wiley.

1.123D Atomic Physics and Spectroscopy

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, 1964.

Physics Level III Supplementary Units

1.133A Electronics

A.C. circuit analysis, band theory of semiconductors, diode, field effect transistor, rectifier circuits, power supplies, single and multistage amplifiers, positive feedback, oscillators.

TEXTBOOKS

Delaney, C. F. G. *Electronics for the Physicist*. Penguin, 1969.
Russell, G. J. & Mann, K. *Alternating Current Circuit Theory*. N.S.W.U.P.
Transistor Manual. General Electric Co.

PRINCIPAL REFERENCE BOOK

Brophy, J. J. *Basic Electronics for Scientists*. McGraw-Hill.

1.143A Biophysics

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, 1962.

1.143B Solid State Devices and Electronics

(Syllabus follows on from 1.133A which is a prerequisite.)

Generalized amplifiers, negative feedback, special amplifiers, regulated power supplies, modulation, pulse circuits, silicon-controlled rectifier circuits, instruments.

TEXTBOOKS

Gibbons, J. F. *Semiconductor Electronics*. McGraw-Hill, 1966.
S.C.R. Handbook. General Electric Co.

1.143D Conceptual Framework of Physics

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.

TEXTBOOK

No set text.

1.143E Electrical and Optical Properties of Solids

Equilibrium properties of semiconductors and insulators, conductivity, excess carriers, flow equations, contact barriers; luminescence, relaxation phenomena.

TEXTBOOKS

Adler, R. B., Smith, A. C. & Longini, L. D. *Introduction to Semiconductor Physics.* Wiley, 1964.

Blakemore, J. S. *Solid State Physics.* Saunders, 1969.

Gray, P. E., De Witt, D., Boothroyd, A. R. & Gibbons, J. F. *Physical Electronics and Circuit Models of Transistors.* Wiley.

1.143F Marine Acoustic and Seismic Methods (Oceanography Unit)

Prerequisite: 10.211A *or* 10.221A *or* 10.031.

Cave 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

No set text.

PRINCIPAL REFERENCE BOOKS

Ewing, W. M., Jardetzky, W. S. & Press, F. *Elastic Waves in Layered Media.* McGraw-Hill, 1957.

Officer, C. B. *Introduction to the Theory of Sound Transmission.* McGraw-Hill, 1958.

Redwood, M. *Mechanical Waveguides.* Pergamon, 1960.

Physics Higher Level III Supplementary Units

1.153B Relativity and Electromagnetism

Scalars and vectors in non-Cartesian frames. Principle of relativity and signal propagation. Space-time. Four-vectors. Mass-energy. Four-momentum. Electromagnetic field equations. Gauges. Wave equation. Solutions. Introductory tensors. Field tensor. Stress tensor. Four-momentum of free field. Moving charges. Electromagnetic mass.

TEXTBOOK

No set text.

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.

Quantum Mechanics
TEXTBOOK
Schiff, L. F. *Quantum Mechanics.* 3rd ed. McGraw-Hill, 1968.

Solid State Physics
TEXTBOOK
   To be approved.

Nuclear and Atomic Physics.
TEXTBOOK
   To be approved.

Statistical Mechanics
TEXTBOOK
   To be approved.

Supplementary Courses
   To be arranged with the Director of Fourth Year.

SCHOOL OF PHYSIOLOGY
AND PHARMACOLOGY

Courses in physiology for students in the Science Course were commenced in 1963. During the second and third years of their BSc course, students may take Principles of Physiology and Physiology II. Students reaching an adequate standard in these subjects may proceed to a BSc degree with honours during the fourth year of the course.

For details of level, unit value, when offered, hours per week, pre-requisites and co-requisites, see page 92.

73.011A Principles of Physiology

An introductory course in physiology. It considers in some detail the basic problems of homeostasis encountered in man and animals. Function is considered at cellular and systemic levels, and examples are drawn from mammalian and invertebrate species.

TEXTBOOK

Vander, A. J., Sherman, J. H. & Luciano, D. S. *Human Physiology*. McGraw-Hill, 1970. ($12.50).

73.012 Physiology II

An advanced course in the principles of physiology, centred on several major areas: circulation, respiration, membrane biophysics, neurophysiology, endocrinology, and reproduction.

TEXTBOOKS

Lists given from time to time.

The course consists of lectures, tutorials, seminars and laboratory work. On some occasions students may be required to attend at other times for the maintenance and treatment of experimental animals.

SCHOOL OF 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 Clause 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 on pages 79-80.

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.

12.001 Psychology I

An introduction to the content and methods of psychology as a behavioural science, with special emphasis on (a) the biological and social bases of behaviour, (b) learning, and (c) individual differences.

The course includes training in methods of psychological enquiry, and the use of elementary statistical procedures.

TEXTBOOKS

Part A: Theory

C.R.M. *Psychology Today*. 2nd ed. C.R.M., 1972.
Mednick, S. A., Pollio, H. R. & Loftus, E. F. *Learning*. 2nd ed. Prentice-Hall, 1973.
Kelly, E. L. *Assessment of Human Characteristics*. Brooks-Cole, 1967.
Selected *Scientific American* reprints, as advised by the School.

Recommended as an additional text for intending honours students:
Hebb, D. O. *Textbook of Psychology*. 3rd ed. Saunders, 1972.

Part B: Practical
Lumsden, J. *Elementary Statistical Method*. Univ. of W.A. Press, 1969.

12.004 Psychology IV

Psychology IV in the BSc (Psychology) course. A program of selected study from the School's Advanced Electives. 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 (e.g., clinical, industrial, educational psychology) or in research.

TEXTBOOKS

To be determined in consultation with Head of School.

12.042 Psychology IIA

(BSc Psychology students only.)

Observational methods and laboratory instrumentation in applied psychology.

TEXT AND PRINCIPAL REFERENCE BOOKS

Part A: Laboratory Instrumentation III

As for 12.733.

Part B: Psychological Assessment (Testing) IIIA

As for 12.373.

12.052 Basic Psychological Processes II

Basic phenomena of learning, perception and motivation. Biological bases of behaviour. Students will select two areas within this unit for concentration of study.

TEXTBOOKS

Learning

Rachlin, H. *Introduction to Modern Behaviorism*. Freeman, 1970.

The following is recommended as a *Principal Reference Book:*
Nevin, J. A. *The Study of Behavior*. Scott, Foresman, 1973.

Perception

Haber, R. N. & Hershenson, M. *The Psychology of Visual Perception*. Holt, Rinehart & Winston, 1973.

For students not intending to proceed to further courses in Perception, an alternative textbook is:

Hochberg, J. E. *Perception*. Prentice-Hall, 1964.

or

Weintraub, D. J. & Walker, E. L. *Perception*. (Basic Concepts in Psycology Series). Brooks, Cole, 1966.

Physiological Psychology

Selected readings in Physiological Psychology will be announced at the beginning of the course.

12.062 Complex Psychological Processes II

Information processing and cognitive functioning. Developmental influences on individual and group behaviour. Social bases of behaviour. Psycholinguistics. Students select two areas within this unit for concentration of study.

TEXTBOOKS

Cognition and Language
Lindsay, P. H. & Norman, D. A. *Human Information Processing.* Academic, 1972.

Developmental Psychology
Liebert, R. M., Paulos, R. W. & Strauss, G. D. *Developmental Psychology.* Prentice-Hall, 1974.

Social Psychology
` Textbook to be advised on School Notice Boards.

PRINCIPAL REFERENCE BOOK
Higgin, G. *Symptoms of Tomorrow.* Plume/Ward Lock, 1973.

12.152 Research Methods II

General introduction to the design and analysis of experiments; hypothesis testing, estimation, power analysis; general treatment of simple univariate procedures; correlation and regression.

TEXTBOOKS
Anderson, B. F. *The Psychology Experiment: An Introduction to Scientific Method.* 2nd ed. Brooks/Cole, Belmont, California, 1971.
Welkowitz, J., Ewen, R. B. & Cohen, J. *Introductory Statistics for the Behavioral Sciences.* Academic, 1971.

PRINCIPAL REFERENCE BOOKS
Bachrach, A. J. *Psychological Research: An Introduction.* 3rd ed. Random House, 1972.
Hays, W. L. *Statistics.* Holt Int. Ed. Holt, Rinehart & Winston, 1969.
Lumsden, J. *Elementary Statistical Method.* Univ. of W.A. Press, 1969.
McGuigan, F. J. *Experimental Psychology: A Methodological Approach.* 2nd ed. Prentice-Hall, 1968.
Underwood, B. J. *Psychological Research.* Appleton-Century-Crofts, 1957.

12.153 Research Methods IIIA

Introduction to analysis of variance—one way and complete factorial designs. Elementary Fortran programming, emphasizing editing of data for use in package programmes.

TEXTBOOKS
Hays, W. L. *Statistics.* International ed. Holt, Rinehart & Winston, 1969.
and either
Blatt, J. M. *Introduction to Fortran IV Programming: Using the Watfor Computer.* Goodyear Pub. Coy, 1968 (or later).
or
Lee, R. M. *A Short Course in Fortran IV Programming.* McGraw-Hill, 1967.

12.163 Research Methods IIIB

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, 1969.
Lieberman, B. *Contemporary Problems in Statistics*. O.U.P., 1971.

PRINCIPAL REFERENCE BOOKS

Nunnally, J. *Psychometric Theory*. McGraw-Hill, 1967.
Winer, B. J. *Statistical Principles in Experimental Design*. McGraw-Hill, 1962.

12.253 Learning IIIA

Current experimental and theoretical problems in learning; classical and operant conditioning; reinforcement issues.

TEXT AND PRINCIPAL REFERENCE BOOKS

To be announced before the commencement of classes.

12.263 Learning IIIB

Human learning processes. Biochemistry of learning, and aversive control of behaviour.

TEXT AND PRINCIPAL REFERENCE BOOKS

To be announced before the commencement of classes.

12.303 Personality IIIA

The development and structure of personality, with reference to biological and social determinants. Problems of theory and measurement.

PRINCIPAL REFERENCE BOOKS

Bischof, L. J. *Adult Psychology*. Harper & Row, 1969.
Lidz, T. *The Person—His Development Throughout the Life Cycle*. Basic Books, 1968.
Mischel, W. *Personality and Assessment*. Wiley, 1968.
Sarnoff, I. *Personality Dynamics and Development*. Wiley, 1962.
Watson, R. I. *The Psychology of the Child*. 2nd ed. Wiley, 1962.

12.313 Personality IIIB*

The psychology of interpersonal relationships and transactions. Techniques of interpersonal influence.

12.323 Motivation IIIA

A study of the conditions governing the arousal and direction of behavioural sequences, with particular reference to the social determinants of the goals of behaviour.

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* Not offered in 1975.

TEXTBOOKS
Cofer, C. N. *Motivation and Emotion*. Scott, Foresman, 1972.
Russell, W. A. ed. *Milestones in Motivation: Contribution to the Psychology of Drive and Purpose*. Appleton-Century-Crofts, 1970.

12.373 Psychological Assessment (Testing) IIIA

Principles and techniques of psychological assessment. Types of tests and their application in selection and allocation procedures.

TEXTBOOK
Anastasi, A. *Psychological Testing*. Macmillan, 1968.

PRINCIPAL REFERENCE BOOKS
Cronbach, L. J. *Essentials of Psychological Testing*. 3rd ed. Harper, 1970.
Helmstadter, G. C. *Principles of Psychological Measurement*. Appleton, 1964.
Miller, D. M. *Interpreting Test Scores*. Wiley, 1972.
Nunnally, J. C. *Introduction to Psychological Measurement*. McGraw-Hill, 1970.
Tyler, L. E. *Tests and Measurements*. Prentice-Hall, 1971.
Vernon, P. E. *The Structure of Human Abilities*. Methuen, 1961.

12.402 Physiological Psychology

(BSc Psychology students only.)

Elementary neurophysiology and neuroanatomy. Neural and endocrine bases of sensory and motor processes and motivation and emotion (feeding, aggression, and sexual behaviour). Physiological bases of learning; psychophysiology of selected psychological states such as stress, sleep, and relaxation; genetics and behaviour; brain neurotransmitters and behaviour.

TEXTBOOK
Milner, P. M. *Physiological Psychology*. Holt, 1970.

PRINCIPAL REFERENCE BOOK
Thompson, R. *Foundations of Physiological Psychology*. Harper, 1967.

12.413 Physiological Psychology IIIA

Elementary neurophysiology and neuroanatomy. Neural and endocrine bases of sensory and motor processes and motivation and emotion (feeding, aggression, and sexual behaviour).

TEXT AND PRINCIPAL REFERENCE BOOKS
As for 12.402 Physiological Psychology.

12.423 Physiological Psychology IIIB

Physiological bases of learning; psychophysiology of selected psychological states such as stress, sleep and relaxation; genetics and behaviour; brain neurotransmitters and behaviour.

TEXT AND PRINCIPAL REFERENCE BOOKS
As for 12.402.

12.453 Human Information Processing IIIA

A study of 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 perception and storage of verbal information. Topics include attention, vigilance, discrimination, memory and retrieval.

TEXTBOOKS

McNicol, D. *A Primer of Signal Detection Theory*. Allen & Unwin, 1971.
Norman, D. *Memory and Attention*. Wiley, 1969.

PRINCIPAL REFERENCE BOOKS

Annett, J. *Feedback and Human Behaviour*. Penguin, 1969.
Mackworth, J. F. *Vigilance and Habituation*. Penguin, 1969.
Mackworth, J. F. *Vigilance and Attention*. Penguin, 1970.
Moray, N. *Listening and Attention*. Penguin, 1969.
Neisser, U. *Cognitive Psychology*. Appleton-Century-Crofts, 1967.

12.473 Perception IIIA

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.

TEXTBOOK

Haber, R. N. & Hershenson, M. *The Psychology of Visual Perception*. Holt, Rinehart & Winston, 1973.

PRINCIPAL REFERENCE BOOK

Kling, J. W. & Riggs, L. A. eds. *Woodworth and Schlosberg's Experimental Psychology*. Holt, Rinehart & Winston, 1971.

12.483 Perception IIIB

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, 1973.

PRINCIPAL REFERENCE BOOK

Howard, I. P. & Templeton, W. B. *Human Spatial Orientation*. Wiley, 1966.

12.503 Social Psychology IIIA

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.

TEXTBOOKS

Aronson, E. *The Social Animal*. Freeman, 1972.
Proshansky, H. M., Ittelson, W. H. & Rivlin, L. G. eds. *Environmental Psychology: Man and his Physical Setting*. Holt, Rinehart & Winston, 1970.

12.513 Social Psychology IIIB

For subject description, textbooks and principal reference books 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

Kennedy, W. A. *Child Psychology*. Prentice-Hall, 1971.

Liebert, R. M., Poulos, R. W. & Strauss, G. D. *Developmental Psychology*. Prentice-Hall, 1974.

Telford, C. W. & Sawrey. *The Exceptional Individual*. Prentice-Hall, 1967.

12.603 Abnormal Psychology IIIA

Conflict, anxiety and avoidance behaviour. Anti-social behaviour, psychosomatic disorders, brain pathology, mental deficiency, schizophrenia, depression, methods of diagnosis and treatment.

TEXTBOOK

Rosen, E., Fox, R. & Gregory, I. *Abnormal Psychology*. 2nd ed. Saunders, 1972.

PRINCIPAL REFERENCE BOOKS

Buss, A. H. *Psychopathology*. Wiley, 1966.

Costello, C. G. ed. *Symptoms of Psychopathology*. Wiley, 1960.

Eysenck, H. J. ed. *Handbook of Abnormal Psychology*. 2nd ed. Pitman, 1973.

Maher, B. A. *Principles of Psychopathology*. McGraw-Hill, 1966.

Maher, B. A. ed. *Contemporary Abnormal Psychology* (selected readings). Penguin, 1973.

Spielberger, C. D. ed. *Anxiety: Current Trends in Theory and Research*. Vols. I & II. Academic, 1972.

12.613 Abnormal Psychology IIIB

Techniques and findings of experimental psychopathology. Measurement and assessment problems relating to description and prediction in the field of abnormal behaviour. Evaluation of treatment and intervention programmes.

TEXTBOOK

Hammer, M., Salzinger, K. & Sutton, S. eds. *Psychopathology. Contributions from Social Behavioural and Biological Sciences*. Wiley, 1972.

PRINCIPAL REFERENCE BOOKS

Millon, T. & Diesenhaus, H. I. *Research Methods in Psychopathology*. Wiley, 1972.

Sarason, I. G. & Sarason, B. R. eds. *Readings in Abnormal Psychology*. Meredith, 1972.

12.623 Guidance and Counselling III

The application of Psychological Tests and other techniques of appraisal to educational and vocational selection and guidance. Advice, and other procedures used to assist client decision making.

TEXTBOOK

Tyler, L. *The Work of the Counsellor*. Appleton, 1961.

PRINCIPAL REFERENCE BOOKS

Carkhuff, R. R. & Berenson, B. G. *Beyond Counselling and Therapy*. Holt, Rinehart & Winston, 1967.

Carkhuff, R. R. *Helping and Human Relations*. Vol. I. *Selection and Training*. Holt, Rinehart & Winston, 1969.

Carkhuff, R. R. *Helping and Human Relations*. Vol. II. *Practice and Research*. Holt, Rinehart & Winston, 1969.

Carkhuff, R. R. *The Development of Human Resources*. Holt, Rinehart & Winston, 1971.

12.653 Industrial Psychology III

The role of the psychologist in industry. Social, psychological and physical conditions affecting work behaviour. Selected aspects of human factors engineering and of human and industrial relations.

TEXTBOOKS

Lupton, T. *Management and the Social Sciences*. Penguin, 1971.
McFarland, D. ed. *Personnel Management*. Penguin, 1970.

PRINCIPAL REFERENCE BOOKS

Brown, J. A. C. *Social Psychology of Industry*. Penguin, 1956.
Mills, D. ed. *Australian Management and Society, 1970-85*. Penguin, 1970.

12.663 Ergonomics III

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.

TEXTBOOK

Singleton, W. T. *Introduction to Ergonomics*. W.H.O., 1972.

PRINCIPAL REFERENCE BOOKS

Grandjean, E. *Fitting the Task to the Man*. Taylor & Francis, 1969.
McCormick, E. J. *Human Factors Engineering*. McGraw-Hill, 1970.
Edholm, O. G. *The Biology of Work*. World University Library, 1967.
Introduction to Work Study. International Labour Office, 1969.
Howell, W. C. & Goldstein, I. L. *Engineering Psychology: Current Perspectives in Research*. Appleton-Century-Crofts, 1971.

12.703 Psychological Techniques III

Laboratory techniques, including the use of recording stimulating, and control equipment. Observation, and other forms of appraisal.

PRINCIPAL REFERENCE BOOKS

Bradford, L. P., Gibb, J. R. & Benne, K. D. eds. *T-Group Theory and Laboratory Method*. Wiley, 1964.

Cooper, C. L. & Mangham, I. L. eds. *T-groups: A Survey of Research*. Wiley, 1971.

Egan, G. ed. *Encounter Groups: Basic Readings*. Wadsworth, 1971.

Gorden, R. L. *Interviewing: Strategy, Techniques and Tactics*. Dorsey, Illinois, 1969.

Kleinmuntz, B. *Personality Measurement*. Dorsey, 1967.

Shouksmith, G. *Assessment Through Interviewing*. Pergamon, 1968.

Webb, E. J., Campbell, D. T., Schwartz, R. D. & Seechrest, L. *Unobstrusive Measures: Non-reactive Research in the Social Sciences*. Rand McNally, 1966.

12.713 Behaviour Control and Modification III

Aversive and appetitive reinforcement in the control and modification of undesirable behaviour. The conditions of attitude change and behavioural influence. Ethical Issues.

TEXTBOOKS

To be advised before the commencement of classes.

12.733 Laboratory Instrumentation III

Use of laboratory equipment, and experimental techniques in Psychology. Care of laboratory animals. Basic electricity and elementary circuit design. Use of polygraphs for physiological recording. Audio and visual perception equipment, and techniques for manipulating auditory and visual factors in experiments.

PRINCIPAL REFERENCE BOOK

Sidowski, J. B. *Experimental Methods and Instrumentation in Psychology*. McGraw-Hill, 1966.

12.741 Psychology (Optometry)

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, 1973.

Part B: Abnormal Psychology

Coleman, J. C. *Abnormal Psychology and Modern Life*. 4th ed. Scott, Foresman, 1971.

SCHOOL OF ZOOLOGY

The School provides undergraduate courses in Zoology and Entomology taught as part of a Unit pattern. The School offers ten units of Zoology and four units of Entomology. All courses leading to a Science degree in Zoology are dependent on an adequate background in Biochemistry and Biometry. The units offered place an emphasis on experimental Animal Physiology, experimental and applied Entomology and an ecological approach to Marine Science.

Graduates at the bachelor level may find employment in scientific and technical departments of various State and Commonwealth organizations, in certain industries and in teaching. Students intending to pursue research careers in any of the various branches of Zoology are urged to complete the requirements for Honours, Master's or Doctor's degrees.

Courses in Zoology are taught mainly in the lecture theatres and laboratories, but field work, including field camps and excursions, is an essential part of all courses. To this end, the School maintains an undergraduate teaching Field Station at Smith's Lake, where compulsory courses are taught during vacations. The animal physiology teaching is strongly oriented towards Australian invertebrate and vertebrate animals, and the School has interests in field stations at which marsupials are studied.

For details of level, unit value, when offered, hours per week, prerequisites and co-requisites, see pages 84-85.

HONOURS IN ZOOLOGY OR ENTOMOLOGY

Students must receive permission of the Head of School before proceeding to Honours. Generally speaking they should have completed all subjects or units required for a Bachelor's degree and have achieved a consistently high standard in relevant units offered by the School of Zoology.

45.101 Biometry

An introduction to 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. Introduction to 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.

PRINCIPAL REFERENCE BOOKS

Rohlf, F. J. & Sokal, R. R. *Statistical Tables*. Freeman, 1969.
Sokal, R. R. & Rohlf, F. J. *Biometry*. Freeman, 1969.
Siegel, S. *Nonparametric Statistics*. McGraw-Hill, 1956.

45.201 Invertebrate Zoology

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. O.U.P., 1972.
Sherman, I. W. & Sherman, V. G. *The Invertebrates: Function and Form. A Laboratory Guide.* Collier-Macmillan, 1970.

PRINCIPAL REFERENCE BOOKS

Al-Hussaini, A. H. & Demian, E. J. *Practical Animal Morphology.* MacMillan, 1967.
Barnes, R. D. *Invertebrate Zoology.* Saunders, 1968.
Fraenkel, G. S. & Gunn, D. L. *Orientation of Animals.* Dover, 1961.
Hyman, L. *The Invertebrata.* Vols. 1-6. McGraw-Hill.
Imms, A. D. *Textbook of Entomology.* Methuen, 1962.
MacGinitie, G. E. & MacGinitie, N. *Natural History of Marine Animals.* McGraw-Hill, 1968.
Nicol, J. A. C. *The Biology of Marine Animals.* Pitman, 1967.
Prosser, C. L. & Brown, F. A. *Comparative Animal Physiology.* Saunders, 1961.
Wilbur, K. & Yonge, C. M. *Physiology of a Mollusc.* Vols. 1 & 2. Academic, 1966.

45.301 Vertebrate Zoology

A comparative study of the Chordata. Morphology, systematics, evolution, 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 Structures.* Wiley, 1974.
Romer, A. S. *The Vertebrate Story.* 4th ed. Chicago U.P., 1959. (Sixth Impression 1971.)

PRINCIPAL REFERENCE BOOKS

Bellairs, A. *The Life of Reptiles.* Vols. 1 & 2. Weidenfeld & Nicolson Natural History, 1969.
Kurten, B. *The Age of the Dinosaurs.* Weidenfeld & Nicolson, 1968.
Marshall, A. J. *Biology and Comparative Physiology of the Birds.* Vols. 1 & 2. Academic, 1960-1961.
Saunders, J. T. & Manton, S. M. *A Manual of Vertebrate Morphology.* 4th ed. O.U.P., 1969.
Walker, E. P. *Mammals of the World.* 2nd ed. Johns Hopkins U.P., 1968.
Wessells, N. K. *Vertebrate Structure and Functions.* Readings from Scientific American. Freeman, 1974.
Young, J. Z. *The Life of Mammals.* Clarendon, 1957.
Young, J. Z. *The Life of the Vertebrates.* O.U.P., 1958.

45.111 Field Ecology

A lecture series on the basic principles of ecology followed by an examination and evaluation of the field methods used to measure the environment and the distribution and abundance of organisms.

TEXTBOOK

Southwood, T. R. E. *Ecological Methods.* Methuen, 1966.

This unit is offered as a lecture series (two per week) and a two-week camp in November/December at the University's Smith's Lake Field Station.

45.112 Marine Ecology

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, 1972.

PRINCIPAL REFERENCE BOOKS

McConnaughey, Bayard H. *Introduction to Marine Biology*. The C. V. Mosby Co., 1970.

Moore, H. B. *Marine Ecology*. Wiley, 1958.

Newell, R. C. *Biology of Intertidal Animals*. Elek, 1970.

Pickard, G. L. *Descriptive Physical Oceanography*. Pergamon, 1963.

Winberg, G. G. *Methods for the Estimation of Production of Aquatic Animals*. Academic, 1971.

45.122 Animal Behaviour

An introduction to Ethology, the biological study of behaviour. Physiological, ecological, developmental and evolutionary aspects of behaviour of vertebrates and invertebrates 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, 1972.

PRINCIPAL REFERENCE BOOKS

Aronson, L., Tobach, E., Lehrman, D. S. & Rosenblatt, J. S. *Development and Evolution of Behaviour*. Freeman, 1970.

Crook, J. H. *Social Behaviour in Birds and Mammals*. Academic, 1970.

Hinde, R. A. *Animal Behaviour*. McGraw-Hill, 1970.

Hinde, R. A. ed. *Bird Vocalization*. C.U.P., 1970.

Klopfer, P. H. *Habitats and Territories*. Basic Books, 1969.

Marler, P. & Hamilton, W. J. *Mechanisms of Animal Behaviour*. Wiley, 1966.

Sluckin, W. J. *Early Learning in Animals and Man*. Allen & Unwin, 1969.

45.132 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, 1972.

Wessells, N. K. *Vertebrate Structure and Functions*. Readings from Scientific American. Freeman, 1974.

PRINCIPAL REFERENCE BOOKS
Hoar, W. S. *General and Comparative Physiology*. Prentice-Hall, 1966.
Tyndale-Biscoe, H. *Life of Marsupials*. Arnold, 1973.

45.142 Developmental and Reproductive Biology

A survey of reproductive mechanisms, reproductive histology, reproductive endocrinology, and embryology, with particular reference to the comparative aspects in vertebrate species. A detailed treatment of marsupial and monotreme reproduction.

TEXTBOOKS
Gilchrist, F. G. *A Survey of Embryology*. McGraw-Hill, 1968.
Nalbandov, A. V. *Reproductive Physiology*. Freeman, 1964.

PRINCIPAL REFERENCE BOOK
Tyndale-Biscoe, H. *Life of Marsupials*. Arnold, 1973.

45.202 Advanced Invertebrate Zoology

A comparative approach to the structure and function of invertebrate animals, including the foundations of animal life, its origin, organization, adaptation and evolution. Emphasis is placed on movement, nervous and chemical co-ordination, metabolism and animal associations.

TEXTBOOK
Barrington, E. J. W. *Invertebrate Structure and Function*. Nelson, 1967.

PRINCIPAL REFERENCE BOOKS
Florey, E. *An Introduction to General and Comparative Animal Physiology*. Saunders, 1966.
Gardiner, M. S. *The Biology of Invertebrates*. McGraw-Hill, 1972.
Hoar, W. S. *General and Comparative Physiology*. Prentice-Hall, 1966.
Hyman, L. *The Invertebrata*. Vols. 1-6. McGraw-Hill.
Newell, R. C. *Biology of Intertidal Animals*. Elek, 1970.

45.302 Vertebrate Zoogeography

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
Cain, A. J. *Animal Species and Their Evolution*. 3rd ed. Hutchinson's University Library, 1971.

PRINCIPAL REFERENCE BOOKS
Darlington, P. J. *Zoogeography: the Geographical Distribution of Animals*. Wiley, 1957.
Darlington, P. J. *Biogeography of the Southern End of the World*. Harvard U.P., 1965.
Keast, A., Erk, F. C. & Glass, B. *Evolution, Mammals and Southern Continents*. State Univ. of N.Y. Press, 1972.
Tyndale-Biscoe, H. *Life of Marsupials*. Arnold, 1973.

45.402 Insect Structure and Classification

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, etc. Field excursions as arranged.

TEXTBOOK

C.S.I.R.O. *The Insects of Australia.* M.U.P., 1969.

PRINCIPAL REFERENCE BOOKS

Guthrie, E. M. & Tindall, A. R. *The Cockroach.* Arnold.
Imms, A. D. *Textbook of Entomology.* Methuen.
Ross, H. H. *Textbook of Entomology.* Wiley.
Snodgrass, R. E. *Principles of Insect Morphology.* McGraw-Hill.

45.412 Insect Physiology

A study of 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., 1969.

PRINCIPAL REFERENCE BOOKS

Beck, S. D. *Insect Photoperiodism.* Academic.
Dethier, V. G. *The Physiology of Insect Senses.* Methuen.
Highnam, K. C. & Hill, L. *The Comparative Endocrinology of the Invertebrates.* Arnold.
Roeder, K. D. *Nerve Cells and Insect Behaviour.* Harvard U.P.
Wigglesworth, V. B. *Principles of Insect Physiology.* Methuen.

45.422 Applied Entomology

Fundamentals of insect control. Pest species and types of damage caused. Control by insecticides, physical and biological means. Insect toxicology. Insecticide resistance. Practical work to illustrate the above and also various aspects of bioassay in Entomology. Field excursions as arranged.

TEXTBOOK

Woods, A. *Pest Control: A Survey.* McGraw-Hill, 1974.

45.432 Project

Detailed studies of selected aspects of insect physiology; ecology and toxicology. Treatment of topics will be in depth rather than breadth. Practical work will illustrate the lectures and will place emphasis on design and planning of experiments.

PRINCIPAL REFERENCE BOOKS

Beament, J. W. L., Treherne, J. E. & Wigglesworth, V. B. eds. *Advances in Insect Physiology.* Academic.
Bunning, E. *The Physiological Clock.* Springer Verlag.
Dethier, V. G. *To Know a Fly.* Holden-Day.
Johanssen, O. A. & Butt, F. H. *Embryology of Insects & Myriopods.* McGraw-Hill.
Lees, A. D. *Diapause in Arthropods.* C.U.P.

The Deputy Registrar (Student Services), Mr. P. O'Brien, is located on the first floor of the Chancellery. See Mr. O'Brien or Mr. S. Briand for matters relating to *financial problems* (he may be able to arrange a loan). 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* contact Mr. J. Grigg (Phone 2143). This section can also advise on matters relating to *discontinuation of subjects* and *termination of courses.*

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 2485.

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.

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. Library enquiries should be directed to 2649.

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

This Handbook has been specially designed as a source of reference for you and will prove useful for consultation throughout the year at this University.

For fuller details about the University— its organization, staff membership, description of courses and so on, you should consult the University Calendar.

Separate Handbooks are published for the Faculties of Applied Science, Architecture, Arts, Commerce, Engineering, Law, Medicine, Professional Studies, Science (including Biological Sciences) and the Board of General Studies.

The Calendar and Handbooks are available from the Cashier's Office. The Calendar costs $3 (hard cover) and $2.50 (soft cover) (plus postage and packing, 90 cents). The Handbooks vary in cost between one dollar and $1.50 (plus 20 cents postage), with the exception of General Studies, which is available free of charge.